



SLOVAK ACADEMY OF SCIENCES  
ANNUAL REPORT  
2024

PART I



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In compliance with § 9 Section 5 c) thereof, the Scientific Council of Slovak Academy of Sciences endorsed the Annual Report on 14. 5. 2025.

The Government of the Slovak Republic took note at its 91st meeting on 28. 5. 2025.

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The Annual Report is accompanied by Appendices included in Part 2.



# 1 SAS SCIENCE POLICY AND SUPPORT OF RESEARCH PROJECTS

## 1.1 Key measures of the SAS Science Policy

One of the key support measures aimed at developing and improving research at the SAS in 2024 was the introduction of a performance contract incentive program. The support of science, research and innovation in Slovakia is known to be insufficient in the long term compared to the European Research Areas (ERA), but also to surrounding countries. The National Strategy for Research, Development and Innovation 2030 brought an improvement in this regard when it introduced a system of so-called performance contracts in the higher education sector and at SAS. These contracts will ensure an increase in the budget based on the adopted performance parameters that the research organizations shall meet within the next three years. The SAS will receive EUR 12.5 million in 2024, EUR 15.4 million in 2025 and EUR 25.3 million in 2026 in addition to its budget for the above purpose. The condition for obtaining these resources is to strengthen the current performance financing of SAS public research institutions, taking into account the results of the nationwide verification of excellence in research (VER – Verification of Excellence in Research), develop a special system of research parameters and conclude performance contracts between the founder (SAS) and 45 public research institutions. The principles of the performance contract system were approved by the SAS Assembly and the Research and Innovation Authority of the Government Office SR. SAS contracts with individual public research institutions were concluded in August 2024.

The funds provided to the SAS within the framework of performance contracts will be redistributed among the sub-programs focused on further development and improvement of the quality of outputs and independent scientific work, as well as all activities for the benefit of society and the SAS. Three sub-programmes are aimed at the development of infrastructure at the institutional level (social sciences pavilion, modernization of existing and addition of new (shared) infrastructure for excellent research), on supporting the strategic priorities of the SAS (integration of smaller institutes, restructuring of public research institutions, young talents, submission of significant projects, transfer of knowledge and protection of intellectual property) and, above all, on improving the quality and supporting the strategic priorities of SAS public research institutions through individual performance contracts.

SAS has created an original system of parameters for public research institutions in four thematic areas with indicators: excellent research (significant publication outputs, significant patents and other outputs, significant grants, significant contractual research), quality research environment (doctoral studies, postdoctoral job positions, internationalization of the research environment, age balance and gender equality), societal impact (popularization

outputs, citizen science, education, normative role), quality management (strategy and action plan, human resources, reporting and regulation, management structures).

Each public research institution selected indicators from the four thematic areas mentioned above. For the selected indicators, each public research institution received a performance reference value for the previous period and an expected improvement (change) of each indicator by the end of 2026. The selection of indicators reflects those areas in which the respective public research institution has the most significant room for improvement. The basic starting point is the evaluation of the international panel during the last Regular Evaluation of SAS Research Institutes and the reflection of this evaluation by the public research institution. Three evaluation panels were established for the negotiation and evaluation of performance contracts with individual public research institutions, one for each scientific section. The task of the panels was to negotiate performance contracts with public research institutions and subsequently monitor and evaluate the fulfilment of performance contract indicators. Each panel consists of the SAS Vice-President for the relevant scientific section, another member of the SAS Presidium for the relevant scientific section, a foreign expert, a VAIA representative and an SAS employee entrusted with the agenda of performance contracts. In the event of failure to meet some of the indicators, the funding of the relevant public research institution from performance contracts in the period 2027–2030 will be reduced proportionally according to the scale of the relevant unmet indicator.

In 2023, the SAS International Advisory Board was created based on the panels and metapanel of the last accreditation evaluation of SAS scientific institutions (2022-2023), which cooperated with the management of the SAS and its institutions in 2024 as well. The Board consists of the following members: Wim van der Doel, Leiden-Delft-Erasmus Universities Alliance, prof. Marja Makarow, University of Helsinki, prof. Valeria Nicolosi, Trinity College Dublin, dr. Özen Nergis Dolcerocca, University of Bologna and Dr. Zdeněk Havlas, Vice-President of the Czech Academy of Sciences.

An important tool for evaluating the quality of scientific work at the individual level is the awarding of top SAS publications. In the Top journal papers in scientific journals with the highest impact category measured by the SJR index (Scimago Journal Ranking) falling within the first percentile of the SJR in the relevant scientific field, seven publications in journals such as Science, ACS Nano, Advanced Sciences and Political Psychology, were awarded. We awarded four top scientific monographs published by renowned foreign scientific literature publishers. Ten papers in journals registered in the Nature index database and five publications in journals included in the Norwegian Register, category 2, were selected for the award.

## 1.2 Support systems of SAS research projects

### Projects and other activities of VEGA Scientific Grant Agency

The Scientific Grant Agency of the Ministry of Education, Research, Development and Youth of the Slovak Republic and the Slovak Academy of Sciences (hereinafter referred to as "VEGA") is a joint body of the Ministry of Education, Science, Research and Sport and the Slovak Academy of Sciences. VEGA represents a system of institutional support for basic research. SAS provides funds to its institutions for research projects from its own budget through this grant scheme.

VEGA is the largest Slovak grant agency in many respects, such as the number of researchers, the number of young researchers under the age of 35, the number of funded projects and received grant applications, and the number of publication outputs in the international scientific space registered in the Web of Science and SCOPUS databases. Publication outputs supported by VEGA annually account for a high share of all Slovak published scientific outputs by Slovak authors registered in the scientific bibliographic databases Web of Science and SCOPUS. With its setup, VEGA supports a wide diversity of projects in all fields of science and technology, and, at the same time, it creates space for the real possibility of ensuring irreplaceable continuity and the unique integration of the young generation of PhD students and postdoctoral students into the research process through supported projects.

#### VEGA's key activities in 2024:

- announcement of a new call for submitting applications for a financial contribution for scientific projects starting in 2025 and initial evaluation of projects;
- financing of ongoing and new VEGA projects;
- final evaluation of projects completed in 2023.

#### Initial evaluation of applications for financial contribution for projects starting in 2025

SAS Presidium approved the wording of the VEGA call for applications for financial contributions to scientific projects on December 14, 2023. The call was announced on March 1, 2024. A total of 987 applications were submitted within the call, 163 of which were from SAS institutes. The evaluation consisted of two rounds. In the first round, the committees assessed the completeness of the application and the subject of the research with regard to the selected committee. In 2024, it was possible to submit an interdisciplinary project within the call, i.e. a project in which a related scientific field is declared. At SAS, the greatest interest in submitting interdisciplinary projects comes from SAS institutes in the field of social sciences. The focus of these projects led to the linking of mainly biological and medical sciences with social sciences and humanities. The evaluation was carried out as a "peer review" in two rounds. The initial evaluation divided projects into individual A - C categories, which are key

indicators of project quality. For SAS, this categorization has a significant impact on the amount of financial resources allocated for research projects in a given year. More than half of the projects submitted from SAS institutes were in category A. The long-term low share of projects in category C points to the high-quality level of submitted projects from SAS institutes. Only 68 projects (of which only 7 were from SAS institutions) did not meet the evaluation criteria (1st and 2nd rounds) and were therefore eliminated.

Project quality category	Number of projects		Share [%]	
	VEGA in total	Of which SAS	VEGA in total	Of which SAS
<b>A</b>	344	74	37	48
<b>B</b>	364	66	40	42
<b>C</b>	211	16	23	10

The list of evaluated projects by VEGA commissions, ranked by success rate, is available at <http://www.vega.sav.sk/index.php?p=show&id=27>.

### Financing of ongoing and new VEGA projects

SAS Presidium allocated EUR 4,979,738 to finance VEGA projects in the form of current expenses in 2024. The principles of the breakdown of funds allocated for SAS VEGA projects in 2024 were approved by the SAS Presidium on December 14, 2023. In accordance with these principles, financial resources were provided to 557 VEGA projects from SAS institutions and 59 joint projects (in which the project leader is a university employee, with SAS employees participating in the research project), a total of 616 projects. For projects where the main recipient of funds was the SAS institute, the average annual contribution amounted to EUR 8,940.

Information on financing SAS VEGA projects in 2024 is available at the VEGA website: <http://www.vega.sav.sk/index.php?p=show&id=16>.

### Allocated funds for VEGA projects in 2024 by the SAS Scientific Section

SAS Scientific Section	Number of projects	Financial contribution (in EUR)
1. Physical, Space, Earth, and Engineering Sciences	176	1,483,039
2. Life, Chemical, Medical, and Environmental Sciences	292	2,521,593
3. Social Sciences, Humanities, Arts, and Culture	148	975,106
<b>Total</b>	<b>616</b>	<b>4,979,738</b>

### **Final evaluation of research projects completed in 2023**

The final evaluation of projects completed in 2023 was carried out in February 2024. A total of 512 projects were completed, 157 of which were from SAS. Part of the evaluation by the individual VEGA commissions was also the selection of projects that brought significant results. VEGA commissions selected 70 projects that achieved significant results, 30 of which were from SAS institutes. The results of these projects are presented in the Report on the Most Significant Results Achieved in VEGA Research Projects Completed in 2023. This Report is published on the SAS VEGA webpage: <http://www.vega.sav.sk/index.php?p=show&id=19>.

### **SAS projects financed through the Slovak Research and Development Agency (APVV)**

An important tool for supporting research and development in Slovakia through competitive project financing is the Slovak Research and Development Agency (APVV).

In 2024, the SAS was very successful in obtaining APVV grants. SAS institutes participated in 470 research projects. In 253 projects, SAS institutes were the main recipients of financial support from the APVV. In 217 projects financed by APVV, SAS institutes were co-recipients of APVV contribution based on a Cooperation Agreement. The total volume of financial resources provided by APVV for SAS research projects reached EUR 10,401,158 in 2024. A total of 144 projects were submitted by SAS organizations in the calls for all APVV grant schemes in 2024, with SAS institutes as the main applicant in 100 projects and SAS institutes as co-researchers in 44 projects together with organizations from other research and development sectors.

All of these data document a high success rate in obtaining APVV grants for SAS. SAS has long been the most successful sector in terms of the success rate of submitted applications by sector. APVV grants are an effective tool for SAS institutions for scientific cooperation between SAS departments with universities, as well as with the business sector. In many cases, the research results of SAS departments lead to implementation outputs in economic and social practice.

### Number of submitted proposals, research projects and funds drawn at the SAS in APVV calls in 2024 by Scientific Sections

SAS Scientific Section	Number of submitted proposals		Number of research projects		Funds provided from APVV (€)	
	A	B	A	B	A	B
Scientific Section 1	30	22	75	78	1,905,698	1,015,393
Scientific Section 2	49	19	134	113	4,456,334	1,226,640
Scientific Section 3	21	3	44	26	1,593,932	203,161
<b>Total</b>	<b>100</b>	<b>44</b>	<b>253</b>	<b>217</b>	<b>7,955,964</b>	<b>2,445,194</b>
<b>A + B total</b>	<b>144</b>		<b>470</b>		<b>10,401,158</b>	

A - SAS organization is the project leader

B - SAS organization is the contractual project solver

Data source: Annual Reports from individual public research institutions SAS

Attracting talented researchers from abroad is a key part of the SAS scientific policy. Top foreign experts will enrich scientific teams and strengthen the involvement of the SAS in international projects. Mobility and reintegration programs help partially reverse the phenomenon of "brain drain" from Slovakia by motivating researchers to return and, at the same time, offering Slovak scientists working abroad suitable conditions to continue their careers at home.

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#### SASPRO 2 program

In 202, the fourth year of implementation of the SASPRO 2 mobility and reintegration program <https://saspro2.sav.sk/> continued, co-financed by the H2020 scheme Marie Skłodowska-Curie Actions - COFUND. An important project aspect is to improve cooperation between the

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scientific and application sectors regarding multidisciplinary approaches to research projects. Applications were submitted within two mobility schemes: Incoming and Reintegration. For both schemes, one of the conditions is that the scientist does not work in Slovakia for some time before applying. The program allows applicants to apply for a work stay of 12 to 36 months, and the field of science in which they can apply is not limited.

The project is worth EUR 9,34 million and the SAS is its coordinator. The co-financing rate from the European Commission is around 50%. In 2024, the project partners co-financed individual implemented projects with an amount of EUR 1.7 million. Calls for the mobility program of the SAS and partners of the Comenius University in Bratislava and the Slovak University of Technology in Bratislava were intended for experienced scientists from abroad and Slovaks interested in working at one of the 70 host organizations of the program partners. Three calls were announced as part of the project. 174 applications were received, 51 work stays were offered, and 39 projects were implemented. All projects recommended for funding from both list A and reserve list B have been screened by the Ethics Commission.

At the end of 2024, a total of 30 scholarship holders were active in all partner organizations (SAS 20, STU 8, UK 9). All projects must be completed by 30. 9. 2025.

Due to the early termination of several projects, a 2nd call was announced in 2024 to extend the duration of successful projects. In the 2nd call, 9 scholarship holders applied for an extension and all projects were evaluated as successful by expert committees and their extension was approved by the SAS Presidium. Two of the approved extensions were ultimately not implemented due to prioritizing the approval of other projects.

In 2024, the SASPRO 2 coordination team organized a training course for scholarship holders called "ERC and beyond: Training for scientists", intended to introduce the ERC scheme and the use of artificial intelligence in the creation of project proposals and scientific articles. The training received positive feedback, as a result of which six scholarship holders submitted a project proposal to the ERC in 2024, and one scholarship holder plans to submit one in 2025.

The coordination team organized spring (online) and autumn (hybrid) meetings of the Evaluation Committees, the aim of which is the ongoing evaluation of the results of individual projects, including the evaluation of publication activities, participation in international events, the degree of integration in the workplace, and the use of financial resources. The directors of institutes, deans of faculties, and scientific tutors of scholarship holders answered the questions of the Evaluation Committee.

In September 2024, the coordination team submitted to REA the second report on dissemination activities, which was a mandatory project output. The report was subsequently approved by REA.

Since October 2024, the coordination team has been addressing the requirements of the European Commission audit No. BAEA469012. The audit focused on the first reporting period (October 2020 to September 2022). The audit was carried out by PriceWaterhouseCoopers (PwC) staff, and the auditors' requirements focused on contractual relationships (grant

agreements, employment contracts, decrees, scholarship conditions), integration of scholarship holders in institutes, settlement of wages, results of their research and other aspects. The report prepared by PwC will be assessed by the European Commission in three review rounds. The final audit result is expected within a time frame of 6 months to 2 years.

Scholarship holders of the SASPRO 2 program are fully integrated in SAS, STU and UK organizations, they publish their works in renowned scientific journals, create their own groups and teams, participate in popularization activities and actively present themselves at domestic and foreign conferences. The program coordinator, together with the partners, continues to develop an effective mobility program that brings benefits to the scholarship holders and host organizations while strengthening and improving international scientific cooperation. The SASPRO 2 program contributes to efforts to retain talented scientists in Slovakia and motivates foreign scientists to work at partner organizations.

### **IMPULZ program**

At the beginning of 2024, the 3rd call of the IMPULZ program announced in 2023 was evaluated. Based on the recommendation of the Evaluation Committee, 3 projects from the fields of electrical engineering, inorganic chemistry and materials research were approved for funding. Since the funding of one of the successful projects was not accepted by the applicant, the next project from the reserve list was selected for funding. The ratio of applications recommended for funding to the number of applications received (success ratio) was 15% in the third year. Successful projects will receive funding ranging from EUR 60,000 to EUR 160,000 per year over the next 5 years. The projects started to be implemented in the second half of 2024 (with implementation starting in July, August and September 2024). Successful applicants must be employed at individual SAS institutes, which will ensure the financing of the project's indirect costs.

In June 2024, the fourth call of the IMPULZ program was announced, the goal of which is to improve SAS institutes through the recruitment of internationally recognized scientists, including talented young researchers. Their task is to create and manage their own research groups at the SAS. The IMPULZ program is intended to help increase research excellence, its internationalization and competitiveness across various scientific fields in the SAS and the European Research Area, and last but not least, to gain success in obtaining prestigious European grants. As part of the fourth call, 27 applications were received for the IMPULZ program (including 9 applications from Scientific Section 1, 7 from Scientific Section 2 and 11 from Scientific Section 3). All applications met the formal criteria and advanced to the first round of evaluation. As part of the two-round evaluation process, the applications were evaluated in the first round by the Evaluation Committee of the IMPULZ Program. The Committee evaluated the applicants' CVs and extended project abstracts. 27 applications were evaluated in the first round, 15 of which were not recommended by the Evaluation Committee to proceed to the second round of evaluation. In the second round, applications were evaluated by independent external evaluators from abroad, who assessed the CVs of the

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applicants and the entire project. A total of 88 external foreign evaluators were approached to assess applications in the second round, 40 of whom accepted to evaluate the project. The success rate was 45%.

Halfway through the implementation of successful projects, an interim evaluation will be carried out, based on which it will be assessed whether the project will continue to be recommended for further funding. The interim evaluation of the project will also take into account all prospects of the project for co-financing from other external sources - such as Horizon Europe (with particular emphasis on the ERC grant scheme) or another prestigious foreign grant with comparable funding to the IMPULZ project.

Detailed information about the Impulz program is available at: <https://impulz.sav.sk/>.

### Štefan Schwarz Support Fund

The postdoctoral Štefan Schwarz Support Fund is intended for graduates of full-time studies from Slovakia and abroad, for whom no more than four years have passed since the defence of their dissertations. Successful applicants will receive a salary allowance for two years, with the option of extending the allowance for 1 more year. The call for 2024 was open from 2. 9. 2024 to 1. 10. 2024. 40 applications were received by the deadline. Number of applications evaluated for Scientific Section 1: 12, for Scientific Section 2: 17, for Scientific Section 3: 11. A total of 24 projects were supported (number of applications supported for Scientific Section 1: 8, for Scientific Section 2: 9, for Scientific Section 3: 7). Successful scholarship holders will implement their projects within SAS institutes for a period of 2 years.

Website of the Štefan Schwarz Support Fund: <https://schwarz.sav.sk/Shell/Home/FrontPage>.

### Grant programs for SAS PhD students

Grant programs for SAS PhD students announced their 6th call in June 2024 to support scientific projects of full-time doctoral students implemented within SAS institutes. This SAS activity aims to financially support high-quality project proposals that form a coherent whole within the framework of projects implemented during doctoral studies and that can be implemented within one year. Students will also gain valuable experience in preparing and implementing projects that are necessary for their future careers and the possibility of obtaining additional grants.

By the deadline for submitting applications in August 2024, 108 applications were received. The number of applications evaluated for each Scientific Section is as follows: Scientific Section 1: 23, Scientific Section 2: 69, Scientific Section 3: 16.

A total of 54 projects were supported in the amount of EUR 153,500 (the number of applications supported by the grant for Scientific Section 1: 12, for Scientific Section 2: 34, 24, for Scientific Section 3: 8. All projects supported by the grant in the sixth call of the program

will be implemented by successful scholarship holders in SAS institutes from 1. 1. 2025 to 31. 12. 2025.

More information can be found at: <https://www.sav.sk/?lang=sk&doc=educ-phdstudy>.

### Grant programs for SAS postdoctoral students

The postdoctoral grant program, known as the Postdocgrant, was announced in January 2024 to financially support high-quality project proposals from young scientists employed in SAS institutes across all scientific disciplines. 118 applications were received by the deadline in February 2024. Of the total number, 29 applications were evaluated for the Scientific Section 1, 68 applications for Scientific Section 2, and 21 applications for Scientific Section 3.

A total of 59 projects were supported based on the evaluation, with the total amount of support for 2024 reaching EUR 279,832. The distribution of support by Scientific Section is as follows: Scientific Section 1: 15 supported projects, Scientific Section 2: 34 supported projects, and 10 projects were supported for Scientific Section 3.

Supported projects will be implemented in SAS institutes. Successful scholarship holders will start to implement their projects from July 1, 2024, or in the case of grant holders from the reserve list, from August 1, 2024 and September 1, 2024. All projects will run until December 31, 2025.

More information at: <https://www.sav.sk/?lang=sk&doc=educ-postdoc>

### Support of EU projects

The EU Project Support Office was established to increase the success of SAS institutes in obtaining Horizon Europe projects and reduce the administrative burden on scientists. It provides information and methodological assistance, effective networking and practical advice in preparing applications and implementing international projects.

The Office, in cooperation with the national contact points of CVTI SR, provides expert consultations in preparing project proposals, organizes professional events (How to write an ERC grant, Effective support for ERC grant applicants, Share of best practice in Cofund projects) and consults on project implementation, prepares overviews of calls and funded projects.

SAS is a member of the European Association of Research Managers and Administrators (EARMA). The key benefits of EARMA membership include establishing contacts and initiating cooperation with domestic and foreign institutions. The cooperation aims to simplify administration and share best practices that will facilitate the daily work of project managers and administrators. In addition, EARMA membership brings access to digital presentations, meetings and participation in educational activities and mentoring programs. Every year, we participate in the EARMA conference, which is a major event for experts in the field of research management and administration. The conference provides a unique opportunity to exchange experiences, establish new international contacts and discuss current trends, challenges and

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innovations in the field of research management, which allows us to improve and optimize processes in our research activities. In 2024, the conference was held in Odense, Denmark, from April 23 to April 25, 2024, under the title "Where is RMA Going? The Future of RMA in a Rapidly Changing World".

Activities of the EU Project Support Office in 2024:

- Regular sending of newsletters via the wordpress domain, in which we inform about current challenges, trainings, events related to the Horizon Europe program.
- Consultations on grant schemes under Horizon Europe: ERASMUS+, MSCA Postdoctoral Fellowships, Hop-on facility HORIZON-WIDERA-2023-ACCESS-06, Renewal Plan - ERC Bridging Grants, HORIZON-CL2-2024-HERITAGE-ECCCH-01-05, ERC AdGv.
- Lecture at the "Young Researchers" event in Stará Lesná at the Young Researchers' Workshop vol. 2. – Project management.
- We participated in the development of the following projects:
  - "SASPRO 3" within the framework of the MSCA Cofund Horizon Europe call 2024 (EUR 9.99 million)
  - "Completion and maintenance of the Euraxess Point SAS center" call of the Ministry of Education (EUR 300K) - approved project.
  - Applications for participation in the "Scheme to support research management and project management of CVTI SR" (EUR 10,000) - approved applications.
  - As a project partner, we participated in the preparation of the project proposal "Building Bridges of Knowledge: Supporting Dialogue with the Diaspora for the Modernization of Slovakia" within the call from the Recovery and Resilience Plan. This project was selected for funding, and as a project partner, we participate in the implementation of the project (EUR 199K) - approved application.
- We organized a training in cooperation with an external company for economic and scientific staff (Financial rules of the Horizon Europe program - Practical exercises on financial issues with regard to the SAS specifics: budget preparation (eligibility of costs, types of costs), financial reporting (financial reporting, time sheets) and inspections (audit in Horizon Europe projects (1st level, 2nd level, CoA, OLAF).

Employees from the EU Project Support Office are constantly improving their qualifications and regularly participate in events for research managers, training courses and training programs, whether online or in person.

More information on EU project support can be found at: <https://euprojects.sav.sk/>.

### Euraxess Point\_SAS

Since its creation (in 2020), Euraxess Point SAS has been providing consultations and support related to the arrival of foreign researchers and PhD students at SAS, or to the arrival of their family members in Slovakia for family reunification. Inquiries to Euraxess Point SAS come

directly from foreign researchers and PhD students or staff of SAS institutes, who are involved in hiring employees and PhD students - coordinators, administrative staff, supervisors, etc.

In recent years, there has been an increase in the number of inquiries from foreign doctoral students and researchers admitted to SAS institutes. There were 227 consultations provided for 2024. Consultations can be simple, where the answer to a question is a short piece of information, or they can provide a recommendation for information sources and represent an average of 2-3 e-mails or telephone calls. However, in most cases, consultations are a complex service and require intensive (especially e-mail) communication and cooperation with other institutions. Some cases (consultations) go on for several months (3-9 months). Most of the consultations (138) were, as in previous years, related to administrative processes related to the granting of visas and temporary stays. Other inquiries were of different focus, such as conditions of (health) insurance for foreigners according to the purpose of temporary stay; the procedure for registering foreigners to the social and health insurance companies; employers' obligations towards the Central Office of Labour, Social Affairs and Family when hiring foreigners for research and development; the procedure for processing a permit for receiving foreigners from third countries for research and development; details of the hosting agreement; information and advice on what documents to supplement in the event of interruption of administrative proceedings by the aliens' police, and others. Instructions and document checks for family reunification (arrival of family members of a researcher/PhD student already working in Slovakia) have been suspended since mid-2024 due to capacity reasons at Euraxess Point SAS. Euraxess Point SAS provided personal assistance at OCP PZ BA to 23 applicants for temporary stay.

Specific topics or complicated cases must be consulted with experts or individual offices/bodies. The Euraxess point SAS team continuously cooperated with the Migration Information Centre (IOM) Slovakia, SAIA, n. o., Bureau of Border and Foreign Police of the Presidium of the Police Force, with representative offices of the Slovak Republic abroad, health insurance companies and the Social Insurance Agency, Ministry of Foreign and European Affairs of the Slovak Republic, etc.

Since approximately June 2024, complications have arisen with the reservation system of the Ministry of the Interior of the Slovak Republic. Foreigners' demand for appointments at the Bureau of Border and Foreign Police (OCP) is high, and there are not enough available dates. Foreigners repeatedly contact Euraxess Point SAS with questions on how to secure an appointment at the OCP. The unavailability of appointments makes it difficult for foreign doctoral students and researchers to obtain a temporary residence permit or perform other actions related to a temporary residence permit. The problem was also communicated at an event organized by SAIA, n. o. in October 2024, which was attended by representatives of the Bureau of Border and Foreign Police Office of the Presidium of the Police Force.

Euraxess Point SAS organised two events in the fall of 2024 with the aim of informing about its activities and enabling the education of coordinators of foreign doctoral students and researchers from SAS institutes. On 7. 11. 2024, Euraxess Point SAS organized "Breakfast with

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Euraxess Point SAS - a meeting for coordinators and administrative staff of SAS institutes." The meeting was aimed at informing about the activities of Euraxess centers, about changes in the Act on Residence of Foreigners in Slovakia, and about sharing good practices. This event was attended by 13 employees from 11 SAS institutes and centers. On 28. 11. 2024, Euraxess Point SAS organized, in cooperation with the non-profit organization PDSC, an educational event "Intercultural Communication and Work with Foreigners." The training was intended for coordinators of foreign doctoral students and researchers, as well as employees of Euraxess Point SAS, and introduced the characteristics of communication and work with people from different cultures. This educational activity was attended by 7 employees from 6 SAS institutes and 3 employees from Euraxess Point SAS.

On October 23-25, 2024, Euraxess Point SAS employees attended a conference organized by SAIA, n.o. called "Overcoming Borders: Skills and Strategies for Professionals in the Internationalization of Universities and Research Organizations" in Piešťany. The event provided a lot of information on internationalization of universities, mobility of foreign doctoral students and researchers, changes in the Act on Residence of Foreigners, workshops, stimulating discussions and more.

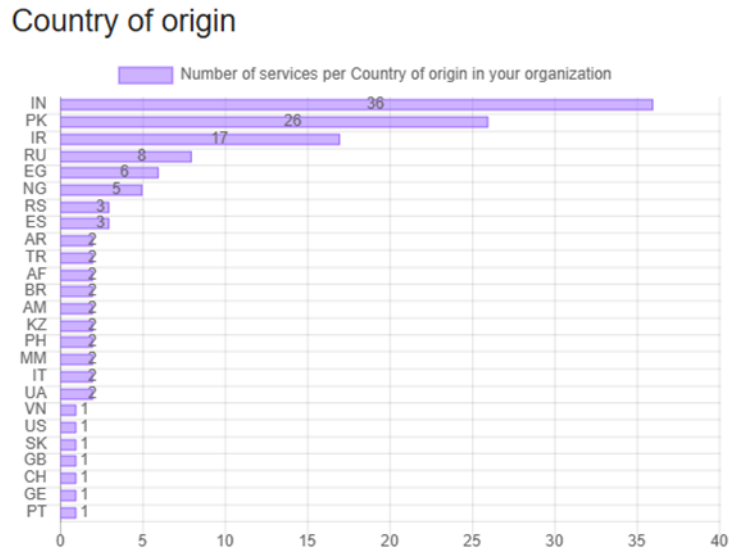
Euraxess Point SAS regularly communicates with SAS institutes, provides information and consultations on individual cases. It also informs all SAS institutes (coordinators and directors) about networking and integration events for foreign researchers and doctoral students organized by SAIA, n. o. as the national coordinator of the Euraxess network in Slovakia (e.g. Christmas meeting for international PhD students and researchers).

In September 2024, the Ministry of Education, Research, Development and Youth of the Slovak Republic published a call for applications for a subsidy to maintain and complete the construction of Euraxess centers in Slovakia. In October, Euraxess Point SAS submitted an application within the framework of this call and is currently awaiting evaluation results. If Euraxess Point SAS is successful as an applicant for a subsidy, it plans to improve its services, organize several events for SAS institutes, recruit new staff, expand its consulting activities, plan socio-cultural events, and create information materials and audiovisual recordings.

Euraxess Point SAS shares necessary information and news on its bilingual website: <https://euraxesspoint.sav.sk/domov/>. At the end of 2024, it began working on expanding the content and updating the website, as well as on a new electronic system for registration and communication with foreign doctoral students, researchers and employees from SAS institutes.

Euraxess Point SAS statistics for January 2024 - December 2024, according to data reported to the European Euraxess portal:

The trend continues that the most consultations are provided to doctoral students and researchers from India (36), Pakistan (26), Iran (17), Russia (8) and Egypt (6). The representation of other countries is shown in graph 1.1:



Graph 1.1

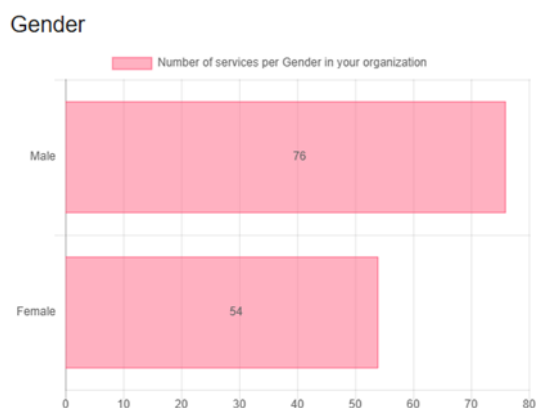
Number of consultations by individual topics/areas (graph 1.2):



Graph 1.2

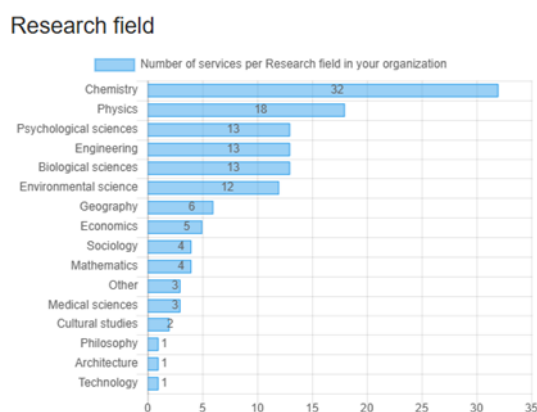
## 1. SAS SCIENCE POLICY AND SUPPORT OF RESEARCH PROJECTS

Most inquiries are from men (76), fewer (54) from women (graph 1.3).



Graph 1.3

Incoming inquiries to Euraxess Point SAS are from doctoral students and researchers working mainly in the fields of chemical sciences (32), physical sciences (18), psychological, technical, and biological sciences (up to 13 – graph 1.4).



Graph 1.4

### Human resources strategy in research - HRS4R

In 2024, activities continued to focus on the ongoing fulfilment of the points outlined in the Action Plan of the Human Resources Strategy in Research. The HRS4R project is in the second phase of implementing the HRS4R SAS Action Plan (2023 - 2025), after which SAS will await the process of defending the quality mark. The European Commission will verify, through a personal visit, whether the measures outlined in the Action Plan have been implemented.

At the end of 2024, 32 SAS institutes joined the HRS4R strategy. The HRS4R SAS Steering Committee and Working Group regularly monitor and evaluate the progress in implementing the strategy. Results and events related to the implementation of action points are published on the project website (<https://hrs4r.sav.sk/>).

In the first half of 2024, a series of training courses was held as part of the Development Program for Directors of SAS Institutes. Only institutes that are part of the SAS HRS4R strategy participated in the training. The course was divided into 4 full-day modules, and the training was provided by an external company (lecturer Mgr. Daniel Bútorá). The modules were focused on improving management skills, efficiency in managing and leading teams and institutes. The program ended with an Application Workshop at the end of the year. A total of 18 institutes participated in the training.

At the end of 2024, senior staff completed 2 modules as part of the Development of Senior Staff of the SAS Office. The modules are also focused on improving leadership skills, efficiency in managing and leading teams at the SAS Office. The training continues in 2025.

In October 2024, the team and working group were strengthened by an HR expert from an external environment, who acts as an HRS4R evaluator for the European Commission. As part of the consultations, we focus primarily on the Principles and Selection of Employees (OTS-N) and provide continuous support in preparing for the defence of the quality mark in October 2025. The supporting document of the strategy - Principles of Recruitment and Selection of Employees in the SAS Public Research Institution - has been finalized. The document concerns the procedures for filling the positions of scientists and other employees with the principles of open, transparent and fair recruitment in the Slovak Academy of Sciences (OTS-N). In October 2024, the newly created position of Head of the Personnel Department was filled by someone with many years of experience in the field of human resources. On 14. 11. 2024, the members of the Steering Committee participated in a lecture called Strengthening Research Careers with HRS4R and CoARA in the Portuguese city of Braga. The lecture was held at INL - the International Iberian Nanotechnology Laboratory.

By receiving the HR Excellence in Research award, SAS committed to incorporating the principles of the Charter and the Code into institutional human resources management policies and strategies, and in particular to emphasising quality working conditions, transparent recruitment based on qualifications and experience, and creating a favourable environment for career development, including gender policy.

### **Technology Transfer Office SAS (KTT SAV)**

After the transformation of SAS organisations into public research institutions as of 1.1.2022, an increase in patent activity can be observed, especially an increased interest in more valuable international applications. This is also positively supported by the “SAS Principles for the Application, Protection and Use of Industrial Property Rights by Organizations Established by SAS (“SAS Principles”), which were approved by the SAS Presidium at the end of 2020. The Principles bring in particular a significantly increased financial incentive for intellectual property protection for creators, as well as more significant support for patenting from central sources, including the assistance of patent attorneys. They also strengthen the role of the KTT SAV, through which intellectual property (IP) protection is ensured centrally in SAS.

## 1. SAS SCIENCE POLICY AND SUPPORT OF RESEARCH PROJECTS

In 2024, based on the SAS Principles, €52,569 was contributed from central sources to SAS institutes that ensure the protection of their intellectual property for patent attorney services and fees for filing foreign applications and granting patents, and €5,610 and contributions in the appropriate amount for remuneration to authors from the SAS Presidium budget.

In 2024, SAS institutes filed 10 priority national (SK) patent applications, 1 Slovak utility model application, 4 European patent applications, 5 international applications under PCT and, as part of the continuation of the so-called national/regional phase, 2 entries into the national/regional phase were made. Based on previous applications, SAS institutes were granted 7 patents in the Slovak Republic and 6 patents abroad in 2024, 4 of which were granted in Europe. 2 utility models were registered in the Slovak Republic. 1 European Union trademark was registered in 2024.

New opportunities brought by the transformation regarding the transfer of knowledge and technologies are also slowly starting to be used. In 2024, the SAS Presidium approved the first entry of the SAS institute into a commercial company, where the institute's contribution (BMC SAV) was an equity stake in intellectual property rights. This example showed that it is necessary to create methodological guidelines for institutes and their supervisory boards so that they are motivated to transfer knowledge, but so that the transfer also brings effective evaluation of knowledge for the institute itself. Therefore, in 2024, at its 34th session, the SAS Presidium adopted the "SAS Principles for the Establishment and Support of Spin-off Companies by Organizations Established by the Slovak Academy of Sciences", which further specifies the procedure for this type of knowledge transfer. Subsequently, the SAS Presidium ordered a legal analysis and the preparation of sample documents for the area of protection and use of intellectual property (IP) in the SAS environment. The analysis aims to propose a method for ensuring IP protection in contracts concluded by the SAS with third parties, as well as to identify IP that is suitable for protection within the framework of contracts in the SAS environment for its possible further commercialization. The possibilities of IP protection and its handling to optimally monetize the value of the created knowledge were also intensively consulted with major grant agencies and VAIA, so that within the framework of contracts with grant agencies, the method of IP protection against premature publication would be prioritized. In this regard, the KTT also actively worked in the preparation of the so-called minimum standard that a research organization must meet in the field of IP protection if it uses public resources for research.

The SAS Presidium initiated the preparation of binding internal regulations to establish the obligations of the SAS organizations in protecting IP in contracts with third parties outside grant agencies within the framework of the founder's regulation regarding the rules of management of the public research institution. (This is a minimum level of protection that the public research institution must not omit in contracts.) These regulations should be approved after discussion in 2025, together with the model documents necessary for establishing a joint venture with the participation of the public research institution in accordance with the applicable principles of the SAS. This mainly concerns a model partnership agreement and a

binding procedure for using the public research institution infrastructure and personnel in the joint venture.

## 2 SAS IN INTERNATIONAL CONTEXT

### 2.1 SAS in the European Research Area

SAS continuously ensures academic mobility in the field of international cooperation and cooperates not only with scientific and research institutes but also with central state administration bodies and representatives of diplomacy. International cooperation within the SAS is coordinated by the SAS Vice President for International Relations and her representatives. The Department of International Cooperation is managed by the Head of Department. The Department of International Cooperation administratively ensures the participation of the SAS in various research programmes such as ERA-NET, European Partnerships, Joint Research Projects of the SAS, the bilateral Mobility program, etc. In 2024, SAS supported excellent research, mainly through the newly created TANDEM CNRS – SAS program. This program supports the submission of ERC projects or projects under Horizon Europe.

In 2024, the SAS was also active in the traditional meetings of the Forum of Academies of the V4 countries and deepening intensive cooperation with the Czech Academy of Sciences. In addition to the continued support of existing bilateral and multilateral project schemes within the existing European partnerships, SAS managed to expand cooperation with new research institutes in Spain, France, Great Britain, Estonia, etc.

SAS pursued activities in the field of security in international research. In cooperation with representatives of ministries, state security services and foreign partners, it provided training and recommendations intended for SAS institutes and drew attention to the possible risks of international cooperation. Tomáš Hromádka is the authorized member of the Presidium of SAS in this area.

The SAS International Prize for 2024 was awarded by the SAS Scientific Council to Professor Miroslav Zeman for his contributions to the development of cooperation between the SAS and the Kingdom of the Netherlands in the field of technical sciences, with particular attention to photovoltaics as a renewable energy source.

An important pillar of the SAS activities is cooperation with international scientific organizations, such as ALLEA (All European Academies), EASAC (European Academies Science Advisory Council) and ISC (International Science Council). By cooperating with these institutions, SAS strives to promote the enlightenment of professional public opinion based on scientific knowledge. SAS also develops cooperation within the framework of UNESCO, CERN, ESA and other groups. In several of these organizations, SAS represents other scientific institutions from Slovakia.

**ISC (International Science Council)** brings together international scientific societies and member organizations at the level of national representation. As part of activities in the ISC, the SAS ensured the activities of 15 national committees, associations of scientists from various scientific disciplines, which represent the Slovak Republic in the relevant international scientific unions. Zuzana Panczová is the SAS representative in the ISC. She participated in several ISC online meetings in 2024 and attended the 2024 ISC European Group Annual Meeting in Stockholm.

**ALLEA (All European Academies)** is a federation of all European academies. ALLEA members currently include 56 academies from 41 countries. Its goals and objectives include the development of science policy in an effort to improve the conditions for scientific work, increase excellence, and develop and adhere to high ethical standards of science in Europe. The SAS representative in ALLEA is a member of the SAS Presidium Michal Kšiňan. The General Assembly meeting was held in May 2024 in Berlin.

**EASAC (European Academies Science Advisory Council)** is made up of the national academies of the EU Member States. The aim is to develop mutual cooperation between academies, create a joint platform for commenting on urgent issues of the development of science and society, and provide advice on the preparation of documents in accordance with EU legislation. EASAC provides highly expert opinions on current issues, assesses European legislation, organizes seminars for European regulators and issues opinions on topics discussed in the European Commission. The SAS representative in EASAC is Vice President Karol Marhold who attended the 2024 EASAC Council meeting in Budapest and the EASAC Environment Steering Panel meeting in Warsaw. Helena Kandárová was nominated by the SAS to the Steering Panel “Biosciences and Public Health”. She attended the meeting in Amsterdam.

**ESA (European Space Agency)** is an intergovernmental organization of 22 member states for space research founded in 1974. Research focuses on environmental monitoring, meteorology, aeronomy and geoinformatics, solar system research and navigation and safety systems. In 2010, an agreement was signed between the Slovak Republic and ESA on Slovakia's entry into the first of three stages of cooperation in research and the use of space for peaceful purposes. SAS actively participated in ESA activities mainly in the fields of space science (space biology and medicine), in mapping of the unused agricultural land and processing of materials, including the development of advanced alloys and material architectures suitable for use in space.

### **Bilateral scientific cooperation**

In 2024, SAS expanded bilateral cooperation with important foreign partners on the basis of cooperation agreements. SAS currently has signed Cooperation Agreements with academies of sciences in the Czech Republic, Serbia, Bulgaria, Romania, Hungary, Poland, Italy, Spain,

Slovenia, France, with DAAD in Germany, with the French Research Center in Humanities and Social Sciences (Centre français de recherche en sciences sociales – CEFRES). Other agreements (with Lithuania, Belgium, Portugal) are in the preparation stage.

In 2024, 15 international calls were announced, within which 92 projects were submitted. Cooperation was also established with other countries such as Taiwan, Great Britain, Japan, Turkey, the United Kingdom and the Vatican. In 2024, SAS launched a new excellent research program, called Tandem CNRS - SAV for 2024-2026, for researchers with the financing of one Slovak-French tandem. This program will result in the submission of an ERC project or a project within Horizon Europe.

### **Multilateral scientific cooperation**

#### ***COST, Horizon 2020 and Horizon Europe projects***

In 2024, the SAS institutes participated in 23 research projects within the Horizon 2020 program and 49 projects within Horizon Europe program. SAS teams participated in the preparation of 56 Horizon Europe project proposals, 11 of which in the position of coordinator.

#### ***COST projects***

The European Cooperation in Science and Technology (COST) program is the oldest European transversal program for scientific and technological cooperation between EU Member States and EFTA countries. The cooperation is carried out through the coordination of national research projects, with the projects being funded at the national level. In 2024, SAS teams participated in 155 COST projects.

#### ***ERA-NET and European Partnership projects***

The ERA-NET (Horizon 2020) and European Partnerships (Horizon Europe) are EU specific tools for coordinating national research programs through national agencies as well as other relevant organizations depending on the thematic focus of the project. The ERA-NET and Co-funded European Partnerships programs are implemented under the COFUND scheme, which means that part of the funds that organizations spend on research projects or implementing activities is co-financed from EU funds. SAS's participation in coordination projects allows teams from SAS institutes to participate in submitting research projects, or to participate in other activities within European partnerships. In 2024, SAS was a member of 10 ERA-NET coordination projects and 5 in a Co-funded European Partnership project. In 2024, teams from the SAS participated in 34 research projects (in 2023, it was 26 projects, in 2022 - 27 projects).

#### ***Other projects***

Other programs with the participation of SAS institutes include the International Visegrad Fund (IVF), within which 14 projects were researched at SAS, and UNESCO (4 projects). SAS institutes were also represented in other important international programs, such as IAEA, NATO, IEA, INES, CERN and EMPR.

## 2.2 Cooperation with economically and research-developed countries outside EU

### Taiwan

Cooperation with Taiwan continues within the Joint Research Projects (JRP) program implemented based on the agreement on bilateral scientific cooperation between SAS and the National Science and Technology Council (NSTC). In 2024, 6 projects were carried out as part of this cooperation. In cooperation with the Taipei Economic and Cultural Office in Prague (TECO), SAS ensured the announcement and organization of the 16th joint call for project submissions for 2025-2027, which opened in February 2024 for all scientific disciplines without topic restriction. Funding was approved for 2 projects starting in January 2025, and 6 projects were submitted.

### Turkey

SAS cooperates with Turkey based on the agreement with TÜBİTAK (The Scientific and Technological Research Council of Turkey). The Joint Research Projects (JRP) program is carried out within the agreement. In 2024, 4 joint bilateral projects were researched, one completed in the given year.

During the year, the 9th joint call SAS-TÜBİTAK was implemented.

### Japan

Cooperation with Japan is carried out under two types of project programs:

- V4-Japan. In 2024, cooperation between the V4 countries and Japan continued in the JRP (Joint Research Projects) format aimed at supporting joint research projects and intensifying scientific and technical cooperation in the field of materials research. Within this cooperation, 4 projects financed from SAS resources were carried out.
- EIG CONCERT Japan is a cooperation program in science and technology between European partners and Japan within the European Interest Group (EIG) for Japan consortium. The consortium follows up on the successful ERA-Net CONCERT Japan project from 2011-2014. In 2024, 3 projects with the participation of the SAS were carried out.

In 2024, the 21st Annual Meeting of the Science and Technology in Society forum was held in Kyoto, Japan. SAS was represented by the President Pavol Šajgalík and the Vice President Martin Venhart.

### **Republic of Korea**

The cooperation is based on a memorandum of understanding between the Republic of Korea represented by the Ministry of Science, ICT and Future Planning of the Republic of Korea, and institutions from the V4 countries (International Visegrad Fund, Ministry of Education, Youth and Sports of the Czech Republic, National Agency for Research, Hungary, the National Center for Research and Development, Poland, and the Slovak Academy of Sciences). The cooperation is based on joint research projects with the participation of teams from scientific institutes and universities in the Republic of Korea and the V4 countries. The V4-Korea JRP call on Clean Energy was opened in February 2023, within which 2 projects with the participation of SAS were supported.

### **2.3 Other activities in the development of international cooperation**

#### **Cooperation of V4 academies and cooperation with the Czech Academy of Sciences**

The meeting of the representatives of the V4 academies of science took place on October 1. – 2. 2024, at the Vila Lanna premises in Prague. The main topics of the meeting were presentations of current activities of the institutions, the work of women in science, the transfer of scientific knowledge, the safety of scientific research and the evaluation of scientific institutions in individual V4 academies.

The traditional meeting of the leadership of the SAS and the Czech Academy of Sciences (AV ČR) was held on May 2.-3. 2024, at the AV Conference Center - Třešť Castle. At the meeting, the delegations discussed the relationship between science and politics, scientific ethics, integrity and academic freedoms, successful application and research programs of the AV ČR, possibilities for cooperation with the SAS, evaluation systems of the AV ČR and SAS departments, as well as performance contracts of the SAS.

#### **Participation of SAS delegations in meetings abroad:**

A delegation of leading representatives of the Slovak Academy of Sciences visited the Vatican on January 17 and 18, 2024, with the intention of establishing cooperation with the Pontifical Academy of Sciences (PAS). The working trip also included a visit to the Holy See's Dicastery for Culture and Education, and a private audience with Pope Francis.

Other SAS delegations participated in the following events in 2024:

- International “Human Rights and Academic Freedom in Europe” Symposium, 20. – 21. 3. 2024, Berlin (Germany)
- 104th meeting of IIASA Council, 18. – 19. 6. 2024, Laxenburg (Austria)

- GLOBSEC Forum, 29. – 31. 8. 2024. Prague (Czech Republic)
- Meeting of V4 Academies, 1. – 2. 10. 2024. Prague (Czech Republic)
- 21st Annual Meeting of the STS Forum and Future Leaders Program, 4. – 8. 10. 2024, Kyoto (Japan)
- meeting with Prof. Hasan Mandal, Rector of İstanbul Technical University and Executive Director of TÜBITAK, 30. 10. – 3. 11. 2024, İstanbul (Turkey)
- ESAF General Assembly and “Share science, shape future” seminar, 5. – 8. 11. 2024, Rome (Italy)
- ISC Annual Meeting, 20. – 23. 11. 2024, Stockholm (Sweden)
- World Science Forum, 20. – 22. 11. 2024, Budapest (Hungary)

### **Significant receptions at SAS**

- Visit of the new Ambassador Extraordinary and Plenipotentiary of the People's Republic of China to the Slovak Republic, H.E. CAI Ge, at the Slovak Academy of Sciences on January 9, 2024. The meeting was also attended by the Political Representative, Mr. Wang Bozh.
- Visit of the new Ambassador Extraordinary and Plenipotentiary of Japan, H.E. Yasuhiro Kawakami, at the Slovak Academy of Sciences on January 15, 2024. The meeting was attended by the Second Secretary of the Embassy of Japan, Kazuko Komo.
- Visit of the Ambassador of the Republic of Korea, H.E. Byeongdo Lee, to Slovakia, at the Slovak Academy of Sciences on February 13, 2024. The meeting was attended by the Second Secretary of the Korean Embassy Kyungmi Kim.
- Visit of the Ambassador of the Republic of Sudan, H.E. Magdi Ahmed Mofadal on May 10, 2024.
- On June 26, 2024, a meeting of the Directors of the Institutes of Social Sciences and Humanities was held with William Berthomière, Deputy Director of the Institutes of Social Sciences and Humanities at CNRS, France.
- Visit of the Ambassador of Romania, H.E. Călin Fabian, to Slovakia, at the SAS on July 27, 2024
- Visit of the Ambassador of the Republic of Turkey, H.E. Erkan Özoral, to Slovakia, at the SAS on September 18, 2024. The topic of the meeting was the continuation and support of cooperation within the Joint Research Project program, as well as possible project cooperation in the Horizon Europe program.
- Visit of the Ambassador of the Federative Republic of Brazil, H.E. Gabriel Boffo Moreira, to Slovakia, at the SAS on October 9 2024. The topic of the meeting was to map specific scientific areas and sciences in which both countries could cooperate, including the possibility of participating in JRP projects.
- Visit of the Ambassador of the French Republic, H.E. Nicolas Suran, to the SAS on October 21, 2024. He was accompanied by the Attaché for Scientific and University Cooperation

## 2. SAS IN INTERNATIONAL CONTEXT

Thomas Perrin. The main topic of the meeting was the deepening of cooperation in the field of science and research between the Academy and French partners.

An overview of international cooperation projects of SAS institutes is included in Annex No. 3.



### 3 SELECTED RESULTS OF SCIENTIFIC RESEARCH

Statistical and scientometric data on the results of scientific research in the SAS in 2024 can be found in Annex no. 6 of this Annual Report. The following selection of achieved results aims to characterize the content focus of the research of SAS institutes, with no claim to the integrity of such a view in the number of publications, application or other outputs. The chapter is divided according to the general focus on the selection of results based on basic research, the application-type results and the results achieved within the framework of international research projects.

#### 3.1 Results based on basic research

##### Scientific Section 1 (Physical, Space, Earth, and Engineering Sciences)

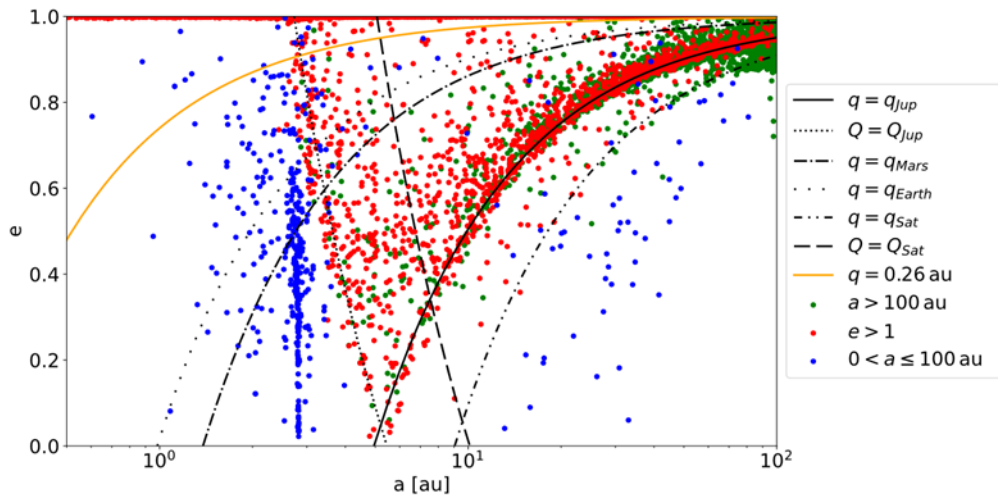
##### Re-examination of the transportation abilities of the 5:2 MMR with Jupiter

**Institute:** Astronomical Institute SAS

**Researcher:** M. Kováčová

**Project:** VEGA 2/0009/22

Resonances in the main asteroid belt play a significant role in the dynamical evolution of small bodies. We focused on the transportation abilities of the 5:2 mean motion resonance (MMR) with Jupiter, which studies link to some potentially hazardous asteroids, but also to fossil L chondrite meteorites. We generated 1008 FLI maps of the resonance, which allowed us to distinguish stable initial conditions from unstable ones. Based on these maps, we integrated over 10,000 unstable test particles for a maximum time of 10 million years. It was shown that approximately 99.5% of the test particles became near-Earth objects at some point during the simulation, over 27% reached perihelion distances less than 0.005 au, 92.8% entered the Hill sphere of the Earth, and over 97% reached an orbit at which we would classify them as potentially hazardous if they were sufficiently large. However, our simulation did not confirm ejections along  $q \approx 0.26$  au that was found in the older work.



*Final distribution of test particles in the simulation. The green and red dots represent the positions from which the particles were ejected into hyperbolic or large-area orbits greater than 100 au. Particles that survived in the simulation for 10 million years are blue. The black curves represent the positions ( $a$ ,  $e$ ) at which the particle would have a perihelion (or aphelion) distance equal to the perihelion (or aphelion) distance of one of the planets. The orange curve represents a perihelion distance equal to 0.26 au.*

#### **Related publications and other outputs:**

KOVÁČOVÁ, Martina. Re-examination of the transportation abilities of the 5:2 MMR with Jupiter. In *Astronomy and Astrophysics*, 2024, vol. 686, article no. A107, p. 1-17.

#### **Observation of quantum entanglement with top quarks at the ATLAS detector.**

**Institute:** Institute of Experimental Physics SAS

**Researchers:** F. Sopková, P. Stríženec, J. Urbán

**Project(s):** MŠVVaM CERN-ATLAS

In the work mentioned below, the first observation of entanglement in a pair of top-antitop quarks at ultrarelativistic energies and in the strong interactions was published. To study the phenomenon, a decay channel containing two charged leptons, elementary particles that do not have the ability to interact strongly, was chosen. This measurement offers new possibilities for using the LHC accelerator to study quantum information and other problems of quantum mechanics. The uniqueness and importance of this measurement are also supported by the fact that the ATLAS collaboration decided to publish this discovery in the *Nature*, where the collaboration has published only one article so far. The standard model of elementary particles contains six quarks that have the ability to interact strongly (nuclearly). In proton-proton collisions, top quarks are produced predominantly in pairs with an antitop

quark. The top quark is extremely heavy and unstable, and decays before it can form bound states with other quarks. The properties of the top quark can therefore only be studied through decay products that preserve its properties. A pair of particles is quantum entangled if the quantum state of one particle cannot be described independently of the quantum state of the other particle. Although the phenomenon of quantum entanglement is known and has been measured at small non-relativistic energies, the problem is highly topical. The Nobel Prize 2022 was awarded precisely for this area of research, for the study of the properties of quantum entangled photons. In the case of the observation of the given effect, it means a unique result - for the first time, the phenomenon has been confirmed in the strong interaction.

#### **Related publications and other outputs:**

ATLAS Collaboration: Observation of quantum entanglement with top quarks at the ATLAS detector. In Nature 633 (2024) 542-547 IF = 50.5, Nature Index

#### **Preparation of a phosphide-based electrocatalyst with a unique fibrillar structure.**

**Institute:** Institute of Materials Research SAS

**Researchers:** C. Bera (principal investigator) et al.

**Project(s):** APVV-20-0299, VEGA 2/0027/23

NiCoP transition metal phosphide has been recognized as a most promising candidate to alternate the noble metals in hydrogen evolution reaction. The facile preparation of NiCoP electrocatalyst in form of fibers with dominant 1D structure formed by needle-less electrospinning technology and finalized by defined heat treatment process is presented for the first time. The study provides a precise method for the preparation of NiCoP or similar phosphide fibers, together with an experimental proof of their excellent electrocatalytic performance in alkali and acidic environments. The as-prepared fibrous NiCoP electrocatalyst sintered in air at 900 °C followed by sintering at 700 °C in Ar/H<sub>2</sub> exhibits low hydrogen evolution reaction overpotential ( $\eta_{10}$ ) of 141 mV in alkali and 146 mV in acidic environment corresponding with low Tafel slopes of 53 and 97.8 mV/dec, respectively. The bimetallic phosphide also shows superior oxygen evolution reaction activity in alkaline medium 1 M KOH with satisfying durability in long-term stability tests. The highly innovative fibrous form of the material not only plays a significant role in regulation of the electronic structure and boosting the electrochemical active sites and thus the electrocatalytic performance in water splitting technology, but also allows tuning of the electrode electric conductivity, occurrence of the active sites probability and thus utilisation of the electrode, together with its permeability and mechanical stability.

#### **Related publications and other outputs:**

BERA, Cyril - STREČKOVÁ, Magdaléna\*\* - ORIŇAKOVÁ, Renáta - GUBÓOVÁ, Alexandra - BYSTRON, T. - GIRMAN, Vladimír - KROMKA, František - PODOBOVÁ, Mária - BOUZEK, Karel. NiCoP fibers as novel

catalysts for hydrogen evolution in alkali and acidic environment. In International Journal of Hydrogen Energy, 2024, vol. 60, pp. 118-132. (2023: 8.1 - IF, Q1 - JCR, 1.513 - SJR, Q1 - SJR). ISSN 0360-3199.ADCA

## Scientific Section 2 (Life, Chemical, Medical, and Environmental Sciences)

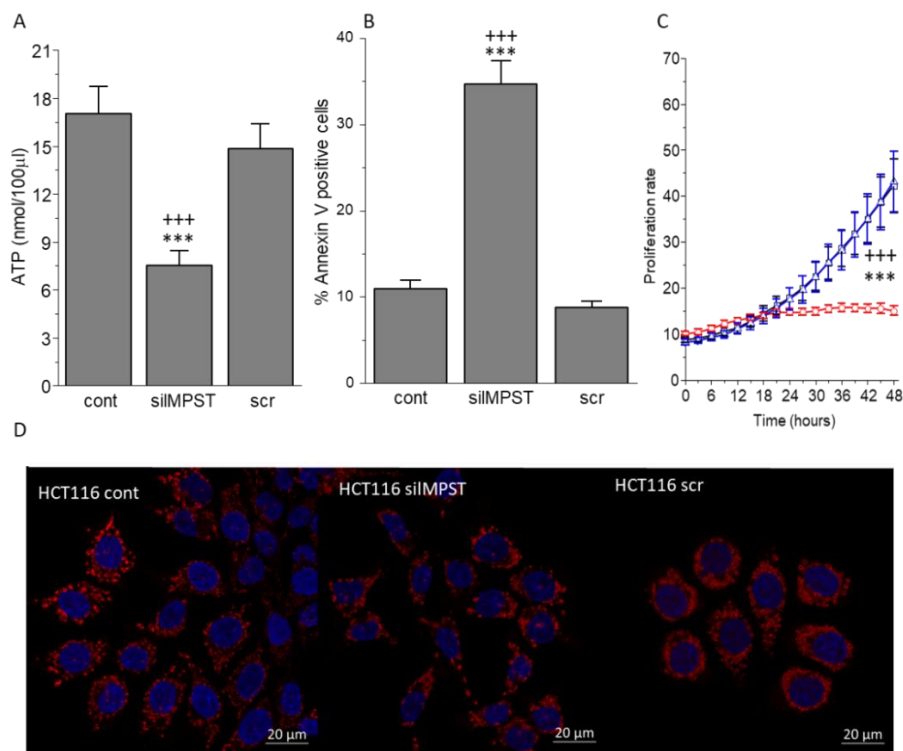
### Role of the 3-mercaptopyruvate sulfurtransferase (MPST) in colon/colorectal cancers.

**Institute:** Biomedical Research Center SAS, Institute of Clinical and Translational Research

**Researchers:** O. Križanová, V. Lišková, K. Matyášová, A. Šoltýsová

**Projects:** APVV-20-0176, VEGA 2/0040/22, VEGA 2/0047/22

The 3-mercaptopyruvate sulfurtransferase (MPST) is a mainly mitochondrial enzyme that endogenously produces hydrogen sulfide, and its function in tumors is still under study. We focused on the determination of function of MPST in colon/colorectal cancers. Silencing the MPST gene in tumor cells resulted in a decrease in ATP levels (Fig. 2.3.3 A) and induction of controlled cell death - apoptosis (Fig. 2.3.3 B). Mitochondria were significantly smaller in cells with the silenced MPST gene, supporting the theory of cells entering apoptosis (Fig. 2.3.3 D). Proliferation (multiplication) (Fig. 2.3.3 C) of tumor cells was also significantly altered after silencing the MPST gene. Our results clearly show that MPST is a significant modulator of mitochondrial energetics, thus supporting ATP production, thereby affecting the growth and invasiveness of colorectal cancer cells. Blocking MPST function by developing a specific blocker could help treat these tumors.



### 3. SELECTED RESULTS OF SCIENTIFIC RESEARCH

*Silencing of 3-mercaptopyruvate sulfurtransferase (MPST) expression in colorectal cancer cells results in decreased ATP levels (A), increased apoptosis (B), decreased cell proliferation (C), and mitochondrial shrinkage (D).*

#### Related publications and other outputs:

MÁTYÁSOVÁ, Katarína - ŠOLTÝSOVÁ, Andrea - BABULA, P. - KRIŽANOVÁ, Oľga\*\* - LIŠKOVÁ, Veronika. Role of the 3-mercaptopyruvate sulfurtransferase in colon/colorectal cancers. In European Journal of Cell Biology, 2024, vol. 103, no. 2, art. no. 151415. (2023: 4.5 - IF, Q2 - JCR, 1.59 - SJR, Q1 - SJR).

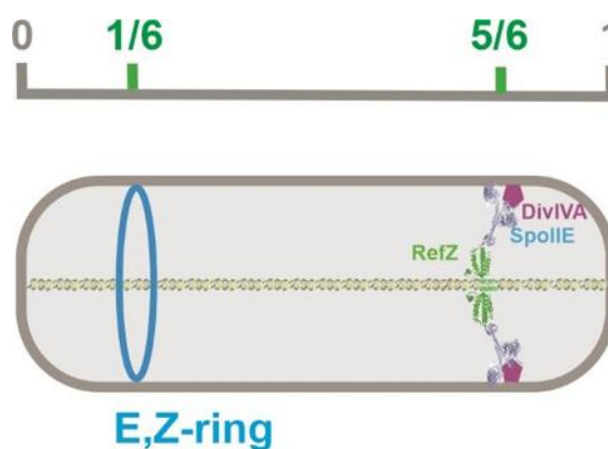
#### Spatio-temporal control of asymmetric septum positioning during sporulation in *Bacillus subtilis*.

**Institute:** Institute of Molecular Biology SAS

**Researchers:** I. Barák, K. Muchová, E. Kalocsaiová, Z. Chromiková, S. Žarnovičanová (for the Institute of Molecular Biology SAS)

**Projects:** VEGA 2/0001/21; APVV-22-0303

The ability of bacterial spores to survive without nutrients for millions of years and then germinate presents, in addition to medical and biotechnological possibilities, also risks to human health. The durability of *Bacillus subtilis* spores has led to their use as probiotics in the food industry, and they have also become the basis for the production of new vaccines. This is also the reason why this organism has been used for decades to study fundamental cellular processes such as cell division and sporulation. In our work, we managed to determine how bacteria can measure their length and find the correct position of cell division during sporulation at 1/6 or 5/6 from the cell pole. Understanding this mechanism is the basis for answers to one of the most fascinating questions in bacterial developmental biology. The knowledge gained about the inhibition of the function of proteins involved in cell division and sporulation can also help in the preparation of new antibacterial drugs against pathogenic multidrug-resistant bacteria.



*Simplified model of sporulation septum location. The model shows how the precise positioning of the asymmetric septum at 1/6 or 5/6 of the cell length can be recognized by positive and*

*negative regulators in rod-shaped bacteria during sporulation. At this positioning, a Z-ring (FtsZ) and an E-ring (SpoIIE) can be formed. RefZ binds to specific DNA sequences, RefZ binding motifs, on both chromosomes (yellow), stretched from one pole to the other as an axial filament. The 3D crystal structure of RefZ is shown in green, the SpoIIE model is in blue, and DivIVA is shown in purple.*

#### **Related publications and other outputs:**

MUCHOVÁ, Katarína - POSPÍŠIL, J. - KALOCSAIOVÁ, Evelína - CHROMÍKOVÁ, Zuzana - ŽARNOVIČANOVÁ, Silvia - ŠANDEROVÁ, H. - KRÁSNY, L. - BARÁK, Imrich\*\*. Spatio-temporal control of asymmetric septum positioning during sporulation in *Bacillus subtilis*. In *Journal of Biological Chemistry*, 2024, vol. 300, iss. 6, art. no. 107339. (2023: 4 - IF, Q2 - JCR, 1.766 - SJR, Q1 - SJR). ISSN 0021-9258. Available at: <https://doi.org/10.1016/j.jbc.2024.107339>

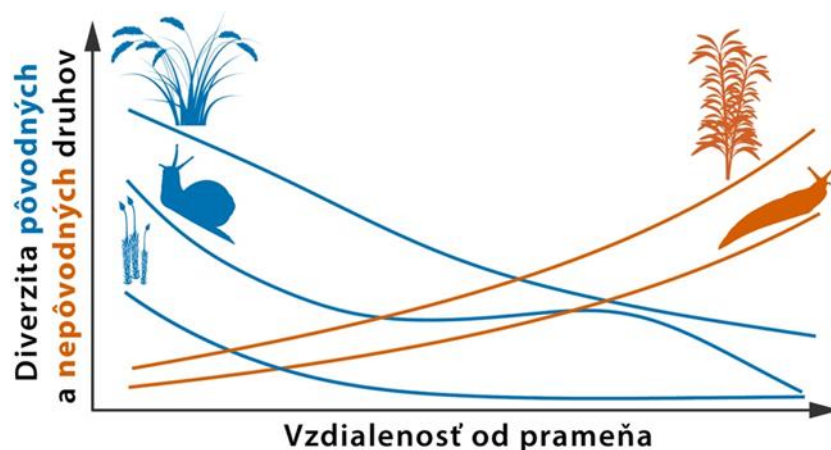
#### **Contrasting diversity patterns of native and alien species across multiple taxa in Central European river corridors.**

**Institute:** Plant Science and Biodiversity Centre SAS, Institute of Botany

**Researchers:** I. Svitková, M. Svitok, T. Čejka, D. Galvánek, D. Senko, K. Skokanová, B. Šingliarová, S. Španiel, R. Hrivnák.

**Projects:** APVV-19-0134

River corridors are among the most important natural pathways for invasive species to spread into landscapes. Nevertheless, the ecological processes underlying invasions of riparian habitats are poorly understood for many taxonomic groups. Our study is the first investigation of the diversity of native and alien species along river corridors, encompassing multiple taxa. We sampled bryophytes, vascular plants, and molluscs along three West Carpathian rivers (Central Europe) to identify spatial trends and drivers of native and alien species diversity across multiple taxa. The diversity of native species had a decreasing trend along the course of all studied rivers, although several studies of riparian vegetation diversity showed a unimodal nature of the data, with the highest number of species in the middle parts of the streams. In contrast, alien diversity showed the opposite trend, displaying a high degree of idiosyncrasy among the rivers. We found that climatic factors, such as altitude and related temperature, played the most significant role in the diversity of alien species, while the diversity of native species was more influenced by, for example, proximity to a spring or the occurrence of natural riparian habitats. Soil properties and anthropogenic factors were of little importance in the analysis of species richness along river corridors. Since climatic factors have been shown to play a significant role in the occurrence of alien plants and molluscs along river corridors, ongoing climate change may mean a gradual spread to higher altitudes and northwards.



- *Diverzita pôvodných druhov machorastov, cievnatých rastlín a mäkkýšov klesá pozdĺž riečnych koridorov*
- *Nepôvodné rastliny a mäkkýše vykazujú opačný trend*
- *Silný klimatický vplyv na diverzitu nepôvodných druhov naznačuje ich budúcu expanziu pozdĺž riek*

*Schematic overview of the study results*

#### **Related publications and other outputs:**

SVITKOVÁ, Ivana\*\* - SVITOK, Marek - ČEJKA, Tomáš - ŠIRKA, Pavel - GALVÁNEK, Dobromil - GÖMÖRY, Dušan - GÖMÖRYOVÁ, Erika - KOCHJAROVÁ, Judita - SENKO, Dušan - SKOKANOVÁ, Katarína - SLEZÁK, Michal - ŠINGLIAROVÁ, Barbora - ŠPANIEL, Stanislav - HRIVNÁK, Richard Contrasting diversity patterns of native and alien species across multiple taxa in Central European river corridors. In *Ecological Indicators*, 2024, vol. 169, art. no. 112859. (2023: 7 - IF, Q1 - JCR, 1.633 - SJR, Q1 - SJR). ISSN 1470-160X. Typ: ADCA. Available at: <https://doi.org/10.1016/j.ecolind.2024.112859>

#### **Scientific Section 3 (Social Sciences, Humanities, Arts, and Culture)**

##### **The Ungraspable as a Philosophical Problem**

**Institute:** Institute of Philosophy SAS

**Researcher:** A. Kuchtová

**Project:** APVV-20-0137

“The Ungraspable as a Philosophical Problem: The Stubborn Persistence of Humanism in Contemporary Phenomenology” is an analysis of the ungraspable, which is defined as that which cannot be grasped by either thought or the senses. The concept of the ungraspable is defined here in the context of contemporary and 20th-century philosophy – the starting point for the analysis is the work of Emmanuel Levinas, Jacques Derrida and Martin Heidegger. The

ungraspable has taken various forms in the history of philosophy, and at certain stages of the history of philosophy, it was considered absolute – for example, in negative theology. The absoluteness of these modalities is related to a certain form of uniqueness, which is related to the desire to grasp and which can be characterized by the following three features: precision, purity and dominance. This issue is related to the important question of grasping the “otherness of the inanimate”, which concerns the ungraspability of nature and things, which is connected to environmental philosophy.

**Related publications and other outputs:**

KUCHTOVÁ, Alžbeta. The Ungraspable as a Philosophical Problem: The Stubborn Persistence of Humanism in Contemporary Phenomenology. Leiden - Boston: Brill, 2024. 327 p. New Research in the History of Western Philosophy, Vol. 5. Dostupné na: <https://doi.org/10.1163/9789004701465>. ISBN 978-90-04-70109-0. ISSN 2949-9518 Typ: AAA

**The production history of the Slovak National Theatre**

**Institute:** Art Research Centre SAS – o. z. Institute of Theatre and Film Research SAS

**Researchers:** D. Podmaková et al.

**Projects:** VEGA 2/0070/13; VEGA 2/0143/16:

The three-volume monumental work "100 Years of the Slovak National Theatre (1920 – 2020)" presents the history of the top professional scene through a hundred emblematic productions of drama, opera and ballet. The first volume contains extensive studies on the establishment of the theatre, its art workshops, buildings, as well as the developmental stages of the SND Drama. The second and third volumes contain similar cross-sectional studies on opera and ballet. The selection of one hundred productions from almost three thousand premieres over a hundred years in a ratio of 50 (drama) : 30 (opera) : 20 (ballet) was made after several years of research; the studies offer many previously unpublished information from domestic and foreign sources. A thirty-five-member team of various backgrounds and generations under the leadership of D. Podmaková created a scientific work written in understandable language for every reader interested in the cultural history of nations in central Europe over the course of several years. A work of a similar nature – the production history of a theater institution – does not yet exist in Slovakia.

**Related publications and other outputs:**

PODMAKOVÁ, Dagmar a kolektív: 100 rokov Slovenského národného divadla 1920 – 2020: Činohra: Opera: Balet. 1027 s. Bratislava: Slovenské národné divadlo : Slovart, 2024. ISBN 978-80-556-4288-8.

#### Political and science-related populist attitudes in Slovakia

**Institute:** Centre of Social and Psychological Sciences SAS – o. z. Institute of Social Sciences SAS

**Researchers:** I. Piterová, A. Loziak

**Projects:** VEGA 2/0065/21: Social and Psychological Correlates of Populist Attitudes

As part of the research on the social and psychological correlates of populist attitudes, the study presented a comprehensive model for predicting political populist attitudes in Slovakia, which explained 54% of the variance. Significant determinants of political populist attitudes in Slovakia are relative deprivation, belief in simple solutions, (external) political efficacy, trust in experts, and conspiracy mentality. For the new concept, populist attitudes related to science, the SCIPop scale was translated into Slovak and tested on a Slovak sample. The scale shows robust psychometric properties, including a four-factor structure and measurement invariance across gender, age, and educational groups. Significant correlations of populist attitudes related to science with political populist attitudes, trust in science, distrust of experts, and perception of science were confirmed.

#### Related publications and other outputs:

PITEROVÁ, Ivana. Science-related populism: Psychometric properties of the Slovak version of the SciPop Scale. In *Československá psychologie*, 2024, roč. 68, č. 2, s. 156-173. (2023: 0.5 - IF, Q4 - JCR, 0.19 - SJR, Q2 - SJR). ISSN 0009-062X. Available at: <https://doi.org/10.51561/cspsych.68.2.156>  
Type: ADCA

PITEROVÁ, Ivana\*\* - LOZIAK, Alexander. A Comprehensive Model for Predicting Populist Attitudes. In *Journal of Social and Political Psychology*, 2024, vol. 12, no. 1, p. 73-88. (2023: 1.8 - IF, Q3 - JCR, 0.741 - SJR, Q1 - SJR). ISSN 2195-3325. Available at: <https://doi.org/10.5964/jspp.11539>  
Type: ADMA

## 3.2 Results based on applied research

### Scientific Section 1 (Physical, Space, Earth, and Engineering Sciences)

#### Electronic mapping of cultural landscape heritage of Ukraine

**Institute:** Institute of Geography SAS

**Researchers:** K. Polyvach

**Projects:** Scholarships for Excellent Researchers Threatened by the Military Conflict in Ukraine (09I03-03-V01-00021)

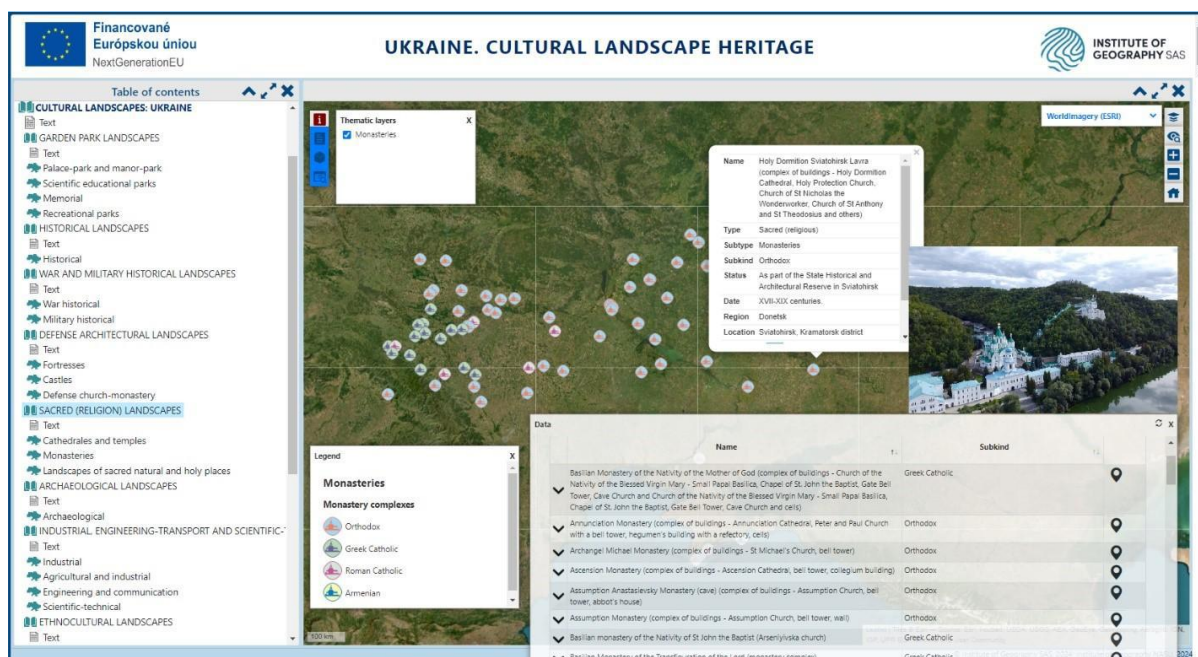
The project results in the development of conceptual and methodological approaches to the study of the cultural landscape heritage of Ukraine as a scientific object and its cartographic representation in the form of a thematic electronic atlas. The Atlas “Ukraine. Cultural Landscape Heritage” was created to structure and visualise spatial information about the most significant part of the heritage of the country and its regions. The interactive atlas contains 39 maps, texts, photographs and tables presented at the global, national, regional and local levels. The content is divided into four parts. The maps reflect the territorial, species and historical characteristics of the formation of approximately 2000 of the most significant elements of the cultural landscape, their state of protection, topographic references and size. The typology of 2000 objects consists of 30 types, grouped into 8 groups.

The atlas is available in two versions: Ukrainian and English. The English version can be found at: [http://projects.geography.sav.sk/web-data/AUKLH\\_ENG/](http://projects.geography.sav.sk/web-data/AUKLH_ENG/).

#### Related publications and other outputs:

1.8 - IF, Q3 - JCR, 0.741 - SJR, Q1 - SJR). Cultural landscape heritage of Ukraine – conceptualisation, structuring and atlas mapping. *Geografický časopis*, 2024, 76(1), 39–61. (2023: 0.5 - IF, Q3 - JCR, 0.223 - SJR, Q3 - SJR). <https://doi.org/10.31577/geogrcas.2024.76.1.03>

### 3. SELECTED RESULTS OF SCIENTIFIC RESEARCH



*Interface of the electronic atlas "Ukraine. Cultural Landscape Heritage"*

#### Study of the usability of the Podunajské Biskupice water source

**Institute:** Institute of Hydrology SAS

**Researchers:** M. Sokáč, M. Koczka Bara, Y. Velísková

**Projects:** Business contract: BVS, a.s., order no. 4500036740

The study provides an overview of the current state of the II. Water Source of Podunajské Biskupice (VZ PB), as well as the possibilities of its use in the future, with regard to various aspects. The BVS, a.s. Board of Directors used the study as a basis for decision-making when deciding on the further use of VZ PB.

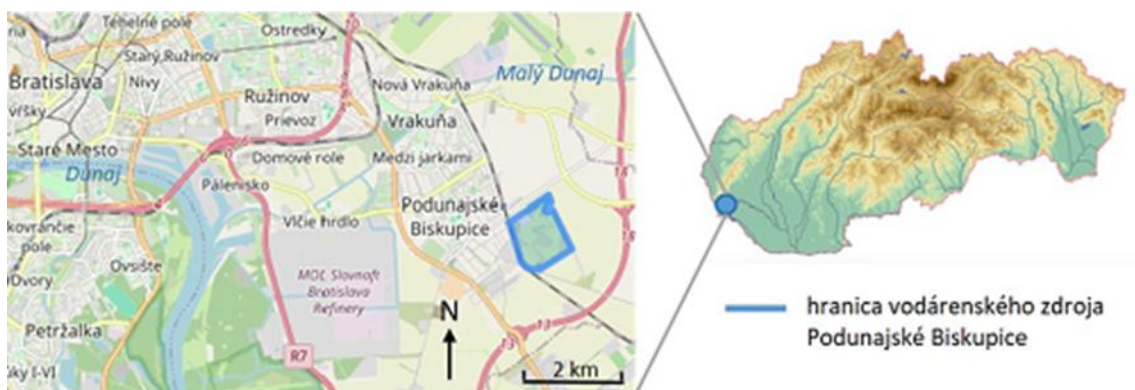
Water is becoming a strategic raw material; therefore, any disruption of a water source is a highly sensitive issue that may have unforeseeable consequences for future generations. From a balance point of view, BVS, a.s. has limited water resources on its territory. Water resources in the area of Žitný ostrov fall under the jurisdiction of another water company (ZsVS, a.s.). Another negative is the decrease in the yield of some currently used water sources (Pečniansky les) under the jurisdiction of BVS, a.s. The definitive cancellation of the VZ PB could negatively impact the resource balance, especially given the increasing demand for water due to the development of industrial construction and population growth in the Bratislava region. A counterargument to the preservation of the VZ PB may be the unclear further development in terms of the remediation of contamination threatening the VZ PB, as well as the CHVO. Despite promises, studies and projects, the implementation of the remediation of environmental loads has not yet been initiated. However, it is also possible

that, in accordance with the applicable legislation, the remediation will be implemented in the foreseeable future, but even in this case, the development of quality in the water source is questionable due to the already escaped contamination.

From a hydrogeological perspective, the VZ PB has a strategic location. It lies in the direction of groundwater flow, between Bratislava (where 14 environmental pressures have been identified so far – ŠGÚDŠ) and the Žitný ostrov Protected Area, where the largest groundwater reserves in Slovakia are located. If necessary, the VZ PB can potentially be used as a hydraulic protection (in the form of a hydraulic shield) of the upper part of Žitný ostrov against contamination from environmental loads, including those not yet documented. In the past, the VZ PB facilities have already been used for such a purpose: until 2001, they were part of the remedial pumping of groundwater of the hydraulic protection system against advancing oil pollution from Slovnaft (total pumped amount approx. 400 l.s-1).

The cancellation of the VZ PB would also mean the loss of protection of the upper part of the CHVO ŽO. For this reason, if the VZ PB was not used as a source of drinking water, we proposed (recommended) the preservation of wells on the territory of the VZ PB, or when developing the territory of the VZ PB, to omit a strip of land in public ownership for the construction of a new system of wells (hydraulic shield), which, if necessary, could be used as hydraulic protection of the upper part of Žitný ostrov - by pumping out pollution originating from higher-situated environmental loads (Vrakuňa landfill, Slovnaft and others).

We consider all of the above aspects to be part of a significant social impact, as it concerns the supply of the population to a significant extent, or rather, the preservation and protection of an irreplaceable water resource in the protected water management area (CHVO) of Žitný ostrov.



*Situational map of the Podunajské Biskupice water source*

*(source of the base map: freemap.sk)*

### 3. SELECTED RESULTS OF SCIENTIFIC RESEARCH

## Development of magnesium alloy and its heat treatment for structural parts of racing karts

**Institute:** Institute of Materials and Machine Mechanics SAS

**Researchers:** P. Oslanec ml., L. Senčeková, T. Švantner, F. Simančík

As part of the research for the Slovak company KKART s. r. o., Lučenec ([www.kkart.sk](http://www.kkart.sk)), which produces lightweight structural components for competitive sports karts, semi-finished products made of AZ91 magnesium alloys were assessed, which the company uses to produce final parts. The company purchases semi-finished products from various suppliers, and their quality often does not meet the demanding production requirements. Analysis and evaluation of the microstructure have shown that cast semi-finished products often exhibit excessive porosity and a significantly inhomogeneous microstructure, caused by inappropriate casting technology. These deficiencies lead to problems with the hermetic tightness of structural parts, especially wheel rims, but also to the impossibility of achieving the required surface quality after final chemical treatment. Ultimately, the insufficient quality of semi-finished products significantly increases production costs, as it is usually only apparent during the final testing and evaluation of product quality.

The result of the research, in addition to identifying defects in the evaluated semi-finished products, was also a proposal for measures that could prevent these defects. A heat treatment was proposed that allows achieving an acceptable quality of the chromated surface even in semi-finished products with a very inhomogeneous structure. An alternative magnesium alloy was also recommended to the manufacturer, as well as a method of casting it into semi-finished products, so that the current problems would be largely eliminated. Cooperation continues on the project, the aim of which is to create a workplace for the production of quality semi-finished products in Slovakia, with the participation of both partners.

## Scientific Section 2 (Life, Chemical, Medical, and Environmental Sciences)

### New potential options for treating diabetic complications using selective aldose reductase inhibitors

**Institute:** Centre of Experimental Medicine SAS

**Researchers:** L. Kováčiková et al.

**Projects:** VEGA 2/0008/22, VEGA 2/0103/22, APVV-20-0411 a APVV-20-0543

Our patented compound cemtirestat disulfide is metabolized in the body to two molecules of cemtirestat - an active inhibitor of the enzyme aldose reductase, which is co-responsible for diabetic complications. The advantage of disulfide therapy is the targeted distribution of the

active drug to tumor cells. Increased expression of aldo-ketoreductases in various cancers causes resistance to clinically used chemotherapeutic agents (e.g. doxorubicin, daunorubicin). Aldose reductase contributes to reducing the effect of chemotherapeutic agents by metabolic deactivation. Cemtirestat disulfide itself is not an aldose reductase inhibitor. The experiments revealed rapid kinetics of disulfide bond cleavage with reduced glutathione, with glutathione levels 10-100 times higher in cancer cells, ensuring preferential drug delivery to tumor cells. This can be used as a strategy for chemotherapeutics to reduce the side effects of treatment. Following these results, we performed a series of experiments which confirmed that disulfide protects erythrocytes from oxidative damage induced by peroxy radicals. We also prepared a series of new oxygen analogues of cemtirestat, with the most potent inhibitor having twice the activity compared to its unsubstituted derivative, but at the expense of selectivity towards the related enzyme aldehyde reductase (a detoxification enzyme). To explain the high decrease in selectivity observed in other derivatives, we chose an in silico molecular modeling approach. We revealed the important role of the C-terminal loop of the aldehyde reductase enzyme (absent in aldose reductase) capable of forming interactions of amino acid residues with inhibitors. The key findings of this research will be used in the development of the next generation of selective inhibitors.

#### **Related publications and other outputs:**

Decision on the grant of European Patent No. EP 4259152 by publication in the European Patent Bulletin No. 24/25 on 19.06.2024. In February 2024, the patent application was extended to India: Application No.202327046869 A (IN202327046869).

KOVÁČIKOVÁ, Lucia\*\* - ŠOLTÉSOVÁ PRNOVÁ, Marta - BOĎO, Pavol - ŠTEFEK, Milan. Cemtirestat dimerization in liposomes and erythrocytes exposed to peroxy radicals was reverted by thiol-disulfide exchange with GSH. In *Free Radical Research*, 2024, vol. 58, no. 1, p.1-10. (2023: 3.6 - IF, Q2 - JCR, 0.778 - SJR, Q2 - SJR). ISSN 1071-5762. Available at: <https://doi.org/10.1080/10715762.2023.2298852>

KOVÁČIKOVÁ, Lucia\*\* - GAIKWAD, Sunil - ALMÁŠIOVÁ, Kristína - ALMÁSSY, Ambroz - ADDOVÁ, Gabriela - MÁJEKOVÁ, Magdaléna - HANQUET, Gilles - DOBRIČIĆ, Vladimir - BOHÁČ, Andrej - ŠTEFEK, Milan. Selectivity of N(2)-substituted oxotriazinoindole aldose reductase inhibitors is determined by the interaction pattern with Pro301-Arg312 loop of aldehyde reductase. In *Medicinal chemistry research*, 2024, vol. 33, no. 3, pp. 492-503. (2023: 2.6 - IF, Q3 - JCR, 0.41 - SJR, Q2 - SJR). ISSN 1054-2523. Available at: <https://doi.org/10.1007/s00044-024-03194-3>. Grafický abstrakt tejto práce bol vybraný pre titulnú stranu marcového vydania časopisu.

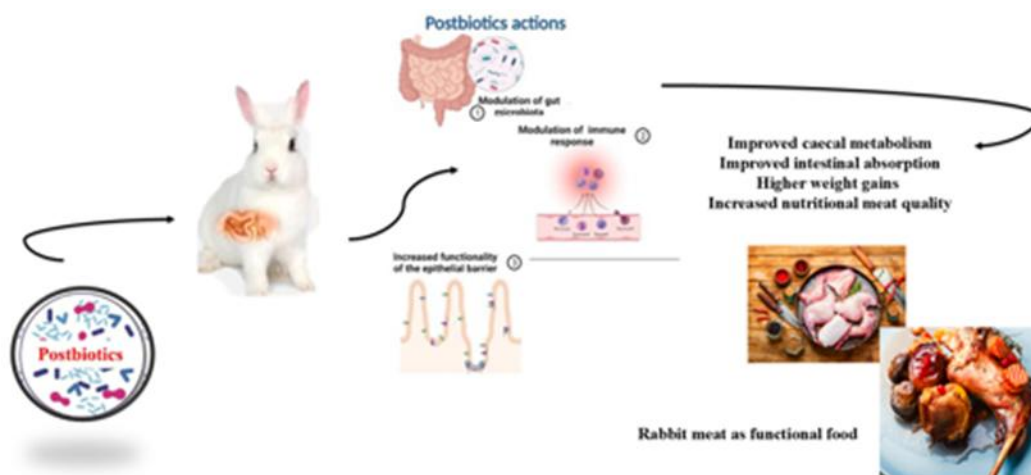
#### **Protective effect of enterocins for preserving the quality of rabbit meat**

**Institute:** Centre of Biosciences SAS

**Researchers:** M. Pogány Simonová, E. Bino, A. Kandričáková, A. Lauková

**Projects:**

Rabbit meat is rich in essential amino acids (EAA) and has a high biological value. Despite efforts to maintain healthy rabbit breeding during rearing, infections can occur, which then affect the carcass quality of the meat. Enterocins – EntS (protein substances with antimicrobial effects produced by some bacteria of the genus *Enterococcus*) are capable of improving not only animal health, but also increasing the nutritional quality of rabbit meat to the level of functional food, as a new type of feed additive. Therefore, the protective effect of EntM (with simultaneous application of the undesirable strain *Enterococcus hirae* Kr8+) on the growth and meat quality of broiler rabbits was verified. EntM administration significantly improved the growth parameters of rabbits and the EAA content in meat, which increases its potential for use as a functional food. Optimized or improved meat parameters during testing emphasize the protective effect of EntM on the health and quality of rabbit meat, which is a fundamental benefit for breeding practice.



*Schematic representation of the action of enterocins (postbiotics) in the intestinal tract of rabbits: beneficial modulation of the intestinal microbiota (increase in the proportion of beneficial bacteria) and microbial metabolism in the caecum of rabbits, increased absorption of nutrients through the intestinal wall and their deposition in rabbit meat, improved/increased carcass yield, nutritional and functional quality of rabbit meat.*

#### **Related publications and other outputs:**

POGÁNY SIMONOVÁ, Monika\*\* - CHRASTINOVÁ, Ľubica - BINO, Eva - KANDRIČÁKOVÁ, Anna - FORMELOVÁ, Zuzana - LAUKOVÁ, Andrea. Application of Autochthonous Biofilm-Forming *Enterococcus hirae* Kr8 Strain in Relation with Enterocin M in Broiler Rabbits and Their Effect on the Rabbit Meat Quality: Risk or Protection? In *Probiotics and Antimicrobial Proteins*, 2024, vol. 16, no. 3, pp. 1076-1086. (2023: 4.4 - IF, Q1 - JCR, 0.906 - SJR, Q2 - SJR).

#### Alveolar echinococcosis – new diagnostic approaches, epidemiology and risk factors for the spread of infection

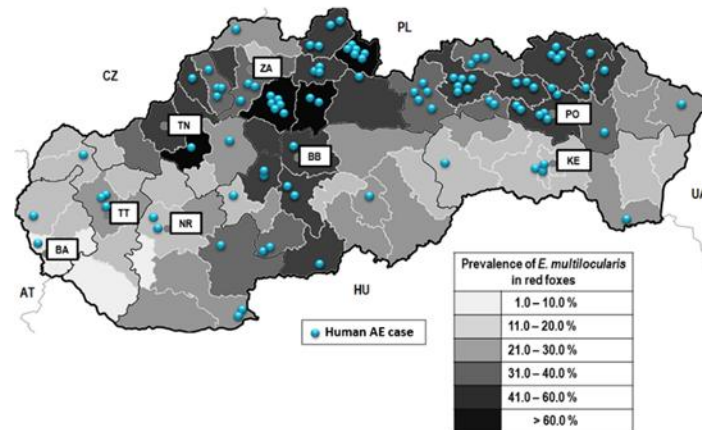
**Institute:** Institute of Parasitology SAS

**Researchers:** D. Antolová; V. Šnábel; M. Miterpáková; J. Halapy (né Jarošová);  
Y. Syrota

**Projects:** APVV-21-0166; VEGA 2/0157/22; VEGA 2/0107/20

The fox tapeworm (*Echinococcus multilocularis*) is the cause of alveolar echinococcosis (AE), a serious parasitic disease in humans that manifests as the formation of lesions, most commonly in the liver. The lesions resemble a malignant tumor – they are poorly demarcated, grow into surrounding tissues and metastasize. In untreated cases, the disease is almost always fatal. Data on the epidemiology of *E. multilocularis* and its genetic diversity are crucial for understanding the mechanisms by which this tapeworm spreads and can help clarify the differences in infectivity and pathogenicity among individual genotypes.

For epidemiological research, diagnostic procedures aimed at the detection of antibodies against the parasite (serological) and the analysis of its DNA (molecular) were developed and implemented by the Institute of Parasitology SAS. These methods are currently used in clinical and diagnostic laboratories throughout Slovakia and have helped to reveal the real incidence of the infection. A comprehensive epidemiological analysis of all cases of AE in Slovakia revealed an almost sixfold increase in the incidence of this disease over the past ten years. Although the disease was most common in people over 60 years of age, up to 5.8% of patients were under 20 years of age. This indicates a high infectious pressure in the environment, or the occurrence of more infectious genotypes in our territory, since, on both the European and global average, patients under 20 years of age account for only about 2% of cases. The correlation between the occurrence of tapeworm in humans and in red foxes, which are the reservoir of the tapeworm, was also confirmed. Based on the obtained results, the districts of the Žilina and Prešov regions, where more than half of the foxes are infected with the parasite, were identified as areas with the highest risk of its transmission to humans (Fig.). The obtained results clearly indicate the need for intensive attention from experts, and given the specific life cycle and zoonotic nature of the tapeworm, a multidisciplinary approach is necessary to solve this issue.



*Geographical occurrence of cases of alveolar echinococcosis in humans (blue marks)*

*in the years 2000 - 2023 and the prevalence of the tapeworm Echinococcus multilocularis in red foxes in the districts of Slovakia.*

#### **Related publications and other outputs:**

ANTOLOVÁ, Daniela - ŠNÁBEL, Viliam\*\* - JAROŠOVÁ, Júlia - CAVALLERO, Serena - D'AMELIO, Stefano - SYROTA, Yaroslav - ROSOLANKA, Róbert - AVDIČOVÁ, Mária - MITERPÁKOVÁ, Martina. Human alveolar echinococcosis in Slovakia: Epidemiology and genetic diversity of Echinococcus multilocularis, 2000–2023. PLOS Neglected Tropical Diseases, 2024, 18, 1, art. no. e0011876. ISSN 1935-2735. (2023: 3.4 - IF, Q1 - JCR, 1.258 - SJR, Q1 – SJR, Decil 1).

SANTORO, Azzurra\*\* - SANTOLAMAZZA, Federica - CACCIÒ, Simone - LA ROSA, Giuseppe - ANTOLOVÁ, Daniela - AUER, Herbert - BAGRADE, Guna - BANDELJ, Petra - BASSO, Walter - BECK, Relja - CITTERIO, Carlo V. - DAVIDSON, Rebecca K. - DEKSNE, G. - FREY, Caroline F. - FUGLEI, Eva - GLAWISCHNIG, Walter - GOTTSTEIN, Bruno - HARNA, Jiří - PETERSEN, Heidi Huus - KARAMON, Jacek - JANSEN, Famke - JAROŠOVÁ, Júlia - JOKELAINEN, Pikka - LUNDSTRÖM-STADELMANN, Britta - MAKSIMOV, Pavlo - MILJEVIĆ, Milan - MITERPÁKOVÁ, Martina - MOKS, Epp - ORIGGI, Francesco - OZOLINA, Zanda - RYSER, Marie-Pierre - ROMIG, Thomas - ŠARKŪNAS, Mindaugas - SCORRANO, Nathalie - SAARMA, Urmas - ŠNÁBEL, Viliam - SRÉTER, Tamás - UMHANG, Gérald - VENGUŠT, Gorazd - VENGUŠT, Diana Ž. - CASULLI, Adriano. Mitochondrial genetic diversity and phylogenetic relationships of Echinococcus multilocularis in Europe. International Journal for Parasitology, 2024, 54, 5, 233-245. ISSN 0020-7519. (2023: 3.7 - IF, Q1 - JCR, 1.111 - SJR, Q1 – SJR, Decil 1).

## Scientific Section 3 (Social Sciences, Humanities, Arts, and Culture)

### Creation of a large language model Mistral-SK

**Institute:** Ludovit Stur Institute of Linguistics SAS and the Centre of Social and Psychological Sciences SAS – in cooperation with the Technical University of Košice

**Projects:** Mistral-sk-7b-v0.1

In 2024, as part of the cooperation between the Ludovit Stur Institute of Linguistics SAS, the Centre of Social and Psychological Sciences SAS and the Technical University of Košice, the Mistral-sk-7b language model was successfully created and presented. It is the first large language model specifically designed for the Slovak language. This model, based on the Mistral-7B architecture with 7 billion parameters, was fine-tuned on extensive Slovak text data, which allows it to accurately understand and generate texts in the Slovak language. Mistral-sk-7b represents a significant advance in the field of natural language processing for Slovak, as it outperforms previous models such as SlovakBERT. This model enables the development of advanced applications such as intelligent chatbots, automated customer support systems and content creation tools, thereby contributing to the improvement of users' everyday lives. Mistral-sk-7b also opens up new opportunities for research and development in the field of artificial intelligence in Slovakia, thereby strengthening the position of the Slovak language in the digital world.

The model was trained on the most powerful European supercomputer Leonardo as part of a grant that the consortium of the Centre of Social and Psychological Sciences SAS, the Ludovit Stur Institute of Linguistics SAS and the Technical University of Košice received at the NSCC. One of the main goals of the project was to provide high-quality tools for natural language processing (NLP) in Slovak, which faces many specific challenges. Slovak, as a language with rich inflection, complex syntax, and a multitude of diacritics, presents a challenge for creating accurate language models. Many existing models for NLP are focused on English or other major world languages, which means that smaller languages like Slovak often remain on the fringes of technological progress.

Mistral-SK has filled this gap and provided tools that can be used in many areas, such as: Machine translation: Improving the quality of translation between Slovak and other languages. Text generation: Creating high-quality texts in Slovak for various purposes, from literary texts to education. Sentiment analysis: Better understanding of emotions and moods in texts, such as reviews or social media posts.

**Related publications and other outputs:**

<https://www.juls.savba.sk/ilm.html>

**Monuments of modern architecture of Slovakia in the DOCOMOMO Register**

**Institute:** Institute of History SAS

**Researchers:** H. Moravčíková, M. Bočková, K. Haberlandová, L. Krišteková, G. Smetanová, P. Szalay

**Projects:** Project names

DOCOMOMO (Documentation and Conservation of Buildings, Sites and Neighbourhoods of the Modern Movement) is an international organisation that deals with the research, documentation, promotion and protection of monuments of modern architecture. The organisation was founded in 1990 in the Netherlands, and Slovakia is one of its founding members. Since its establishment, one of the key objectives of DOCOMOMO International has been to compile a global register of the most important works of modern architecture and urbanism. The aim was to draw attention to the scope, structure and values of modern architectural heritage and to support its protection. From the beginning, the aim was not only to emphasise its universal character, but also to underline regional specificities.

The monograph is the result of over 20 years of cooperation between the research team of the Department of Architecture of the Institute of History SAS and this international organization, and the contribution of the Slovak research environment to the international professional discussion on the values and protection of modern architecture. 101 works thematized in the book represent Slovakia in the selection of the most significant creations of modern architecture and urbanism, which is under DOCOMOMO International and, at the same time, offers a unique perspective on the modern architectural heritage of Slovakia and another way of reading the history of contemporary architecture in a broader international context.

### 3. SELECTED RESULTS OF SCIENTIFIC RESEARCH



The over 700-page publication presents buildings that are among the most significant works of modern architecture and urban planning in Slovakia. The publication aims to spread awareness about the unique architecture in Slovakia. It also draws attention to the alarming condition of some buildings and the persistent reluctance of competent authorities to properly protect these buildings. The book is published bilingually because, in addition to spreading awareness among the Slovak audience, it participates in international professional discussion and thus ranks among the DOCOMOMO series of publications of buildings from other countries.

#### **Related publications and other outputs:**

MORAVČÍKOVÁ, Henrieta – BOČKOVÁ, Monika – HABERLANDOVÁ, Katarína – KRIŠTEKOVÁ, Laura – SMETANOVÁ, Gabriela – SZALAY, Peter. 101: Slovenská architektúra v registri DOCOMOMO / 101 Slovak Architecture in DOCOMOMO Register. Bratislava: Čierne diery, 2024. ISBN 978-80-69103-00-9.

#### **Environmental issues from the perspective of the social sciences**

**Institute:** Institute of Philosophy SAS; Institute of State and Law SAS; Institute of Political Science SAS

**Researchers:** R. Sťahel, K. Blaškovič, M. Augustín, L. Bocková (EU Bratislava)

**Projects:**

Several institutes of the Scientific Section 3 addressed various aspects of environmental protection and environmental issues in general in 2024.

Through its activities and research results, the Department of Environmental Philosophy of the Institute of Philosophy SAS productively influences the public debate on the socio-political causes and consequences of environmental devastation. This influence is realized mainly through a series of articles in print and online media, interviews, appearances in discussions, as well as in the form of lectures and debates organized for both professional and general public. One of the outputs in 2024 was the creation of the Climate Crisis as a Social Problem initiative, within which scientists working in the field of social sciences and humanities address the public to intensify a society-wide debate on the causes, connections and possible consequences of socio-environmental risks, as well as on ways for society to adapt to these risks.

The Institute of State and Law SAS created the scientific monograph called “Environmental safety. Climate change, environmental protection and the international legal framework.” In the first part, attention is paid to the security aspects of climate change, which are presented in three directions of impact – the impact on the individual, on the security of states and on international politics. The second part is devoted to the international legal regulation of environmental security. The subject of research is not only the possibilities of environmental protection by the standards of international law, but also how environmental degradation affects these rights (for example, human rights) and influences their development. The third part of the monograph presents the UN Security Council as the central body of the international collective security system and its approach to environmental security issues, while also analyzing the reasons preventing its more active steps.

The legal aspects of environmental issues are also examined in a study on compliance with related EU legislation in Slovakia since its accession to the union in 2004. It was published in the journal *European Politics and Society* and was created in cooperation with the Institute of Political Sciences SAS. The article pursues three main objectives: 1. It assesses Slovakia’s non-compliance since EU accession, using quantitative indicators to compare non-compliance with EU directives in different policy areas. 2. It examines whether the factors known in the existing literature to influence compliance also apply to Slovakia. 3. The authors address environmental infringements in Slovakia, highlighting the importance of environmental issues and the significant number of related infringement proceedings in the country, including those involving the Court of Justice of the European Union. The analysis contributes to the understanding of the shortcomings in compliance with environmental policy legislation in our country.

#### **Related publications and other outputs:**

The call "Climate Crisis as a Social Problem"

BLAŠKOVIČ, Kristián. Environmentálna bezpečnosť. Klimatická zmena, ochrana životného prostredia a medzinárodnoprávny rámec. 1. vyd. Bratislava: VEDA, 2023. 262 s. ISBN 978-80-224-2050-1.

### 3. SELECTED RESULTS OF SCIENTIFIC RESEARCH

BOCKOVÁ, Lucia - AUGUSTÍN, Michael\*\*. Unpacking the Slovak context: exploring EU law compliance and environmental infringements. In *European Politics and Society*, 2024, vol. 25, iss. 5, pp. 778-808. (2023: 0.561 - SJR, Q1 - SJR). ISSN 2374-5118. Available at: <https://doi.org/10.1080/23745118.2024.2328575>

### 3.3 Results based on international cooperation

#### Scientific Section 1 (Physical, Space, Earth, and Engineering Sciences)

##### Flexible halide perovskite photodetectors

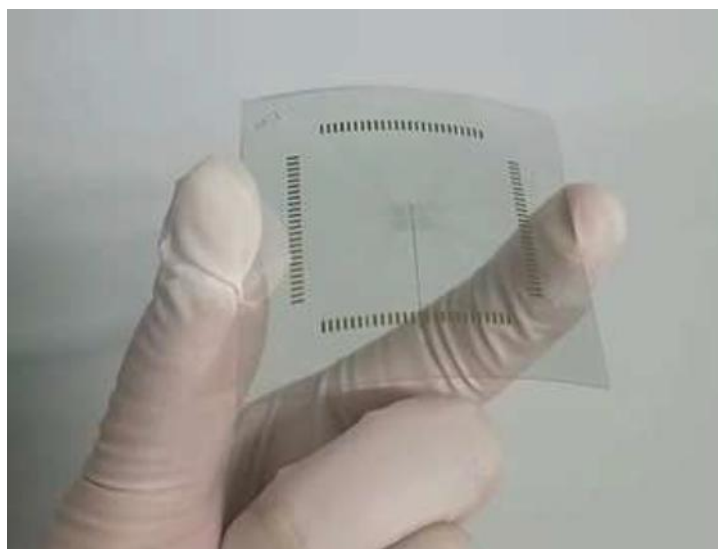
**Institute:** Institute of Physics SAS

**Researcher:** N. Mrkývková and the team of OMN authors

**Projects:** APVV-21-0297

**Project partners:** Chimie ParisTech, PSL Research University, CNRS, Institut de Recherche de Chimie Paris, Sorbonne Université, CNRS, Institut de NanoSciences de Paris

Metal-halide perovskites are currently considered very promising materials for high-performance photodetectors (FDs) due to their excellent optoelectronic properties. Our research focuses on developing stable and efficient perovskite FDs for various applications, including optical communications and imaging. Specifically, we have investigated several strategies to improve device performance, such as incorporating gold nanoparticles to improve the quality of perovskite crystals and using additives such as n-propylammonium iodide and formamidinium chloride to passivate defects. These approaches led to significant improvements in key performance parameters such as sensitivity, response time, and on/off current ratio. The developed FDs exhibit excellent long-term stability under ambient conditions, which is crucial for practical applications.



*Image of a 10×10 pixel photodetector array on a flexible substrate*

### 3. SELECTED RESULTS OF SCIENTIFIC RESEARCH

We have successfully integrated perovskite FDs into optical communication systems, enabling the transmission of optical signals. In addition, we have fabricated flexible perovskite FD arrays on substrates such as polyethylene terephthalate (PET), which may be used in wearable and flexible devices in the future. The flexible arrays exhibit high sensitivity, detectivity, and fast response times, making them suitable for high-resolution imaging applications. These advances pave the way for the development of next-generation perovskite-based optoelectronic devices with broad applications in areas such as communication, imaging, and sensing.

#### **Related publications and other outputs:**

T. Wang, D. Zheng, K. Vegso, G. Baillard, P. Nadazdy, N. Mrkyvkova, P. Siffalovic, Y. Chen, L. Coolen, T. Pauporte, F. Feng: A dual strategy to enhance the photoelectric performance of Perovskite-Based photodetectors for potential applications in optical communications. *Chem. Eng. Journal* 2024, 488, 151068. DOI: 10.1016/j.cej.2024.151068

T. Wang, D. Zheng, K. Vegso, N. Mrkyvkova, P. Siffalovic, X. Yuan, M. G. Somekh, L. Coolen, T. Pauporte, F. Fu: Flexible array of high performance and stable formamidiumbased low-n 2D halide perovskite photodetectors for optical imaging. *Nano Energy* 2023, 116, 108827. DOI: 10.1016/j.nanoen.2023.108827

T. Wang, D. Zheng, K. Vegso, N. Mrkyvkova, P. Siffalovic, T. Pauporte: High-Resolution and Stable Ruddlesden–Popper Quasi-2D Perovskite Flexible Photodetectors Arrays for Potential Applications as Optical Image Sensor. *Adv. Funct. Mater.* 2023, 2304659. DOI: 10.1002/adfm.202304659

#### **Integrated Technological and Information Platform for Wildfire Management (SILVANUS)**

**Institute:** Institute of Informatics SAS

**Researchers:** Z. Balogh, E. Gatiaľ, L. Hluchý, M. Bobák, O. Habala, Š. Dlugolinský, M. Šeleng, J. Zelenka, T. Kasanický, S. Hassankhani, I. Budinská (researchers from the Institute of Informatics SAS)

**Projects:** H2020-101037247

In the era of the climate crisis, wildfires are becoming increasingly frequent and dangerous. The SILVANUS project aims to provide a new, innovative technological solution to enhance preparedness and prevention of forest fires. The key output of the project is the development of an intelligent platform for forest management, including increasing climate resilience and preventing and suppressing wildfires. SILVANUS connects experts from the fields of environmental, technical and social sciences to help and support regional and national authorities responsible for wildfire management in the respective countries. The Institute of Informatics SAS participated primarily in the development of the following components: a phone application for reporting fires and warnings of danger, a platform for real-time data collection and aggregation, an algorithm for coordinating UAV and UGV swarms, a semantic platform for data management, and cloud tools for running models for predicting the spread of forest fires. The Institute of Informatics SAS actively participated in two rounds of prototype

demonstrations of integrated technologies at 12 pilot application sites (Indonesia, Australia, the Czech Republic, Romania, Portugal, Italy - Puglia, Italy - Sardinia, France, Croatia, Slovakia, Greece and Brazil). The Institute also participated in presentations of technologies developed under the SILVANUS project in the media (RTVS: VAT, RTVS: Experiment) and at meetings of the consortium and partner projects, as well as dissemination of results at professional conferences and in publications (ISCRAM, IUFRO, Požární ochrana).

### Related publications and other outputs:

MAJLINGOVÁ, Andrea - BRODRECHTOVÁ, Yvonne - MARCINEKOVÁ, Lenka - BALOGH, Zoltán - GATIAL, Emil. Information and innovative technology supporting the wildfire risk management and forest resilience - Slovak case study. In 26th IUFRO World Congress : Book of Abstracts. - Stockholm, Sweden, 2024, p. 1189. Typ: GII

GATIAL, Emil - BALOGH, Zoltán - HASSANKHANI DOLATABADI, Sepideh. Spatiotemporal data access for map services based on R-star tree index and LSM tree. In INES 2024 : 28th IEEE International conference on intelligent engineering systems 2024. Proceedings, p. 117-120. ISSN 1543-9259. Available at: <https://doi.org/10.1109/INES63318.2024.10629146> (INES 2024 : 2024 IEEE 28th International conference on intelligent engineering systems) Typ: ADMB

HASSANKHANI DOLATABADI, Sepideh - GATIAL, Emil - BUDINSKÁ, Ivana - BALOGH, Zoltán. Integrating human-computer interaction principles in user-centered dashboard design: insights from maintenance management. In INES 2024 : 28th IEEE International conference on intelligent engineering systems 2024. Proceedings, p. 219-224. ISSN 1543-9259. Available at: <https://doi.org/10.1109/INES63318.2024.10629098> (INES 2024 : 2024 IEEE 28th International conference on intelligent engineering systems) Typ: ADMB

MAJLINGOVÁ, Andrea - BRODRECHTOVÁ, Yvonne - MARCINEKOVÁ, Lenka - BALOGH, Zoltán - GATIAL, Emil. Information and innovative technology supporting the wildfire risk management and forest resilience - Slovak case study. In 26th IUFRO World Congress : Book of Abstracts. - Stockholm, Sweden, 2024, p. 1189. Typ: GII

BALOGH, Zoltán - GATIAL, Emil - HASSANKHANI DOLATABADI, Sepideh - DLUGOLINSKÝ, Štefan - SALTARELLA, Marco - SCIPIONI, Marcello Paolo - GRUNWALD, Dominika - PRZYBYSZEWSKI, Marcin - MAJLINGOVÁ, Andrea - BRODRECHTOVÁ, Yvonne - MOJIR, Kayvan Yousefi - OLSON, Nasrine - LEVAK, Jelena - CHANDRAMOULI, Krishna. Communication protocol for using nontraditional information sources between first responders and citizens during wildfires. In Proceedings of the International ISCRAM Conference. - ISCRAM, 2023, vol. 20, pp. 152-165. ISSN 2411-3387. Available at: <https://seafire.sk/f/3fd9e70183434635a158/?dl=1> (20th Global Information Systems for Crisis Response and Management Conference) Type: ADMB

BALOGH, Zoltán - GATIAL, Emil - ZELENKA, Ján - HASSANKHANI DOLATABADI, Sepideh - MAJLINGOVÁ, Andrea - BRODRECHTOVÁ, Yvonne - MOJIR, Kayvan Yousefi. Protokol pre hromadnú komunikáciu s verejnosťou počas lesných požiarov. In Požární ochrana 2023 : Recenzovaný sborník abstraktů XXXII. ročníku mezinárodní konference. - Ostrava : Sdružení požárního a bezpečnostního inženýrství, z.s., 2023, p. 1-4. ISBN 978-80-7385-267-2. (Požární ochrana 2023 : XXXII. ročník mezinárodní konference) Typ: AFG

GATIAL, Emil - BALOGH, Zoltán - ZELENKA, Ján - HASSANKHANI DOLATABADI, Sepideh - MOJIR, Kayvan Yousefi. Mobilná aplikácia pre zapojenie obyvateľov do prevencie lesných požiarov a ich aktívnu spoluprácu počas boja s lesnými požiarimi. In Požární ochrana 2023 : Recenzovaný sborník abstraktů XXXII. ročníku mezinárodní konference. - Ostrava : Sdružení požárního a bezpečnostního inženýrství, z.s., 2023, p. 22-24. ISBN 978-80-7385-267-2. (Požární ochrana 2023 : XXXII. ročník mezinárodní konference) Typ: AFG

### 3. SELECTED RESULTS OF SCIENTIFIC RESEARCH

MOJIR, Kayvan Yousefi - MACEVICIUTE, Elena - OLSON, Nasrine - GATIAL, Emil - BALOGH, Zoltán. Citizen engagement in wildfire management: needs, challenges, methods and framework. In Proceedings of the International ISCRAM Conference. - ISCRAM, 2023, vol. 20, pp. 761-772. ISSN 2411-3387. Available at: <https://seafire.sk/f/dfe4bc4c45cc493c9718/?dl=1> (20th Global Information Systems for Crisis Response and Management Conference) Type: ADMB

ZELENKA, Ján - KASANICKÝ, Tomáš - GATIAL, Emil - BALOGH, Zoltán - MAJLINGOVÁ, Andrea - BRODRECHTOVÁ, Yvonne - KALINOVSKÁ, Simona - REHÁK, Richard - SEMET, Yann - BOUSSU, Gregoire. Coordination of drones swarm for wildfires monitoring. In Proceedings of the International ISCRAM Conference. - ISCRAM, 2023, vol. 20, pp. 144-151. ISSN 2411-3387. Available at: [//doi.org/10.59297/MUJT3755](https://doi.org/10.59297/MUJT3755) (20th Global Information Systems for Crisis Response and Management Conference) Type: ADMB

#### Wearable smart patch for vital signs monitoring in a life-saving system

**Institute:** Institute of Measurement Science SAS

**Researchers:** M. Tyšler, R. Bagín, D. Gogola, F. Lehockí, B. Ondrušová

**Projects:** NATO SPS project G5825 Smart Patch for Life Support Systems (SP4LIFE)

MVTS in support of NATO project G5825 SP4LIFE

An innovative system has been designed to monitor the vital functions of injured persons during mass disasters. The system consists of smart patches that record electrocardiograms, photoplethysmograms, respiratory movements and temperature from the chests of injured persons. From these signals, they autonomously evaluate heart rate and respiratory rate. If any of these parameters exceed the permissible limits, the patch generates a warning light and sound alarm. In addition, the patches can communicate with a monitoring tablet via Bluetooth LE. In advertising mode, they transmit vital parameter values and potential alarms. In critical situations, in the event of an alarm, the tablet can establish two-way communication with one or more patches, and all measured signals are transmitted to the tablet for display and more detailed analysis, including determination of blood pressure and blood oxygenation using AI methods. The project results in functional patch designs, software for signal acquisition and processing and communication with the tablet, as well as a tablet application for monitoring multiple patches and for the determination and prediction of blood pressure and blood oxygenation. The functional model of the system was successfully tested in cooperation with the Fire and Rescue Corps of the Slovak Republic.

The result was obtained within the NATO Science for Peace and Security program, under the SP4LIFE project, which was coordinated by the Institute of Measurement Science SAS and whose partners are from Slovakia, Belgium, North Macedonia and Serbia.

#### Related publications and other outputs:

LEHOCKI, Fedor - MADEVSKA BOGDANOVA, Ana - TYSLER, Milan - ONDRUSOVA, Beata - SIMJANOSKA, Monika - KOTESKA, Bojana - KOSTOSKA, Magdalena - MAJAK, M. – MACURA, M.

SmartPatch for Victims Management in Emergency Telemedicine. In MEASUREMENT 2021: Proceedings of the 13th International Conference on Measurement. – Bratislava: Institute of Measurement Science, SAS, 2021, 2021, p. 146-149. ISBN 978-80-972629-4-5.

GOGOLA, Daniel - ACKOVSKA, Nevena - BAGIN, Richard - KOTESKA, Bojana – MADEVSKA BOGDANOVA, Ana - KOSTOSKA, Magdalena - LEHOCKI, Fedor – TYSLER, Milan. Integrated Smart Patch for Heart Rate and Respiratory Rate Monitoring. In: Measurement 2023, 14th International Conference on Measurement, 29 - 31 May 2023, Smolenice Castle, Slovakia.

BAGIN, Richard – KOTESKA, Bojana – KOSTOSKA, Magdalena – ACKOVSKA, Nevena – MISHEV, Anastas – MADEVSKA BOGDANOVA, Ana – TYSLER Milan, Smart System for Real-time Monitoring of Vital Parameters. In SQAMIA 2024, Proceedings of the Eleventh Workshop on Software Quality Analysis, Monitoring, Improvement, and Applications, Novi Sad, Serbia, September 9-11, 2024.

## Scientific Section 2 (Life, Chemical, Medical, and Environmental Sciences)

### Identification of new fat cell subtypes and nutrient sensing mechanism

**Institute:** Biomedical Research Center SAS, Institute of Experimental Endocrinology

**Researchers:** Zuzana Kovaničová, Barbara Ukropcová, Jozef Ukropec, Miroslav Baláž

**Projects:** SASPRO 1148/01/02, SASPRO 1260/02/02

Metabolic activation of adipose tissue is considered a very promising strategy for the prevention and treatment of obesity and associated metabolic diseases. Today, we know that not only brown but also white adipose tissue can significantly increase its metabolic activity in response to cold. It contains beige fat cells, which can burn stored energy and release it into the environment in the form of heat, just like brown fat cells. In the works of Wang et al., 2024 and Vargas-Castillo et al., 2024, we contributed to the identification of new subtypes of beige fat cells and showed that they use different mechanisms for heat production (Fig. 2.3.8 A). We contributed to this discovery by observing that the newly discovered subtypes of beige fat cells are also present in human adipose tissue, which opens new possibilities in the treatment of metabolic diseases. In the third work by Ding et al., 2024, we participated in the discovery of a new molecular mechanism of nutrient sensing. We showed that cells can sense the concentration of glucose inside them via Phosphatidylinositol 4-phosphate (PtdIns4P). The decrease in intracellular glucose levels leads to a decrease in the amount of phospholipid in the Golgi complex and the subsequent stabilization of the adipose triacylglycerol lipase ATGL, an enzyme that triggers the cleavage of fat droplets, and the cell switches its metabolism to fatty acid oxidation (Fig. 2.3.8 B). These results are significant for revealing the identity and understanding of the functioning of adipocytes, as they may bring new therapeutic options for the treatment of obesity and metabolic diseases in the future.



## 2D material with stimuli-responsive optical properties

**Institute:** Institute of Inorganic Chemistry SAS

**Researchers:** Names of the researchers, Names of the researchers, Names of the researchers,

**Projects:** Name of the project/projects

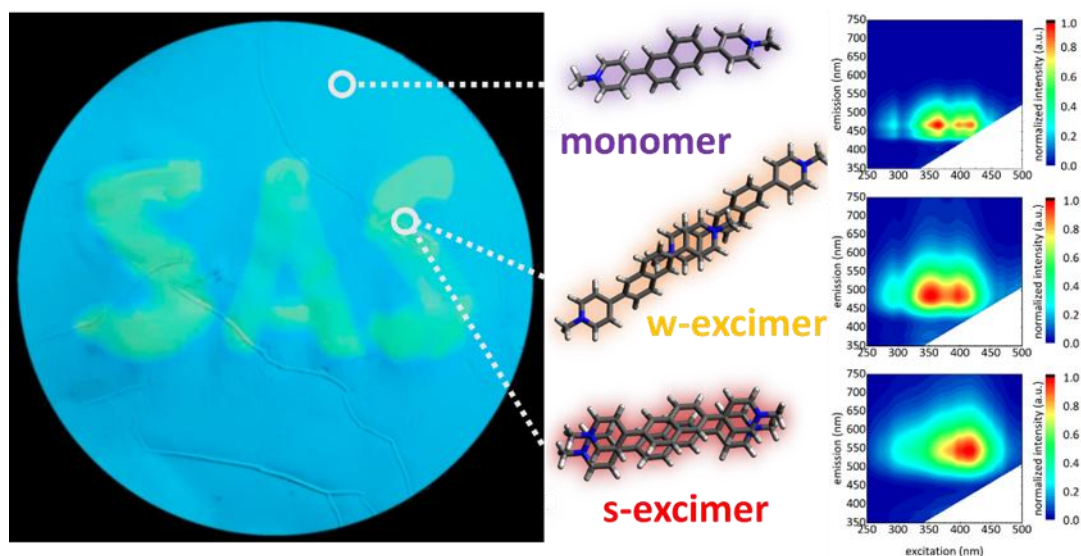
Deep-sea animals, such as the fish *Lampanyctus achirus*, rely primarily on bioluminescence to communicate with each other and with their surroundings. This ability to produce light is key to a variety of survival strategies, including attracting mates, luring prey, and avoiding predators. The emitted light can vary in time, intensity, and even colour, allowing these organisms to transmit complex signals.

The phenomena of colour change in the emitted signal are also addressed in the present work, which deals with the preparation and analysis of a material capable of changing its optical properties based on external stimuli. The study focuses primarily on the integration of organic dyes with 2D materials, creating structures exhibiting switchable optical properties. The photoluminescent changes of such a material are, in this case, induced by changes in its immediate environment, for example, the presence of specific solvents.

An important component is a naphthalene derivative synthesized in the laboratory of Professor Kawamata. This substance can transform in the excited state from monomeric units to excimers interacting via delocalized  $\pi$ -systems in the presence of DMSO. The optical properties of such materials were investigated at the University of Bayreuth using the fluorescence lifetime imaging technique. The ability to respond to external stimuli reversibly predetermines this material for use not only in optoelectronics and sensors, but also in imaging technologies.

The overall goal of this research is primarily to understand the behaviour of naphthalene derivative molecules and interactions in 2D materials. We assume that the chosen approach and the acquired knowledge will be helpful in the field of materials science in the design of similar systems. Using complex analytical techniques, the study ensures robust interpretation of the data and, at the same time, emphasizes the importance of combining theoretical and experimental methods.

### 3. SELECTED RESULTS OF SCIENTIFIC RESEARCH



The inscription "SAS" was created using DMSO on the surface of the thin film ( $\lambda_{ex} = 365$  nm).

Inset: fish of the species *Lampanyctus achirus* (source: Danté Fenolid / Science source)

#### Related publications and other outputs:

MATEJDES, Marián - ŠKORŇA, Peter - SLANÝ, Michal - KLEMENT, Róbert - BUJDÁK, Juraj - KAWAMATA, Jun - BREU, Josef. Excimer formation in a 2D confined space. In *Materials Today Chemistry*, 2024, vol. 42, art no. 102436. (2023: 6.7 - IF, Q1 - JCR, 1.239 - SJR, Q1 - SJR). ISSN 2468-5194. Available at: <https://doi.org/10.1016/j.mtchem.2024.102436> Type: ADCA

#### PEOPLE – EA (Pioneering Earth Observation Applications for the Environment - Ecosystem Accounting)

**Institute:** Institute of Landscape Ecology SAS

**Researchers:** J. Černecký, A. Halabuk

**Projects:** PEOPLE-EA (ESA)

Ecosystem accounting is a systematic process of recording and reporting information about ecosystems and their services. The Institute of Landscape Ecology SAS has been involved in the implementation of the PEOPLE-EA (Pioneering Earth Observation Applications for the Environment - Ecosystem Accounting) project since 2023, supported by the European Space Agency ESA (<https://esa-people-ea.org/en>). This research project was successfully completed in 2024. A total of 8 research and statistical institutions from 5 European countries participated in the implementation of project activities. The consortium was led by the Belgian institution VITO. The project focused on the development of more accurate and standardized ecosystem accounting in line with the international SEEA EA (System of Environmental Economic Accounting – Ecosystem Accounting) framework. The main

objective of the project was to test remote sensing tools and methods for ecosystem accounting for European and national needs.

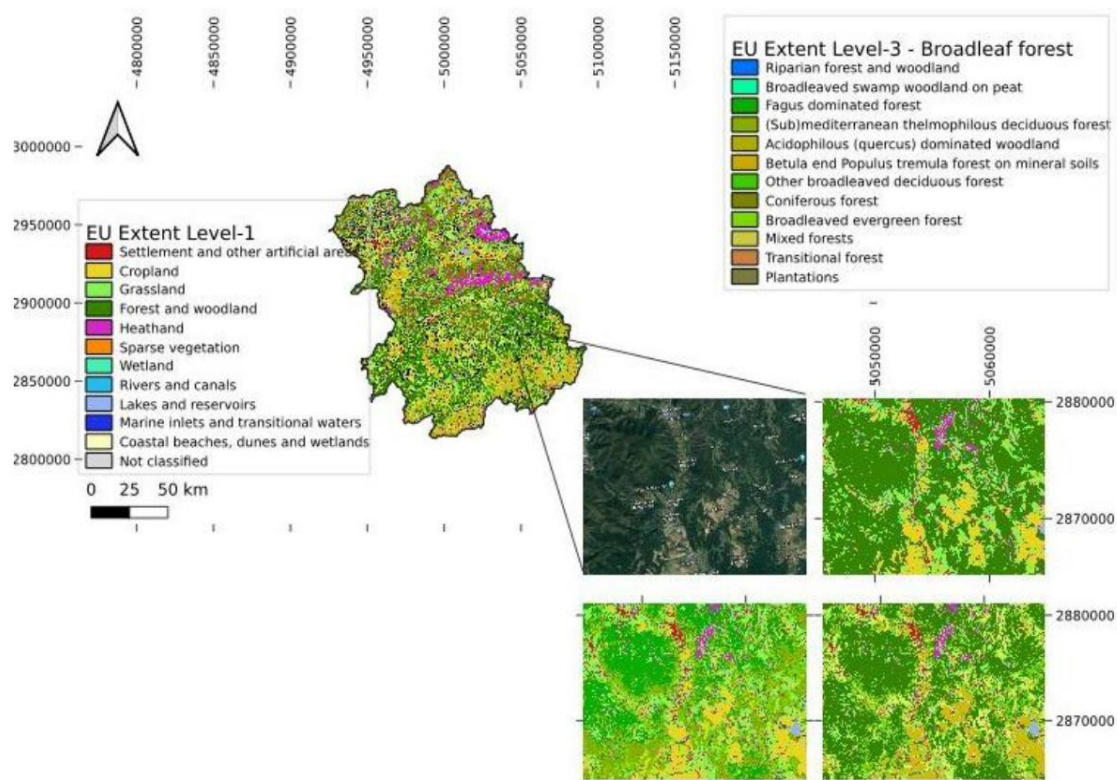
The research within the project focused on applications of ecosystem extent mapping, assessment of their condition and services for society. One of the key outputs of the project was the integration of two separate tools for ecosystem accounting (<https://aries.integratedmodelling.org/>) and satellite data processing (<https://openeo.cloud/>), which led to the development of prototypes of selected ecosystem accounts. For Slovakia, the development of ecosystem extension products (ecosystem map) was tested with the implementation of a comprehensive habitat mapping model at a high thematic and spatial level (see Fig.).

In addition, the project included the creation and implementation of a methodology for assessing the state of forest ecosystems on an annual basis, as well as the validation of a newly developed methodology focused on the assessment of the ecosystem service of wood production. These tasks represent an important basis for the accounting of wood stock (wood provision account) and enable consistent quantification of available wood resources and monitoring of the state of forest ecosystems in large areas.

Although the PEOPLE-EA project focused mainly on applied aspects, all developed methodologies were based on a precise assessment of the current possibilities of integrating satellite-based remote sensing into ecosystem accounting. The importance of this approach was confirmed by the published scientific output in the form of a professional article, which was published in the prestigious journal *Ecosystem Services* (93.1 JIF percentile in the Ecology category). The article summarised the development and current status of integrating remote sensing into ecosystem accounting, identifying its main advantages and the obstacles that need to be overcome for its wider application.

The PEOPLE-EA project contributed to the development of tools for consistent data production on European ecosystems and their services, which have long-term relevance for environmental and economic decision-making at European and national levels.

### 3. SELECTED RESULTS OF SCIENTIFIC RESEARCH



*Example of outputs for an ecosystem map for central Slovakia*

*with high spatial (10 m) and thematic resolution*

#### **Related publications and other outputs:**

KOKKORIS, Ioannis P.\*\* - SMETS, Bruno - HEIN, Lars - MALLINIS, Giorgos - BUCHHORN, Marcel - BALBI, Stefano - ČERNECKÝ, Ján - PAGANINI, Marc - DIMOPOULOS, Panayotis. The role of Earth observation in ecosystem accounting: A review of advances, challenges and future directions [Úloha diaľkového prieskumu Zeme v ekosystémovom účtovníctve: Prehľad pokroku, výziev a budúceho smerovania]. In *Ecosystem Services*, 2024, vol. 70, article no. 101659. (2023: 6.1 - IF, Q1 – JCR; 93,1 JIF percentil v kategórii Ecology; 2.106 - SJR, Q1 - SJR). ISSN 2212-0416. Available at: <https://doi.org/10.1016/j.ecoser.2024.101659> Type: ADCA

**Scientific Section 3 (Social Sciences, Humanities, Arts, and Culture)****A common heritage from the Romans to the jewels of Great Moravia**

**Institute:** Institute of Archaeology SAS

**Researchers:** K. Pieta, M. Ruttkay, J. Ruttkayová, V. Varsik

**Projects:** Interreg SK-CZ -304021CKV5,

The archaeological park in Pác, in the Cífer municipality, offers a unique insight into the region's past through the reconstruction of a Roman-Germanic settlement from the 4th century AD and an archaeological exhibition in a reconstructed mill. The site was explored by Títus Kolník (Institute of Archaeology SAS) in 1969–1980. It was a large building complex dating back to the 4th century AD. The residence of the Germanic-Quad prince combined two worlds – Roman and Germanic. The use of construction techniques and Roman building materials is evidence of the cooperation between the Germans and the Romans. The unique find was met with the initiative of the local government to build an archaeological park within the framework of cross-border cooperation, to complete the existing one in the municipality of Modrá by 2024 under the Interreg SK-CZ-304021CKV5 project. The archaeological park was opened to the public on 27. 4. 2024. Thanks to this "museum in nature", the public can experience the authentic atmosphere of the princely residence through demonstrations of everyday life and crafts, a Roman bath, combat, etc.



*View of the building reconstructions from the Roman era in the Cífer-Pác archaeological park*

*(Photo: J. Ruttkayová)*

As part of a joint project, a new, unique museum was built in the largest and most visited archaeological open-air museum in the Czech Republic, in Modrá u Velehradu – the Treasury of Great Moravia. It is a modern museum built below ground level, equipped with the most powerful security systems. Within the pilot exhibition entitled Elites of Great Moravia, the most significant finds from the forts and burial grounds of Great Moravia are presented to the public, representing the material culture associated with the highest social class of the 9th - 10th centuries. The visitors can admire several unique period products - jewelry, weapons, equipment set in panoramic scenes depicting the most significant milestones of Great Moravian development. These finds represent significant South Moravian sites - Mikulčice, Staré Město, Uherské Hradiště, Modrá, Pohansko u Břeclavi. The original bell from the fort of Bojná near Topolčany attracts particular attention, as it is one of the unique European items that not only documents the consolidation of Christianity in the 9th century, but also points to the maturity of the nobility of that time. The exhibition is the work of the Moravian Museum in cooperation with the municipality of Modrá, the Institute of Archaeology of the Czech Academy of Sciences, Brno, v. v. i., the Faculty of Arts of the Masaryk University - Department of Archaeology and Museology, and the Institute of Archaeology SAS.

**Related publications and other outputs:**

[www.archeoparkcifer.sk](http://www.archeoparkcifer.sk)

[www.archeoskanzen.cz](http://www.archeoskanzen.cz)

#### Life in the border region of ancient Egypt – research of the Institute of Oriental Studies SAS

**Institute:** Institute of Oriental Studies SAS

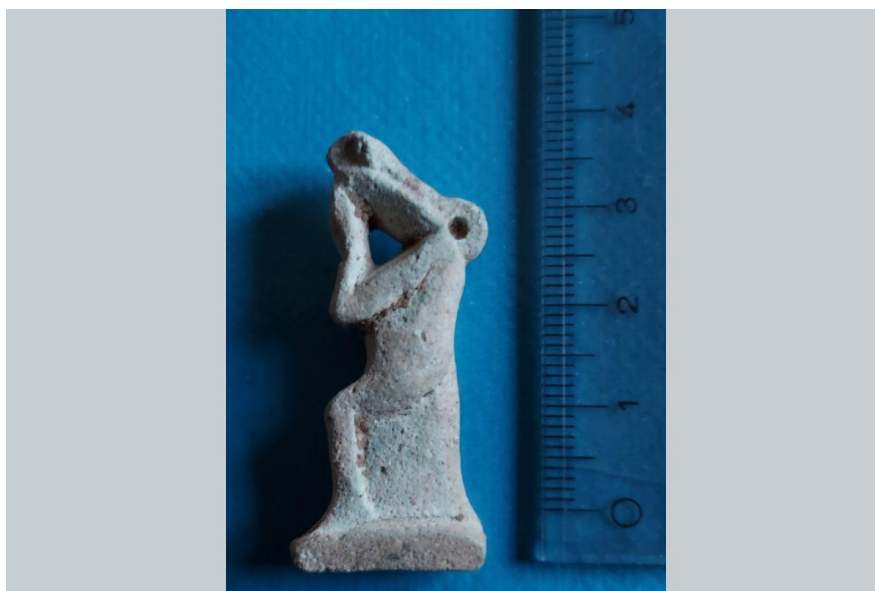
**Researchers:** J. Hudec, V. Verešová et al.

**Projects:** International Archaeological Research Program at Tell el-Retaba (Egypt)

Egyptologists from the Institute of Oriental Studies SAS continued their field research at Tell el-Retaba in 2024, as well as their investigation of unprocessed finds from the border areas of ancient Egypt – in cooperation with foreign archaeologists. During the archaeological research, numerous structures from multiple phases of settlement were uncovered in the study area. The material found has added to the corpus of knowledge about the settlement and burial ground from the Second Intermediate Period (new graves, a donkey grave near one of the graves, cattle graves and stables), about the settlement from the Early New Kingdom (parts of farm buildings), and about the fortresses from the Late New Kingdom (fortress walls and ditches). Remarkable finds have also appeared in the mixed layers of the Third Intermediate Period and the Late Period, documenting the settlement and active trade contacts of the site with the eastern Mediterranean until the Greco-Roman period.

More detailed analyses were carried out primarily in the area of stratigraphy and its comparison with other sites in the vicinity, as well as in the Nile Valley (Tell el-Dabaa, Elephantine), while pointing out a different course of settlement, probably related to the local population and the location of the site on the eastern border of the empire. The most significant achievements include the evaluation of the analysis of metal objects from various phases of settlement, which was partially carried out in 2021-2023 and was successfully published this year. The analyses once again proved the exceptional position of the site on the map of Egypt, also in the field of metal processing and the use of metal objects. Research on the fortification systems of the New Kingdom continued and pointed out the similarities of the local fortification with the stone architecture in the centre of the country (the mortuary temple of Ramesses III in Medinet Habu). The current knowledge about storage facilities from the site was summarized, and the organization of storage activities in individual periods was assessed with regard to given historical events (creation of warehouses/stocks in times of crisis). Further analysed were objects from a set discovered in one of the tombs of the early 18th dynasty, which include silver ornaments and jewelry, stone beads, and seal amulets (scarabs and scaraboids). The silver objects in particular point to a kinship with similar artefacts from the east, from the southern (Tell el-Ajjul) or northern (Sidon, Beirut) Levant, and thus the connection of the ancient Egyptian site with this area at the beginning of the New Kingdom.

In addition to several scientific studies on the subject, a collective monograph of the authors and participants on the research at Tell el-Retaba was also published.



#### **Related publications and other outputs:**

HUDEC, J. – VEREŠOVÁ, V. (eds.) 2024. Tell el-Retábí a príbeh jeho objavovania. Bratislava: Veda.

ODLER, M., KMOŠEK, J., VEREŠOVÁ, V., HULKOVÁ, L., JARMUŽEK, Ľ., RYŠ- JARMUŽEK, A., WODZIŇSKA, A., HUDEC, J., RZEPKA, S. Discovering fresh copper of Tell el-Retaba: from the “Hyksos” to the Third Intermediate Period, *Ägypten und Levante/Egypt and the Levant* 34, 2024, 397–431.

VEREŠOVÁ, V., KOVÁR, B. Egypťania sa pripravovali na krízové časy. In *Pády impérií*, Drábik, J., Kovár, B. (eds.), Bratislava: Premedia, 2024, s. 59-66.

#### **When beliefs flourish without credible institutions**

**Institute:** Centre of social and psychological sciences SAS – o. z. Name of the SAS Institute

**Researchers:** M. Adamus – E. Ballová Mikušková et al.

**Projects:** APVV-20–0387, APVV-20-0319, NPO no. LX22NPO5101

Conspiracy beliefs have long been at the centre of public debate, due to the negative or dangerous consequences they can lead to. They were originally studied as cognitive phenomena associated, for example, with deficiencies in analytical or scientific thinking, or in connection with the human need to seek structure in the world around us. In an international study led by the Centre of social and psychological sciences SAS, we focused on how factors that we have little power to influence contribute to conspiracy beliefs, such as the quality of democratic institutions and their credibility, and we also focused on the role of experienced financial uncertainty and institutional trust in the process of supporting conspiracy beliefs. Research has shown that individuals who face economic difficulties are often less trusting of government and institutions, and are therefore more likely to believe in conspiracy theories. Importantly, our results are valid not only in Slovakia but in the European context. This suggests that this is one of the general, universal mechanisms responsible for the susceptibility to conspiracy beliefs. Our research, therefore, contributes to the discussion about the role of deteriorating economic conditions and distrust of institutions in supporting conspiracy beliefs. The study was developed through cooperation between researchers from the Centre of social and psychological sciences SAS, from Pavol Jozef Šafárik University in Košice, from Masaryk University in Brno, the University of Messina in Italy, and from Heriot-Watt University in Dubai.

#### **Related publications and other outputs:**

ADAMUS, Magdalena - BALLOVÁ MIKUŠKOVÁ, Eva - KAČMÁR, Pavol - GUZI, Martin - ADAMKOVIČ, Matúš - CHAYINSKA, Maria - ADAM-TROIAN, Jais The mediating effect of institutional trust in the relationship between precarity and conspiracy beliefs: A conceptual replication of Adam-Troian et al. (2023). In *British Journal of Social Psychology*, 2024, vol. 63, iss. 3, pp. 1207-1225. (2023: 3.2 - IF, Q1 - JCR, 2.19 - SJR, Q1 - SJR). <https://doi.org/10.1111/bjso.12725>



## 4 EDUCATIONAL ACTIVITIES AND SUPPORT OF PHD STUDENTS

SAS institutes actively participate in third-level higher education (doctoral studies) as external educational institutions based on framework agreements concluded with individual universities and their faculties. After the entry into force of the amendment to Act No. 131/2002 Coll. on Higher Education and Act No. 269/2018 Coll. on Quality Assurance in Higher Education, the SAS has created a separate internal quality assurance system for doctoral studies. It focuses on the quality of the institutional environment, the quality of potential supervisors and the quality of the outputs of the doctoral students themselves.

The SAS institutes continue in the process of concluding “Framework agreements on cooperation with an external educational institution by participating in the implementation of doctoral study programs” with the relevant universities. Currently, SAS institutes have concluded 125 agreements on doctoral studies with 31 faculties of universities in the Slovak Republic. The most important partners of SAS institutes in doctoral studies are the Comenius University (57 agreements), the Slovak University of Technology (16 agreements), and Pavol Jozef Šafárik University in Košice (15 agreements). These universities are ranked best in international rankings. An overview of the number of agreements with universities and their faculties is presented in Table 4.1.

### Development of the number of researchers and PhD students.

The number of SAS researchers increased slightly last year, but overall it has a balanced number. The number of PhD students has stabilized in the last five years (Fig. 4.1).

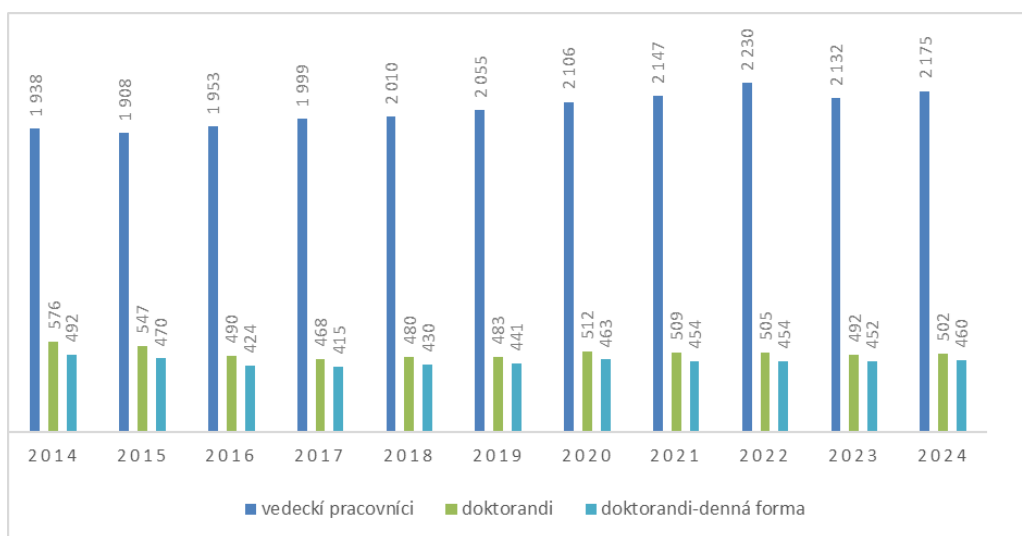


Fig. 4.1: Development of the number of researchers and PhD students in 2014-2024

Table 4.1: *The number of framework agreements with an external educational institution for participation in the implementation of PhD study programs concluded as of 31.12. 2023*

University	Faculty	Number of agreements
Comenius University in Bratislava	Faculty of Mathematics, Physics and Informatics	8
	Faculty of Natural Sciences	17
	Faculty of Medicine	3
	Jessenius Faculty of Medicine	1
	Faculty of Physical Education and Sport	1
	Faculty of Pharmacy	2
	Faculty of Arts	17
	Faculty of Law	1
	Faculty of Social and Economic Sciences	7
Slovak University of Technology in Bratislava	Faculty of Electrical Engineering and Information Technology	4
	Faculty of Informatics and Information Technologies	1
	Faculty of Civil Engineering	2
	Faculty of Mechanical Engineering	2
	Faculty of Materials Science and Technology in Trnava	1
	Faculty of Chemical and Food Technology	6
University of Economics in Bratislava	Faculty of Economics and Finance	3
Slovak University of Agriculture in Nitra	Faculty of Biotechnology and Food Sciences	1
	Faculty of Horticulture and Landscape Engineering	2
Constantine the Philosopher University in Nitra	Faculty of Natural Sciences and Informatics	2
	Faculty of Arts	4
University of Trnava	Faculty of Arts	4
Technical university in Zvolen	Faculty of Ecology and Environmental Sciences	2
	Faculty of Forestry	1
Matej Bel University in Banská Bystrica	Faculty of Arts	2
Pavol Jozef Šafárik University in Košice	Faculty of Natural Sciences	12
	Faculty of Arts	3
Technical University of Košice	Faculty of Materials, Metallurgy and Recycling	4
	Faculty of Mechanical Engineering	1
	Faculty of Metallurgy	1
	Faculty of Electrical Engineering and Information Technology	2

#### 4. EDUCATIONAL ACTIVITIES AND SUPPORT OF PHD STUDENTS

University of Veterinary Medicine and Pharmacy in Košice		6
University of Žilina	Faculty of Civil Engineering	1
Alexander Dubček University of Trenčín		1

In 2024, SAS institutes trained a total of 502 PhD students (223 males (M) and 279 females (F)). 476 PhD students (204 M and 272 F) were enrolled full-time and 42 part-time (19 M and 23 F). There were 134 (67 M and 67 F) newly admitted PhD students for full-time doctoral studies with a topic assigned by SAS. The number of foreign PhD students slightly increased to 155 (91 M and 64 F). Their share in the total number of students is 30% (Fig. 4.2). The main obstacle to the faster internationalization of doctoral studies is the lengthy and complicated processing of the necessary documents by third-world applicants. Last year, several accepted PhD students from third countries did not enrol after all, because they did not get an entry visa after several months. To facilitate the immigration process, a Euraxess point was established at the SAS in 2020. Its employees assist foreign students in preparing the necessary documents.

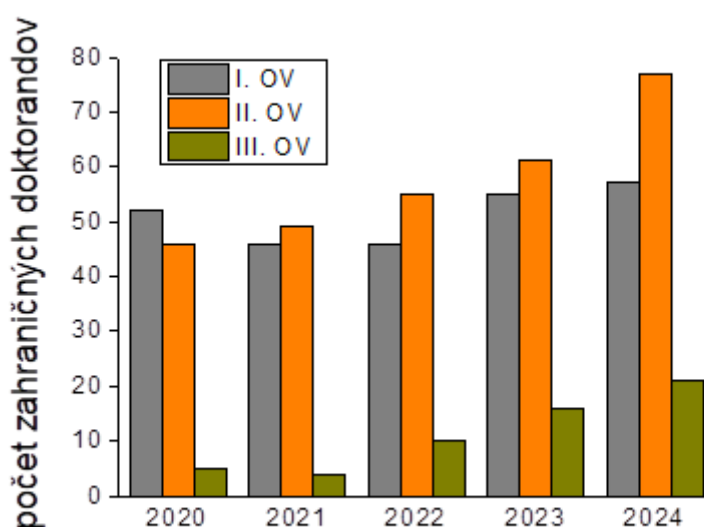


Fig. 4.2: Development of the number of foreign PhD students by science sections (OV) in 2020-2024

94 PhD students (36 M and 58 F) completed their doctoral studies with a successful thesis defence. 54 of them were employed in research (SAS, universities, abroad), 18 outside research within their field, and 5 outside their field. In 17 cases, SAS institutes do not have information about the practical application of their PhD graduates.

The net monthly income of doctoral students in 2023 reached €1025.50 before and €1194 after the dissertation exam and did not change in 2024 (Fig. 4.3).

The scholarship amount was guaranteed to students from central sources. Individual institutes can increase scholarships for specific PhD students, e.g. based on good performance. Starting in 2023, students achieving above-standard results during their doctoral studies will be awarded a motivational scholarship, which will be paid to them together with the standard scholarship in December.

In 2024, the SAS Presidium approved the provision of a motivational scholarship to full-time doctoral students financed not only from central sources, but also for doctoral students accepted and financed from the resources of the POO SR call "Scholarships for excellent PhD students (R1)" and from the call "Scholarships for excellent researchers threatened by the military conflict in Ukraine". For the academic year 2023/2024, this scholarship worth €154,395 was awarded to 153 doctoral students.

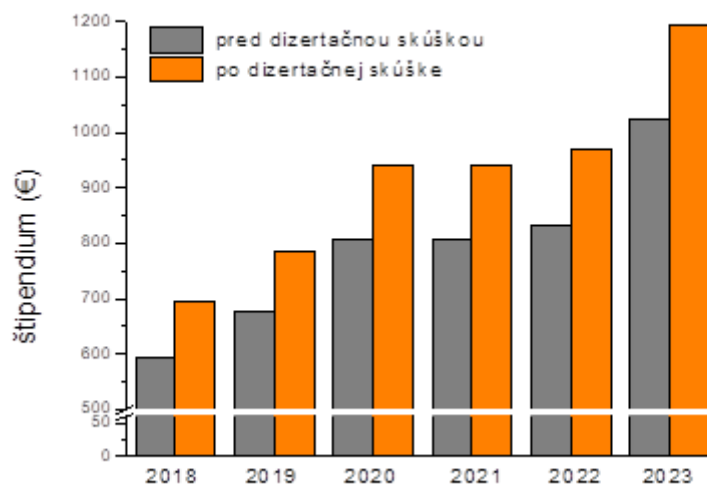


Fig. 4.3: *Development of the net monthly income of PhD students before and after the completion of the dissertation exam in 2018-2023*

In an effort to motivate and support young scientists, the SAS provides a competitive compensation contribution of €150/month in 2024. The SAS Presidium increased the organizations' wage fund by €75 and provided €75 from its own funds. In 2024, 21 graduates received a compensation contribution.

SAS supports young scientists through the Štefan Schwarz Support Fund. Institutes employing successful applicants will receive from central sources a wage fund in the amount of 100% of the tariff salary in salary class T8 of the salary scale and salary level 4, including levies, and the scholarship holders will receive an additional payment from the institute for two years (with the possibility of extension by one year) to the salary of at least € 300 per month. In 2024, 24 PhD students from 17 institutes received an additional payment. The SAS Presidium approved the extension of the scholarship from the Štefan Schwarz Support Fund for 7 applicants.

#### 4. EDUCATIONAL ACTIVITIES AND SUPPORT OF PHD STUDENTS

PhD students studying at SAS have the opportunity to complete the so-called soft skill training every year and develop skills necessary for the academic and/or non-academic career. In 2024, courses were offered on communication and presentation skills, ethics and integrity of scientific work, writing grant proposals, time management, training in doctoral study management and career planning. Courses are offered in Slovak and English.

In 2024, a lecture and discussion called "What is the ethics of artificial intelligence and why does science need it?" was organized for the Academy's PhD students and other employees.

An important part of preparing for an academic career is the Doktografant program, whose successful applicants can receive € 2,000 for a one-year scientific project related to the topic of their dissertation. By participating in the project, students practically learn to write a grant application, manage the grant budget and write a final report for the project. In 2024, 56 out of a total of 108 applicants received this grant. At the same time, we launched the first grant call for postdoctoral students within 5 years of defending their dissertation in 2024. The call received 118 applications and 59 were funded.

In 2022, an all-academic PhD seminar was established, and in 2024, selected representatives from each scientific section presented and discussed the results of their work. These meetings on a three-month basis are an opportunity for the PhD students to get to know each other and, thanks to their work, gain an overview of what their young colleagues are doing within the individual institutes.

PhD students and young researchers under the age of 35 compete annually in intra-academic competitions for the best publication or set of publications.

The Student Personality of Slovakia is a national competition of young talented people, students of the first and second level of university studies or third level - PhD students. PhD students from the SAS were also awarded for the academic year 2023/2024. In the category Metallurgy, Mechanical Engineering, Energy, Ing. Lenka Ďaková, PhD., from the Institute of Materials Research SAS, became the Student Personality of the year. RNDr. Mária Urbanová, from the Biomedical Research Center SAS, was awarded in the category Medical Sciences and Mgr. Júlia Čížová, PhD., from the Institute of History SAS, in the category Philosophy, Political Science, Sociology, Pedagogy, Psychology, History. The jury declared Ing. Lenka Ďaková, PhD. the Top Student Personality of Slovakia for the academic year 2023/2024.

In November 2024, the pilot seminar, the Day of the SAS Doctoral Students, was held. Students had the opportunity to get to know each other, present topics of their doctoral theses, talk about the pitfalls of writing projects and how not to lose motivation in submitting projects and scientific work.

The SAS doctoral students were informed about the possibilities of participating in the competition with the opportunities of financial rewards, grants and scholarships.

As part of cooperation with colleges and universities, SAS employees participated most in the lecturing activities of colleges - 320 employees lectured 8,657 hours in their home country and

29 employees lectured 740 hours abroad. Exercises and seminars were led by 217 employees (10,890 hours) from their home country and by 19 employees (528 hours) abroad.

An important part of pedagogical activity is supervising diploma and bachelor's theses. 385 SAS employees supervised 884 diploma and bachelor's theses, 193 employees opposed 281 dissertation and habilitation theses. 339 supervisors acted as the main supervisors of doctoral students. In total, they supervised 514 doctoral students (also for other institutions). SAS employees worked as members of PhD defence committees (241), doctoral dissertation defence committees (39), as members of committees or opponents in inauguration or habilitation proceedings at universities (61).



## 5 APPLIED RESEARCH AND SAS PROFESSIONAL ACTIVITIES FOR SOCIETY

Under Act no. 133/2002 Coll. and Act no. 243/2017 Coll., as it stands, SAS as a self-governing, scientific institution of the Slovak Republic carries out activities to develop science, education, culture and the economy. In addition to its main mission, it also provides a number of services and systematic activities for the public and the state sector that are not provided by any other organization in Slovakia. It should be emphasised that it is a complex of activities and infrastructure that serves not only scientific purposes but also contributes to the country's development in the economic, social, and cultural spheres; it helps increase the standard of living, the level of knowledge, and the education of its population.

SAS scientists provide expertise and carry out professional activities for the Government of the Slovak Republic, for self-governing and regional institutions and, last but not least, for several European bodies and international organizations, such as the European Commission, the European Council, the European Food Safety Authority (EFSA), OECD, WHO, NATO and UNESCO.

In addition, SAS builds and maintains unique collections, databases and corpora, which, on the one hand, can be used in further research, and on the other hand, rank Slovakia among culturally advanced countries. Information about them can be found in Annex No. 4 hereof.



## 5.1 SAS activities for technical and economic development

The most significant activities of SAS institutes for society in the field of technical and economic development implemented in 2024 include the following:

**Astronomical Institute SAS** is a permanent member of the EST project (European Solar 4m Telescope), which has been included in "The pan-European infrastructure in the ESFRI ROAD MAP" since 2017. This membership is key to ensuring direct access for Slovak scientists to cutting-edge technology for solar research in the future. In addition, the institute performs expert work in assessing the findings of "meteorites", special phenomena and bodies in the atmosphere. It is the administrator and operator of the international IAU MDC database of meteor showers and the database of meteor tracks. (<https://www.iaumeteordatacenter.org>) It also provides calculations of sunrise and sunset times for Slovak airports and the level of cosmic radiation affecting air traffic.

**Centre for Advanced Materials Application SAS (CEMEA)** is a member of the Slovak Battery Alliance (SBaA), which is the only Slovak cluster working in the areas of strategy, legislation and communication to create a comprehensive battery chain in Slovakia. It is a powerful platform for cooperation between the public and private sectors, innovators, academia and financial institutions with the aim of participating in the battery value chain in Europe.

**Institute of Electrical Engineering SAS** has long been dedicated to the development of new semiconductors. Cooperation has been established in this area with the world leader, the Industrial Technology Research Institute, ITRI (Taiwan), which, based on documents signed in 2023, provides specific financial support for the institute worth € 2.7 million. The STU in Bratislava also participates in the aforementioned cooperation. This is a significant stimulus for improving further cooperation with industrial partners in the field of design, assembly and testing of power modules for electromobility (Smikron-Danfoss, ONSEMI, DELTA SK, Foxconn SK). In this context, the SK Chips interest association was founded. It wants to contribute to the development of the semiconductor technology ecosystem in Slovakia.

**Institute of Physics SAS** is a member of the Slovak National Center for Quantum Technologies, z.z.p.o. – QUTE.sk, and is one of the key partners of the association. Its goal is to support the development of quantum technologies in Slovakia.

**Institute of Chemistry SAS**, based on the continuously achieved results of basic research, produces a wide range of rare carbohydrates. These are supplied to the foreign market, some as the only producer in the world. The institute maintains direct contact with several leading global companies and, through its business partners, has established connections with the most significant suppliers of pure chemicals. The departments of the institute provide analytical, chromatographic, electrophoretic and spectroscopic assessments and measurements, as well as complete analytical and structural characterizations of products and studied substances to other departments.

**Mathematical Institute SAS** participates in research on the issue of information protection for the state sphere, especially for the needs of the Ministry of Defence of the Slovak Republic. In cooperation with the Academy of the Police Force, solutions were proposed integrating hardware and software tools for data collection and analysis to evaluate the level of security/risk of a subject for permission or refusal of entry to the territory of the Slovak Republic. The obtained results show suitable prerequisites for the overall improvement of security, optimization and efficiency of Schengen border management processes, especially when dealing with crises.

**Institute of Geotechnics SAS** has long been profiled as a workplace that helps reduce environmental burdens from mining activities and landfilling on water sources. For Rudné bane, š.p., a technology for purifying mine water in Nižná Slaná was designed with the possibility of selective extraction of individual metals (Fe, Mn, Ni, Co, Mg) in the water purification process. Under the CHZJD landfill, pilot tests of groundwater purification were carried out in cooperation with the Faculty of Natural Sciences of Comenius University in Bratislava, Environcentrum s.r.o., Košice, and the companies ProMinent Slovensko s.r.o., Bratislava and GEOTest, a.s., Brno, pilot tests of groundwater purification were carried out, using advanced electrochemical oxidation, membrane filtration and biotechnology. The purification of landfill water contaminated primarily with fluorides, ammonium ions and cyanides in the Žiar nad Hronom location was proposed.

**Institute of Hydrology SAS** is a permanent member of the GWPO (Global Water Partnership Organization), which is involved in water management worldwide. GWP cooperated in launching the Slovak Republic Action Plan in the fight against drought. At the national level, it functions as a knowledge and expert platform for mediating dialogue between governmental and non-governmental organizations active in water management and environmental protection.

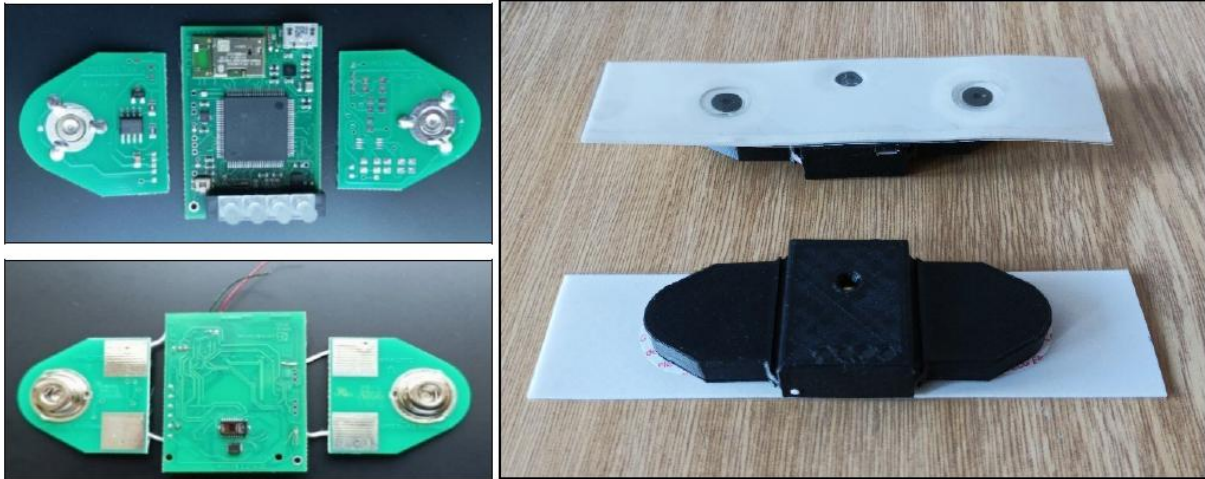
**Institute of Informatics SAS** is strategically focused on research activities related to the use of high-performance computing and a comprehensive solution to security and improving the quality of life of the population. It significantly contributed to the development of the European cloud for open science by expanding the capacity of computing, storage and data resources in accordance with the FAIR principles for scientific data (findability, accessibility, interoperability and reusability) and the integration of national research data repositories. Within the 4ACEs project, it participates in the treatment of neurodegenerative diseases using speech processing and artificial intelligence, while developing applications for stimulating cognitive functions in people with Alzheimer's disease. The application is based on voice interaction with end users and uses the expertise of partners in the field of speech technologies. The institute actively cooperates with the AlslovakIA Center for Artificial Intelligence Research, is a member of GAIA-X for the Slovak Republic, and under this initiative participates in the preparation of the implementation of standards and norms for data sharing and OpenData. It is part of SCDI - the Slovak Center for Digitalization and Innovation.

**Institute of Materials and Machine Mechanics SAS** is significantly involved in the production of special metal and composite materials for the needs of industrial applications with high added value. In cooperation with HydroExtrusion a.s. and VÚJE a.s., small-scale production of real-size containers for the permanent storage of spent nuclear fuel in dry storage has begun, the development of which was completed at the institute in the previous period. Within the framework of a long-term contract, the institute provides mechanical tests, microstructural analyses, chemical composition analyses and tests of resistance to intergranular corrosion of steel semi-finished products and pipe parts made of steel and Ti for Slovenské elektrárne, a. s., Bratislava. In the field of microstructural analyses, the institute also actively cooperates with the Slovak National Museum - Archaeological Museum in Bratislava, in the evaluation of historical finds of objects, especially swords from the 10th to 18th centuries.

**Institute of Materials Research SAS** cooperates with industrial partners in expert activities, in determining the basic properties of the material, chemical composition, microstructure, failure, fractographic analyses and heat treatment of materials, etc. In 2024, 27 economic contracts, orders and expert opinions were implemented.

**Institute of Measurement Science SAS** provides calibration, service and maintenance of the tilt measurement system of the nuclear reactor objects of the Mochovce and Jaslovské Bohunice atomic power plants. A measuring system for automated measurement of changes in the reactor vessel tilt was put into continuous operation at the third unit of the Mochovce nuclear power plant. This measuring system uses the principle of optoelectronic sensing of measured values with a resolution of measuring the level and the displacement of the curtain at the level. The measuring system is in continuous operation and thus contributes to increasing the safety standards of the Mochovce nuclear power plant operation.

In addition, the institute has been involved in monitoring and interpreting vital functions using modern measurement methods for a long time. As part of an international NATO project, an innovative system for monitoring the vital functions of injured persons during mass accidents was developed. The system consists of smart patches that record electrocardiograms, photoplethysmograms, respiratory movements and temperature from the chests of injured persons. From these signals, they autonomously evaluate heart rate and respiratory rate. If any of these parameters exceed the permissible limits, the patch generates a warning light and sound alarm. The project results in functional patch designs, software for signal acquisition and processing and communication with the tablet, as well as a tablet application for monitoring multiple patches and for the determination and prediction of blood pressure and blood oxygenation. The functional model of the system was successfully tested in cooperation with the Fire and Rescue Corps of the Slovak Republic.



**Earth Science Institute SAS** carries out monitoring and analysis of seismic hazards throughout Slovakia, including the preparation of seismic assessments in economically important locations. This activity is carried out using the National Network of Seismic Stations, which currently has 15 stations located throughout Slovakia. It significantly participated in the analysis of the earthquake in eastern Slovakia in February 2024, where more than 50 macroseismic questionnaires from 19 observed locations were assessed, while the probability and strength of expected aftershocks were estimated, and preventive measures were recommended. In addition, the institute performs continuous measurements of the geomagnetic reference field and the world magnetic model WMM for the needs of navigation and transport (air, sea, land) for the Ministry of Defence of the Slovak Republic. Magnetic declination measurements are made for the airports of Sliač, Kuchyňa and Prešov. The institute also contributes to proposals for solving the current energy crisis by analyzing realistic possibilities for using geothermal energy, or by searching for suitable storage sites for storing energy reserves in gaseous fuels.

## 5.2 SAS activities to improve the living conditions of human beings and nature protection

Slovak Academy of Sciences, as the most credible organization in the Slovak Republic for a long time, significantly contributes not only to the level of education and culture but also to ensuring better living conditions for the population, environmental protection and the overall general development of the state. It does so not only with its professional approach, competencies, and knowledge, but mainly through its expert, educational, and explanatory activities towards the public.

With its openness, expertise, broad, almost universal focus and, last but not least, its personnel background, the SAS is destined to express its views on various issues of national governance. SAS experts can respond impartially and with principled consistency to current problems

resonating in the public and thus partially influence the development of the state and society. SAS scientists have long been proactively involved in the preparation and commenting on strategic and government documents, the legislative process, and in solving societal challenges and geopolitical forecasts.

From the related activities over the past period, we can highlight:

**Institute of Geography SAS** has developed conceptual and methodological approaches to the study of the cultural landscape heritage of Ukraine as a scientific object and its cartographic representation in the form of a thematic electronic atlas. The Atlas “Ukraine. Cultural Landscape Heritage” visualizes spatial information about the most significant part of the cultural heritage of the country and its regions. The Atlas is available in two versions: Ukrainian and English. The English version can be found here: [http://projects.geography.sav.sk/web-data/AUKLH\\_ENG/](http://projects.geography.sav.sk/web-data/AUKLH_ENG/).

Water is becoming a strategic raw material; therefore, any disruption of a water source is a highly sensitive issue that may have unforeseeable consequences for future generations.

**Institute of Hydrology SAS** provides an overview of the current state of the II. Water Source of Podunajské Biskupice (VZ PB), as well as the possibilities of its use in the future.

From a balance point of view, the elimination of any water source could have a negative impact, especially considering the increase in water consumption due to industrial development and the growing population in the Bratislava region. A counterargument to the preservation of VZ PB may be the unclear further development in terms of the remediation of pollution threatening the Žitný ostrov Protected Area. Despite promises, studies and projects, the implementation of the remediation of environmental loads has not yet been initiated. However, it is also possible that, in accordance with applicable legislation, remediation will be implemented in the foreseeable future. Even in this case, the quality development in the aforementioned water source remains questionable due to the already leaked pollution.

From a hydrogeological aspect, the water source has a strategic location. It lies in the direction of groundwater flow, between Bratislava (where 14 environmental loads have already been identified) and the Žitný ostrov Protected Area with the largest groundwater reserves in the Slovak Republic. If necessary, the source can potentially serve as hydraulic protection (in the form of a hydraulic shield) of the upper part of Žitný ostrov from pollution from environmental loads, including those not yet documented. In the past, the VZ PB facilities have already been used for such a purpose: until 2001, they were part of the remedial pumping of groundwater of the hydraulic protection system against advancing oil pollution from Slovnaft (total pumped amount approx. 400 l.s-1).

If the water source were to be eliminated, it would also mean the loss of protection of the upper part of the CHVO ŽO. Therefore, if the VZ PB was not used as a source of drinking water, we proposed (recommended) the preservation of wells in the VZ PB territory, or when

developing the VZ PB territory, to omit a strip of publicly owned land for the construction of a new system of wells (hydraulic shield), which could, if necessary, be used as hydraulic protection of the upper part of Žitný ostrov - by pumping out pollution originating from higher-situated environmental loads (Vrakuňa landfill, Slovnaft and others).

We consider all of the above aspects to be part of a significant social impact, as they concern the supply of the population to a significant extent, or the preservation and protection of an irreplaceable water resource in the protected water management area of Žitný ostrov.

Another example is the direct involvement of the **Institute of Geotechnics SAS** in solving the current problem of liquidation and neutralization of mining waters in the vicinity of Nižná Slaná and the Slaná River.

Within the Ministry of Economy of the Slovak Republic, the Academy, through its public research institutions - e.g. the Earth Science Institute of the SAS or the Institute of Geotechnics SAS, is trying to actively participate in the proposals for a new national strategy for fulfilling the conclusions and tasks of the EK in defining the potential of the Slovak Republic in the areas of critical and strategic raw material resources.

Scientific and professional SAS workers were and are members of advisory boards and active working committees of state and public administration bodies and organizations. They have been involved in researching current societal problems and the challenges of public life for a long time. They also act as experts in international organizations, and their decisions determine the situation in the Slovak Republic.

SAS is aware that it transfers the results of its research into practice, contributes to better management of public affairs, better health care, the safety of residents, and environmental protection. SAS employees have provided and continue to provide explanations on climate change, global warming, and other environmental issues.

### **5.3 SAS activities in social, cultural and managing area**

Science is one of the key factors in the overall civilizational state of society. The Slovak Academy of Sciences understands the potential that the professional knowledge, language skills, expert competencies, general educational level and ethical capital of its employees represent for our country, its direction towards a good life in all aspects and for everyone. Scientific and professional SAS workers significantly participate in setting the social agenda and are involved in solving current problems of society and the challenges of public life. They

provide answers to qualitatively new phenomena such as artificial intelligence, neurotechnology and, in traditional topics such as "nature conservation", they offer paradigmatically new approaches. In addition to working directly in the research field, they are members of advisory boards and working committees of state administration bodies and organizations, and act as experts in international organizations, whose decisions also determine the situation in the Slovak Republic.

By producing research results that determine the identification and management of societal issues and putting them into practice, the SAS contributes to better administration of public affairs, to increasing the educational and cultural standard of the population, to resistance to extremism and openness to what is different, and, at the same time, to the preservation and appreciation of cultural heritage, to better care for physical and mental health, to the safety of the population and environmental protection, etc.

**Institute of Archaeology SAS** carries out archaeological research on domestic and foreign sites. It engages in maintaining monuments, making accessible and using historical architecture and objects to popularize our history and cultural tourism. The institute also provides several expert activities in the planning and preparation of constructions of national importance and prepares assessments and expertise on archaeological objects. Employees act as forensic experts in the field of cultural heritage. The institute has been cooperating for a long time in the creation of permanent archaeological exhibitions, e.g. the Museum of Great Moravia in Bojná, the collection in Nitra on Martinský vrch, the Museum of Liptov in Ružomberok, the Nitra Castle, the City Museum in Sereď, etc. (the institute is also a sought-after partner in the international exhibition space). In 2024, the Cífer-Pác Archeopark was opened to the public - from a historical aspect, it is the residence of a Germanic-Quad prince. You can experience the authentic atmosphere of the princely residence through demonstrations of everyday life, crafts, and leisure. A visit to the archeopark park was included in the educational system of elementary schools.

**Institute of History SAS** is a strategic partner of the Ministry of Foreign and European Affairs of the Slovak Republic and embassies of the Slovak Republic in informing about Slovak history abroad and promoting it. The institute's expert team provides advice on the evaluation of architectural works as potential cultural monuments and generally provides consultations and expert opinions in the field of protection and restoration of architectural monuments, especially of the 20th century. The institute participates in the preparation of various exhibitions at home and abroad. It also prepares assessments when changing the names of streets and squares and thus participates in determining the nature of public space.

**Centre of Social and Psychological Sciences SAS** solves methodological and conceptual problems of forecasting the development of Slovak society in a national and global context. The centre's portfolio includes an initiative on the health and social impacts of unfounded public beliefs, as well as the dissemination of best practices and training of experts focused on

refuting unfounded beliefs and combating hybrid threats. These are based on findings from recent years about the serious consequences of unfounded beliefs in health and social behaviours. In 2024, the centre, JÚLŠ SAV, and TUKE introduced the Mistral-sk-7b language model, the first large language model specifically designed for the Slovak language. This model enables the development of advanced applications such as intelligent chatbots, automated customer support systems, and content creation tools. In 2024, the centre provided expert work in the fields of Roma equality, foreign integration, and brain drain. The centre coordinated the processes and data collection for the 12th round of the European Social Survey (one of the basic objectives of which is to monitor stability and changes in the social structure, living conditions and attitudes of Europeans and to interpret social, political and value transformations of Europeans). The centre is a partner of the Slovak Center for Digital Innovations, where it provides expertise in the field of the impact of digital transformation on the workforce and mirrors the possibilities of adapting the workforce to the transformation.

**Institute for Sociology SAS** ensures the operation of the Slovak Archive of Social Data (SASD, <http://sasd.sav.sk>) and continuously provides data files and documentation for research archived in SASD via the archive's website. SASD is a service provider in Slovakia within the CEESDA ERIC distributed infrastructure. The multi-partner social research "How are you, Slovakia?" continued in 2024. Press releases issued by the institute were picked up by the TASR and SITA news agencies, as well as several opinion-forming media. The institute profiles itself as a centre for social science expertise, monitoring current moods in society (topics such as "pandemic truths", "nationalism, populism and social networks" ...).

**Institute for Research in Social Communication SAS** examines the effects of stimulation developing language literacy in preschool age on pre-primary and primary education, as well as the effects of targeted work on creativity and originality of thinking in children. It addresses a new topic of the connection between the climate crisis and mental health. Its expert team deconstructs some beliefs related to the Roma population and shows through in-depth interviews the high value that young Roma people place on learning and education. It prepares the concept of gender equality plans for the long term and provides support and advice in their implementation (in 2024, a new SAS Gender Equality Plan for 2025-2029 was prepared). It maps people's attitudes towards important social topics in connection with current events in the surveys "How are you, Slovakia?", together with the Institute for Sociology SAS.

**Ludovit Stur Institute of Linguistics SAS** operates the Dictionary Portal and provides the wide professional and lay public with the opportunity to obtain information about the use of language from older as well as from the latest explanatory dictionaries and manuals. It offers language consulting services to the public by phone and correspondence, as well as personal consultations. A website with a database of answered questions has been created. The Slovak Terminology Database project of the Slovak National Corpus department was recently enriched with a terminological collection of law, epidemiology and immunology. In 2024, the Digital Atlas of the Slovak Language was added to the databases. A major innovation is the

Slovak version of the generative large language model Mistral-7b-v0.1 (Mistral AI), which we discuss in more detail at CSPV.

**Institute of Philosophy SAS** - the research results of the Department of Environmental Philosophy can be used as a basis for societal debate on climate change and the necessary strategic and legislative steps. The Department of Human Rights and Normativity deals with the topic of social human rights with an overlap into specific practice. The Department of Analytic Philosophy engages in reflection on AI on the grounds of the Committee on Ethics and Regulation of Artificial Intelligence, and, together with the Department of Social Philosophy and Philosophical Anthropology, in reflection on the ethics of neurotechnology in the drafting of UNESCO recommendations for the aforementioned area. The institute provides consultations on the creation of educational curricula on topics such as the Holocaust and genocide for the University of Texas.

**Institute of Ethnology and Social Anthropology SAS** devotes part of its scientific capacity to the issue of transgender people, human rights and the family. One of the projects focuses on the role of living heritage for communities displaced from Ukraine due to war and its protection. The project's ambition is to provide a safe space for the practice and transfer of various forms of living heritage, including intergenerational transmission and mediation, which also affect social cohesion between refugees and the receiving society. The institute is creating scientific teams that focus on individual aspects of the lives of marginalized Roma communities (especially health and environmental justice). The institute's topics also include suburbanization, and the intention is to expand knowledge about the current process of population migration to the hinterland of the capital in cooperation with the Institute of Geography SAS (this is not a quantitative analysis of basic processes but rather an understanding of significant social transformations under the influence of intensive migration). The institute's employees are recognized authorities in the field of reflection on conspiracy theories. The institute provides expert coverage of the issue of national cultural heritage protection in cooperation with UNESCO. Employees apply their expertise in councils, commissions and working groups of the government, ministries and institutions, and sometimes as national representatives in international institutions. The institute develops digital humanities and digital curation, and supports research infrastructure in the fields of ethnology and social anthropology.

**Institute of Slovak Literature SAS** has cooperated for a long time in the continuous education of pedagogical staff in the field of Slovak literature. It participates in the projects Art in Schools and Literary Quotient for secondary schools. It cooperates with the organizers of the Anasoft Litera literary award and the civic association Platform for Literature and Research, which, together with the institute, is the publisher of the professional online periodical *plav.sk*. It organizes various events and performs at domestic and foreign forums presenting Slovak literature, such as festivals, book fairs, etc.

**Institute of World Literature SAS** Researchers from the institute are not only specialists in the field of individual national literature but thanks to their knowledge of individual cultures in

Slovakia, as "cultural ambassadors" they play an important role in intercultural dialogue, mediating cultural contents and values in the current era, which is the bearer of numerous crises, e.g. the less discussed crisis of education. One of the forms embodying mediation is professional and artistic translation. The cultural event of 2024 is the most extensive Slovak translation of the Upanishads to date.

**Institute of State and Law SAS** has been providing consultancy and expertise in solving legal problems for a long time. Commentaries on individual laws published by the institute become the interpretive authority for their application. The research results are applied to the decisions of the Slovak courts, including the Supreme Court of the Slovak Republic, the Supreme Administrative Court of the Slovak Republic, and the Constitutional Court of the Slovak Republic. The employees of the institute, as members of the Legislative Council of the Government of the Slovak Republic, directly and substantially influenced several drafts of generally binding legal regulations with their comments and proposals before their advancement to the next phase of the legislative process. The institute's experts contribute to the creation and enforcement of the code of ethics of the judicial profession. One female and one male employee of the institute served on the Judicial Council of the Slovak Republic in 2024.

**Institute of Economic Research SAS** provides macroeconomic forecasts as well as expert opinions in the field of international economic policy and the topic of an efficient labour market in the Slovak Republic. In 2024, the institute prepared expertise for several state and public administration bodies. These include: a microsimulation model for the forecast of students at pre-primary, primary and secondary levels of education and the forecast of the demand for teachers at individual levels of education, the results of the project Strengthening the Ecological Transition in Slovakia through climate and macroeconomic modelling, such as a comprehensive framework for the assessment of climate policies and alternative scenarios for achieving carbon neutrality in Slovakia by 2050.



## 6 SAS PERSONNEL STRUCTURE AND SCIENTIFIC QUALIFICATION OF EMPLOYEES

2,175 researchers, 205 of which are doctors of science (156 males (M) and 49 females (F)) and 2,012 CSc. / PhD. (1,015 M and 997 F) have been employed at SAS institutes as of 31.12.2024. Compared to last year, the number of researchers with a scientific-pedagogical degree decreased. There are 121 professors (94 M and 27 F) and 177 assistant professors (131 M and 46 F) working at the SAS. According to the qualification structure, 219 principal investigators (168 M and 51 F) and 1,156 independent researchers (621 M and 535 F) worked at the SAS in 2024.

On 1. 1. 2022, Act No. 347/2021 Coll., amending Act No. 133/2002 Coll. on the Slovak Academy of Sciences, as amended, entered into force, which substantially changed the issue of awarding scientific qualification degrees of levels I and IIa to SAS researchers, universities and other institutions. By law, the Commission for the Assessment of Scientific Qualifications was established. Its scope is to decide on proposals for granting scientific qualification levels IIa and I based on proposals submitted by public research institutions, universities, or holders of certificates of competence to conduct research and development. In 2024, the SAS Scientific Council approved the new content requirements of the proposal, including new requirements (criteria) for creative ability and the minimum level of research, development or artistic activity necessary for awarding the relevant scientific qualification degree.

In 2024, 86 proposals for awarding scientific qualification degrees were submitted to the Commission for the Assessment of Scientific Qualifications of Employees, 37 of which were from the Slovak Academy of Sciences and 49 from the Ministry of Education, Science, Research and Sport of the Slovak Republic and other departments of the Slovak Republic. The commission discussed 8 proposals for granting scientific qualification level I and 78 proposals for granting scientific qualification level IIa. It granted 80 scientific qualification degrees and rejected 6 proposals.



## 7 FINANCIAL RESOURCES AND SAS ECONOMIC ACTIVITY

As of 31. 12. 2024, the Slovak Academy of Sciences consists of 1 budget organization (chapter manager) and 47 public research institutions.

According to the Act on Public Research Institutions, as amended, all public research institutions can carry out business activities. In 2024, 4 public research institutions carried out business activities.

When drawing funds, valid legislation, principles within the framework of individual programs, functional and economic classification, and binding expediency of their use, were observed. All organizations were involved in the budget information system of the State Treasury.

The approved revenue budget for 2024 was EUR 8,000,000. The revenue budget also included the budget for the sale of the building. Due to the fact that the sale did not take place in 2024, the income was not fulfilled and the budget for current expenses was not used in the same amount. In fact, the SAS budget organization transferred non-tax revenues of EUR 304,278 to the income account of the state budget.

These were payments from the sale of services worth EUR 196,429, income from the rental of buildings and premises of EUR 10,007, proceeds from the sale of capital assets of EUR 27,400, other non-tax income of EUR 24,852 (mainly income from credit notes, overpayments from advance billing for gas, electricity, heat), income from violations of regulations of EUR 411 and refunds resulting from financial settlements with the state budget for 2023 in the amount of EUR 45,179.

Table 7.1: *Structure of budget revenue (in EUR)*

Main category/category	Approved budget	Revised budget	Actual	% to approved budget	% to revised budget
<b>200 – Non-tax revenues</b>	<b>8,000,000</b>	<b>8,000,000</b>	<b>304,278</b>	<b>3.80</b>	<b>3.80</b>
210 – Revenue from business and property ownership	0	8,300	8,300	x	100.00
220 – Administrative fees and other fees and charges	0	198,547	198,547	x	100.00
230 – Capital revenue	7,500,000	7,527,400	27,400	0.37	0.36
290 – Other non-tax revenues	500,000	265,753	70,031	14.01	26.35

In the approved budget for 2024, the chapter had a budget of total expenditure worth EUR 125,655,201. During the year, the budget of total expenditure was adjusted based on the budgetary measures to EUR 143,308,430. An increase of EUR 17,653,229 was involved in the adjustment of the expenditure budget.

The increase in expenditure was influenced by budgetary measures, which mainly dealt with:

- increase in the budget of expenditures from payments earmarked for projects financed from the EU structural funds, including co-financing from the state budget for the project "Building a Centre for the Use of Advanced Materials of the Slovak Academy of Sciences" (source 3AA1 and 3AA2) worth EUR 1,140,378;
- release of EU funds and state budget funds for financing joint projects of the SR and the EU (source 3AA1 and 3AA2) – funds committed in 2023 pursuant to Section 8 of Act No. 523/2004 Coll. Worth EUR 269,908;
- increase in the budget of expenditures ensured by committing budgetary funds from the chapter of the Government Office of the Slovak Republic following the Resolution of the Government of the Slovak Republic No. 283/2024 on the Updates of the Action Plan of the National Strategy for Research, Development and Innovation 2023, worth EUR 12,468,904;
- increase in the budget of expenditures ensured by committing expenditure in the chapter of the Ministry of Education, Science, Research and Sport of the Slovak Republic, worth EUR 2,645,103;
- increase in the budget of expenditures ensured by committing expenditure in the chapter of the Ministry of Culture of the Slovak Republic, worth EUR 500,000, intended for the renovation of historical monuments;
- increase in the budget of expenditures ensured by committing expenditure in the General Treasury Management chapter worth EUR 628,936 in connection with exceeding the expenditure limit for increasing contributions to health insurance companies on behalf of the employer.

Table 7.2: *Structure of budget expenditures (in EUR)*

Main category/category	Approved budget	Revised budget	Actual	% to approved budget	% to revised budget
<b>Total expenditure</b>	<b>125,655,201</b>	<b>143,308,430</b>	<b>135,553,940</b>	107.88	94.59
<b>600 – Current expenditure</b>	<b>117,166,681</b>	<b>128,158,083</b>	<b>127,906,353</b>	<b>109.17</b>	<b>99.80</b>
<i>of which: 641-provided regular transfers</i>	<i>100,924,562</i>	<i>118,539,764</i>	<i>118,539,764</i>	117.45	100.00
<b>700 – Capital expenditure</b>	<b>8,488,520</b>	<b>15,150,347</b>	<b>7,647,587</b>	<b>90.09</b>	<b>50.48</b>
<i>of which: 721-provided capital transfers</i>	<i>0</i>	<i>5,975,402</i>	<i>5,975,402</i>	x	100.00

As of 31. 12. 2024, the SAS budget organization drew funds worth EUR **135,553,940** through expenditure accounts in the State Treasury. The structure of total expenditure according to sources was as follows:

- budget expenditure from source 111 worth EUR 134,143,654;
- budget expenditure from the EU Structural Funds, including co-financing from the state budget worth EUR 1,410,286.

Of the total budget expenditures, current expenditures amounted to EUR **127,906,353**. Of this, current transfers within the public administration (item 641) worth EUR **118,539,764** consisted of the founder's contributions provided to public research institutions of the SAS (of which the institutional financial contribution worth EUR **111,183,441**, the contribution based on the budgetary measure of the Ministry of Finance of the Slovak Republic based on the Resolution of the Government of the Slovak Republic No. 283/2024 of the Action Plan of the National Strategy for Research, Development and Innovation 2030 (OHU program) worth EUR **7,144,521**, the contribution to the CEMEA project worth EUR **99,993**) and the contribution to the public university worth EUR **11,809**.

Of the accounting budget expenditures, capital expenditures amounted to EUR **7,647,587**. Of this, capital transfers within public administration (item 721) worth EUR **5,975,402** consisted of founder contributions provided to public research institutions (of which institutional financial contribution worth EUR **1,842,468**, contribution based on the budget measure of the Ministry of Finance of the Slovak Republic, Resolution of the Government of the Slovak Republic No. 283/2024 of the Action Plan of the National Strategy for Research, Development and Innovation 2030 worth EUR **4,132,934**).

The amount of EUR **882,131** was returned by transfer to the account of the Ministry of Education, Science, Research and Sport of the Slovak Republic (unauthorized withdrawal).

The average number of registered employees, as calculated for 2024 in the budgetary organization of the SAS Office was 118.9 persons. The average salary level for 2024 was EUR 2,778, of which 2,764 came from the state budget (source 111). (data source výkaz Práca 2-04, FIN 1-12).

In 2024, SAS public research institutions achieved a total income of EUR **176,440,321**. Of the total income of public research institutions, the institutional financial contribution amounted to EUR **113,025,909** (including: current amount of EUR **111,183,441** and capital amount of EUR **1,842,468**). The contribution based on the budgetary measure of the Ministry of Finance of the Slovak Republic during 2024 - Resolution of the Government of the Slovak Republic No. 283/2024 of the Action Plan of the National Strategy for Research, Development and Innovation 2030 (OHU program) amounted to EUR **11,277,456** (including: current amount of EUR 7,144,521 and capital amount of EUR 4,132,935).

Private resources, which mainly consisted of income from the sale of products, goods and services, income from the rental of buildings, premises and objects, amounted to **EUR 8,501,751**, and grants from domestic entities outside the public administration amounted to **EUR 394,740**. Other income of public research institutions consisted of contributions to project research, mainly contributions from the state budget provided by the Slovak Research and Development Agency and foreign grants, mainly funds for international cooperation project research (Horizon 2020, multilateral projects within the EU, other multilateral projects, bilateral projects and projects within the framework of intergovernmental agreements on scientific and technical cooperation).

Total expenditures of public research institutions amounted to **EUR 165,949,511**, of which current expenditures amounted to **EUR 153,792,24** and capital expenditures amounted to **EUR 12,156,687**.

The average registered number of employees calculated for 2024 was 2,965.4 persons in public research institutions. The average salary level was EUR 2,088, of which EUR 1,882 came from the state budget (source 111–IFP + APVV+V-V-I + sources of other chapters). (data source výkaz Práca 2-04, FIN 1-12)

Table 7.3: *Average earnings of SAS researchers for 2024 in EUR (employees with the title DrSc., PhD., CSc. – Data source Výkaz Práca 2-04):*

Organizations	Annually calculated number of workers		Total volume of wages (Práca 2-04; 610)	Average salary
	Physical condition	FTE		
SAS – research organizations	1,984.23	1,665.05	48,706,704	2,437.70
SAS - Scientific Section 1	639.23	530.45	16,962,340	2,664.77
SAS - Scientific Section 2	870.00	742.20	20,493,036	2,300.93
SAS - Scientific Section 3	475.00	392.40	11,251,328	2,389.43
SAS – infrastructure organizations	44.00	27.30	804,740	2,456.47
<b>SAS – public research institutions total</b>	<b>2,028.23</b>	<b>1,692.35</b>	<b>49,511,443.62</b>	<b>2,438.00</b>

Table 7.4: *Average earnings according to the remuneration tables (Act No. 553/2003 Coll.) for 2024 (data source Výkaz Práca 2-04)*

Salary table	Average salary	Number of persons
university teachers and research and development employees - appendix 5	2,376	1,965.80

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basic table - appendix 3	1,521	999.60
Total SAS	2,088	2,965.40



## 8 ACTIVITIES OF SAS SELF-GOVERNING AND SCIENTIFIC BODIES

### 8.1 Assembly of Slovak Academy of Sciences

In 2024, three sessions of the SAS Assembly, thirteen regular sessions of the Assembly Committee and one per rollam vote of the Assembly Committee were held, with the Assembly also exercising the standard powers granted by the SAS Act and the SAS Statute during this period.

At its plenary session in May 2024, the Assembly elected prof. MUDr. Daniel Pella, PhD., as an external member of the Scientific Council SAS for 2021–2025, discussed the Draft Principles of the Performance Contract System and heard information on the breakdown of the SAS budget for 2024 in accordance with the principles approved by the Assembly.

In September 2024, the Assembly discussed and approved Amendment No. 6 to the SAS Statute, the Principles of Remuneration of Members of the SAS Presidium, the Principles of Proposal and Distribution of the Academy's Budget for 2025, as well as the Schedule for the Election of Candidates for the SAS President and Members of the SAS Presidium in 2025–2029. The Assembly asked the SAS Presidium to initiate a discussion on the amendment of the Rules for Remuneration of the Director of a Public Research Institution Established by the Slovak Academy of Sciences.

The Assembly session in November 2024 focused on the election of the SAS President for 2025–2029, which was held separately for the first time and in advance of the elections of candidates for members of the SAS Presidium. The academic communities of the organizations and groups of leading scientists nominated two candidates, František Šimančík and Martin Venhart. The Assembly elected Martin Venhart by secret ballot as the candidate for the next SAS President.

Selected members of the SAS Presidium and the head of the SAS Office were invited to the meetings of the Assembly Committee, as needed. The Committee debated current problems of the Academy, and, in particular, the materials being prepared and submitted to the plenary sessions of the Assembly and their comments. The members of the Assembly Committee continued to be members of the committees and advisory bodies of the SAS Presidium by virtue of their function. In 2024, the Committee representatives attended all regular meetings of the SAS Presidium. The Chairman of the Assembly also invited to meetings of the SAS Scientific Council, and they attended other official SAS events. In the second half of the year, the Committee organized the elections of the SAS President and candidates for members of the SAS Presidium for 2025–2029.

The composition of the Assembly of Slovak Academy of Sciences in 2024:

Mgr. Ľuboš Kľučár, PhD.

President of the SAS Assembly  
President of the 2nd chamber of SAS Assembly  
Institute of Molecular Biology SAS

Mgr. Radoslav Passia, Ph.D.

President of the SAS Assembly  
President of the 3rd chamber of SAS Assembly  
Institute of Slovak Literature SAS

RNDr. Katarína Gmucová, CSc.

Vice-President of the SAS Assembly  
President of the 1st chamber of SAS Assembly  
Institute of Physics SAS

MVDr. Daniela Antolová, DrSc.

Institute of Parasitology SAS

RNDr. Ján Gálik, CSc.

Institute of Neurobiology of the Biomedical Research Center SAS

Ing. Veronika Hvozdíková, PhD.

Institute of Economic Research SAS

Ing. Michal Kadúć

Centre of Operations SAS - o.z. Computing Center SAS

Ing. Anna Kalistová, PhD.

Centre of Social and Psychological Sciences SAS – o. z. Institute of Social Sciences SAS

doc. RNDr. Karol Nemoga, CSc.

Mathematical Institute SAS

## 8.2 SAS Presidium

The SAS Presidium is an executive self-governing body of the Slovak Academy of Sciences, whose internal structure and scope of activities are defined by § 10 of Act No. 133/2002 Coll. on the Slovak Academy of Sciences, as amended, and Article XIII of the SAS Statute. The Presidium's roles and objectives for 2021 - 2025 are specified in the Program Statement of the SAS Presidium and in the Action Plan of the SAS Presidium, which was updated at the SAS Presidium meeting on 12. 10. 2023.

The SAS Presidium (P SAV), as a collective body, takes decisions at its meetings in the form of resolutions. The form and manner of SAS Presidium meetings are regulated by the Rules of Procedure of SAS Presidium. Meetings of the SAS Presidium are convened and headed by the president of the academy or the vice-president of the academy, authorized by him. They usually take place once a month, usually on the second Thursday of the month.

In 2024:

- 11 regular meetings of the SAS Presidium took place, two of which were external. The meeting on 13. 6. 2024 was held in Košice, and the September meeting (4. 9. 2024) in KC Academia, Stará Lesná.
- Special meeting of the P SAV on 29. 5. 2024,
- 5 meetings per rollam.

The agenda of the meeting is drawn up according to the approved structure and contains the following basic points of discussion:

1. Information about negotiations, events, travel reports
2. Follow-up of the implementation of resolutions and tasks of the SAS Presidium ("C" resolutions - in writing, others that do not need to be recorded in the minutes - orally)
3. Minutes and programs of meetings of the academy's bodies
4. Concepts, analyses, activity reports
5. Economic and budgetary issues
6. Legislative and legal issues (internal regulations of the academy, principles, comment procedures, founding documents, lawsuits, etc.)
7. Domestic projects (VEGA, APVV, SASPRO, IMPULZ and others)
8. MVTS (projects including RP EU, NATO and others, agreements, opinions)
9. International relations (proposal letters, invitations)
10. PhD studies, education, cooperation with universities, SRK
11. Awards and honours (SAS, other bodies)
12. Personnel issues (selection procedures, appointments, nominations to bodies)
13. Accreditations, evaluations

14. Application of results (cooperation, patents)
15. Popularization of results (conferences, seminars, exhibitions, TK, DOD, media and others)
16. Information system (SAS publishing activity, magazines, databases, SANET, web)
17. Dislocation measures
18. Control and audit activity
19. SAS Assembly, SAS Scientific Council, the Learned Society of Slovakia, trade unions operating on the SAS premises, central body of state administration
20. Miscellaneous

In 2024, within the discussion of legislative proposals and legal issues, the SAS Presidium approved:

- statute and rules of procedure of the evaluation committee of the SAS postdoctoral „PostdokGrant“ program,
- SAS principles for the provision of financial resources to full-time doctoral students from central sources,
- amendment no. 1 to the Statute of the SAS Postdoctoral „PostdokGrant“ program,
- update of the Statute of the SAS Small project scheme to support the popularization and promotion of science,
- a model regulation for increasing the institutional resilience of the SAS organizations and a questionnaire for identifying the possible influence of foreign power,
- directive on the provision of web services and virtual servers,
- operating rules of the SAS premises and Rules for entry and parking on the SAS premises at Patrónka,
- draft amendment No. 6 to the SAS Statute, which the P SAS submitted for approval to the SAS Assembly,
- SAS principles for the establishment and support of spin-off companies by organizations founded by the SAS,
- amendment no. 14 to the organizational rules of the SAS Office,
- amendment no. 2 to the Statute of the SAS return project scheme for parents returning to work after maternity or/and parental leave,
- principles of distributing financial contributions to members of national committees and principles of reimbursement of foreign business trips to SAS representatives in international organizations financed from the SAS budget,
- amendment of the wording of the approval process for foreign business trips (November)
- sample registry rules for public research institutions,
- draft principles of the academy's budget proposal and distribution for 2025, approved by the SAS Assembly,

## 8. ACTIVITIES OF SAS SELF-GOVERNING AND SCIENTIFIC BODIES

- methodology of annual evaluation and performance financing of SAS scientific organizations in 2025,
- several amendments to the founding documents of SAS organizations,

the board of directors expressed its opinion on the selected draft internal regulations before their approval by the SAS Praesidium, or rather, the SAS Assembly.

At its January meeting, the P SAS approved, among other things, the call for the SAS return project scheme for parents returning to work after maternity or/and parental leave, and in May 2024, it approved a proposal to announce the fourth call for the IMPULZ program. As part of international projects, a call for the Mobility Visit program for 2025 was launched, a call for a joint mobility grant of the French government and the Slovak Academy of Sciences in the field of social sciences and humanities for young scientists for 2025 was approved, and several proposals for funding programs in the field of international cooperation were approved.

Within point 5 of the P SAS meeting program - economic and budgetary issues - the P SAS regularly discussed proposals for adjusting the budget of the SAS and SAS institutes. At the meeting on 10. 4. 2024, it approved the proposal for the final account of the SAS chapter for 2023, and in June, it voted on an algorithm for determining the maximum limit of the founder's contribution to the audit of SAS organizations. In September, the report on the settlement of financial relations with the state budget for 2023 was approved. The Presidium paid special attention to performance contracts. At a special meeting on 29. 5. 2025. the P SAS approved the principles of the SAS performance contract system and members of the evaluation panels for SAS performance contracts, and subsequently, the schedule of financing of SAS performance contracts for research and infrastructure public research institutions for 2024 and indicative for 2025 and 2026. The priorities of the SAS investment reservoir were discussed and approved at several meetings. The Presidium was also informed about the preparation and implementation of the Perún supercomputer project.

P SAS further approved:

- the results of the competition for doctoral students and the competition for young scientists under the age of 35,
- 2023 SAS Award for the Popularization of Science and Social Applications of Science,
- jubilants' proposal for the award of a Letter of Greeting of the P SAS at the seminar "SAS Personalities 2024",
- a proposal for the award for top publications.

At the meetings in June and October, P SAS discussed reports on the activities of the supervisory boards. Within point 10 of the agenda – doctoral studies, education, cooperation with universities, SRK – it approved the guarantors of doctoral studies.

At the November meeting, the outline and schedule for the preparation of the annual report on the activities and management of the SAS organization for 2024 and the annual report on the activities of the SAS for 2024 were approved.

Urgent matters and proposals for the discussion of which it was not possible or expedient to convene a meeting were discussed by the P SAS per rollam. In this way, the wording of the declaration on the current event of 15. 5. 2024 was agreed in May 2024. P SAS referred to the attack on the Prime Minister of the Slovak Republic as an unprecedented act, undermining democracy, stability and the values of civil society built over the years. In October 2024, the opinion of the P SAS on the statements of the authorized representative of the Slovak Government for the review of the process of resource management during the COVID-19 pandemic was approved per rollam.

Representatives of the P SAS regularly attended the meetings of the SAS Assembly. At the suggestion of the material submitter, representatives of the board of directors were invited to discuss economic and budgetary issues, legislative and legal problems. The chairmen of the OZ SAS workers and OZ Science and Research were invited to discuss materials related to labour and social interests and wage claims of the academy's employees.

In January 2024 (17. and 18. 1. 2024), a delegation from the Slovak Academy of Sciences led by prof. RNDr. Pavol Šajgalík, DrSc., the President of the SAS, visited the Vatican with the intention of establishing cooperation with the Pontifical Academy of Sciences (PAS). The working trip also included a visit to the Holy See's Dicastery for Culture and Education and a private audience with Pope Francis.

The composition of the SAS Presidium in 2024:

- prof. RNDr. President of the SAS
- prof. RNDr. Peter Samuely, DrSc., Vice President for Science, Research and Innovations
- prof. MVDr. Juraj Koppel, DrSc., Vice President for Budget and Legislation
- Mgr. Zuzana Panczová, PhD., Vice President of the SAS for International Relations
- Mgr. Martin Venhart, PhD., Vice President for Scientific Section 1
- prof. RNDr. Karol Marhold, DrSc., Vice President for Scientific Section 2
- RNDr. Miroslav Morovics, Csc., Vice President for Scientific Section 3
- Ing. Ivana Budinská, PhD.
- RNDr. Pavol Siman, PhD.

Dr. Ing. František Simančík  
MUDr. Mgr. Tomáš Hromádka, PhD.  
prof. RNDr. Ľubica Lacinová, DrSc.  
Mgr. Róbert Karul, PhD.  
Mgr. Michal Kšiňan, PhD.  
Ing. Marek Radvanský, PhD.

### 8.3 SAS Scientific Council

The SAS Scientific Council is a self-governing body of the academy for solving scientific and conceptual tasks. It exercises its powers under § 9 Section 5 of the Act on the SAS.

Meetings of the Scientific Council, convened by its Chairman, are determined by semi-annual plans. The Chairman of the Scientific Council is, according to § 9 Section 2 of the Act on the SAS, the SAS President. The President of the SAS Assembly and the President of the Learned Society of Slovakia are regularly invited to the meetings of the Scientific Council. Candidates for the scientific degree DrSc. and chairmen of the relevant defence committees are invited to the designated part of the meeting.

In 2024, 3 regular meetings of the SAS Scientific Council were held: 7. 2., 29. 5., 13. 11.,

On 24. 7. 2024, a special meeting was held, and in one case, the Scientific Council deliberated per rollam: 12. 1. – 22. 1. 2024.

#### At the meeting on **12. 1. – 22. 1. 2024, the Scientific Council**

##### **approved per rollam**

- addendum to the Criteria for scientific qualification levels IIa and I.

#### At the meeting on **February 7, 2024, the Scientific Council**

##### **awarded**

- the honorary scientific degree of Doctor of Science in Materials Engineering (DrSc. h. c.) to prof. Yury Gogotsi,

##### **elected**

- Ing. Peter Švec, DrSc., of the Institute of Physics SAS and prof. Mgr. Mgr. Peter Šajda, PhD., of the Institute of Philosophy SAS, as members of the Commission for the Assessment of Scientific Qualifications,

##### **awarded**

- the SAS Medal for the support of science to:  
prof. RNDr. Gejza Wimmer

prof. RNDr. Karol Marhold,  
prof. PhDr. Rastislava Stoličná, DrSc.

**took note of**

- the material Concept of performance contracts for the SAS
- the meetings plan of the Scientific Council in 2024: 29. 5. 2024, 11. 9. 2024, 13. 11. 2024.

**At its meeting on May 29, 2024, the Scientific Council**

**awarded**

- the scientific degree of Doctor of Technical Sciences RNDr. to Matej Baláž, PhD., an independent researcher at the Institute of Geotechnics SAS, based on the successful defence of the doctoral dissertation "Mechanochemistry as a tool for recycling waste and synthesis of nanocrystalline materials" in the field: 020500 Materials Engineering (original numbering 020600),
- the scientific degree of Doctor of Technical Sciences dr. h. c. mult., prof. Ing. to Jozef Živčák, PhD., MPH, Professor at the Faculty of Mechanical Engineering of the Technical University of Košice, based on the successful defence of the doctoral dissertation "Material development in personalized implantology" in the field: 020300 Mechanical Engineering,
- the scientific degree of Doctor of Pharmaceutical Sciences to prof. PharmDr. to Adriana Duriš Adameová, PhD., an employee of the Faculty of Pharmacy, the Comenius University in Bratislava, based on the successful defence of her doctoral dissertation: "New perspectives on pathomechanisms and therapy of heart diseases: emphasis on necroptosis" in the field: 030105 - Pharmacology,
- the scientific degree of Doctor of Psychological Sciences to doc. PhDr. to Gabriel Bianchi, CSc., an independent researcher at the Institute for Research in Social Communication SAS, based on the successful defence of his doctoral dissertation Figurations of Human Subjectivity: A contribution to Second-Order Psychology (Palgrave, 2022) in the field: 050100 Psychological Sciences,

**did not award**

- the scientific degree of Doctor of Biological Sciences RNDr. to Dana Jurkovičová, PhD., an independent researcher at Institute of Experimental Endocrinology of the Biomedical Research Center SAS in Bratislava in the field 010600 Biological Sciences (formerly 010622 General Biology),

### approved

- the proposal for the award of the honorary scientific degree of Doctor of Medical Sciences (DrSc. h. c.) to Roberto Bolli, M. D., D. Sc. (Hon.) FAHA, FACC,

### elected

- prof. Mgr. Peter Halama, PhD., from the Centre of social and psychological sciences SAS as a member of the Commission for the Assessment of Scientific Qualifications,

### awarded

- the SAS Gold Medal
  - to prof. MVDr. Juraj Koppel, DrSc.,
- the SAS Gold Medal in memoriam
  - to Ing. Mária Omastová, DrSc.,
- the Medal for the Support of Science
  - to prof. RNDr. Mikuláš Huba, CSc.,
- the SAS Award for the results of international scientific and technical cooperation
  - to the staff of the Institute of Inorganic Chemistry SAS, consisting of: to Ing. František Šimko, PhD., Ing. Michal Korenko, PhD., doc. Ing. Miroslav Boča, DrSc., Ing. Zuzana Netriová, PhD., Mgr. Pavol Weiner, Ing. Jozef Priščák for the project of international industrial cooperation between ÚACH SAV and the consortium HYDRO ALUMINIUM AS (Porsgrunn, Norway) and RIO ALUMINIUM PECHINEY (Voreppe, France),
- the SAS Award for the results of scientific research work
  - to the team of researchers of the Institute of Virology of the Biomedical Research Center SAS, led by Ľudovít Škultéty, PhD., consisting of: Mgr. Eva Špitálska, PhD., RNDr. Zuzana Sekeyová, PhD., Ing. Katarína Palkovičová, Mgr. Marco Quevedo Diaz, PhD., for outstanding contributions to innovation in the development of vaccines, diagnostic antigens, and research into antibiotic resistance in rickettsial infections,
  - to the research team of the Center for Experimental Medicine SAS, the Cementirestat Team, led by Ing. Milan Štefek, CSc., consisting of: Mgr. Pavol Boďo, RNDr. Lucia Kováčiková, PhD., Ing. Marek Lepáček, RNDr. Magdaléna Májeková, PhD., Ing. Marta Šoltéssová Prnová, PhD., Ing. Milan Štefek, CSc., in the field of research into the mechanisms of pathological changes affected by long-term hyperglycemia, interdisciplinary research into nanomaterials and polymer composites and nanocomposites,

- to the team of authors of the Institute of Slovak Literature SAS, consisting of Mgr. Radoslav Passia, Ph.D., doc. Mgr. Vladimír Barborík, CSc., Mgr. Katarína Badžgoňová, doc. PhDr. Anikó Dušíková, CSc., Mgr. Michal Habaj, PhD., Mgr. Matej Masaryk, PhD., Mgr. Vladimíra Mravcová, PhD., Mgr. Viliam Nádaskay, PhD., PhDr. Jana Pátková, Ph. D., doc. Mgr. Jaroslav Šrank, PhD., for the scientific publication *Literary Landscapes of Bratislava: An Image of the City after 1918* (Bratislava: VEDA, 2023),
- to Mgr. Eva Dědečková, PhD. and doc. Mgr. Richard Sťahel, PhD., of the Institute of Philosophy SAS, for the monograph *Current Challenges of Environmental Philosophy* (Leiden - Boston : Brill, 2023),
- the SAS Award for the results of scientific research work for young researchers
  - PhDr. Mgr. Daniela Vacek, PhD., of the Institute of Philosophy SAS, for a collection of works focused on ethical issues of artificial intelligence, on the philosophy and logic of responsibility, and for studies in the field of analytical aesthetics,
- the International SAS Award
  - for Outstanding work in the field of technical sciences to a scientist from the Netherlands, prof. Dr. Ing. Miroslav Zeman,

### approved

- the Annual Report on the Activities of the Slovak Academy of Sciences for 2023.

The main point of the meeting of the Scientific Council on 24. 7. 2024 was the proposal for a self-remediation on the appeal against the decision of the SAS Scientific Council (removal of RNDr. Dana Jurkovičová, PhD.), and the forwarding of the proposal for the award of the scientific degree of Doctor of Biological Sciences to RNDr. Dana Jurkovičová, PhD., to the SAS Presidium, as the competent authority for the decision, under § 5 Section 1, letter a) of the Decree of the Slovak Commission for Scientific Degrees No. 65/1977 Coll. on the procedure for awarding scientific degrees.

The opinion on the awarding of the scientific degrees "Doctor of Sciences" in the conditions of the Slovak Academy of Sciences, especially in the context of Act No. 347 /2021 Coll. of September 21, 2021, amending and supplementing Act No. 133/2002 Coll. on the Slovak Academy of Sciences (hereinafter referred to as the "Act on the SAS") was provided by prof. RNDr. Juraj Koppel, DrSc., Vice-Chairman for Economy and Legislation. The above-mentioned law, among other things, changed the part of the Act on the SAS that regulates the status and scope of the SAS Scientific Council. While until 31. 12. 2021, the Scientific Council had the

competence to award scientific degrees (§ 9, Section 7, letter d) of the Act on the SAS), from 1. 1. 2022, this competence is no longer present in the law. Following the above, it was necessary to proceed in accordance with § 5, Section 1, letter a) of the Decree of the Slovak Commission for Scientific Degrees No. 65/1977 Coll. on the procedure for awarding scientific degrees as amended by Decree No. 302/1990 Coll.: „*The bodies authorized to decide on the award of a scientific degree are: The Presidium of the Slovak Academy of Sciences, if the defence of the doctoral dissertation took place before a commission operating at the Slovak Academy of Sciences*“. For this reason, the removal of RNDr. Dana Jurkovičová, PhD., against the negative decision of the SAS Scientific Council dated 10. 6. 2024 could not be reviewed, as the decision in question was issued by an authority that was not competent for the matter.

### **At a special meeting on 24. 7. 2024, the SAS Scientific Council**

#### **revoked**

- the resolution of the Scientific Council of 29. 5. 2024, on not granting the scientific degree of Doctor of Biological Sciences to RNDr. Dana Jurkovičová, PhD., an independent researcher at the Cancer Research Institute of the Biomedical Research Center SAS in Bratislava, in the field 010600 - Biological Sciences,
- the decision of the Scientific Council of 10. 6. 2024, on rejecting the proposal of the Commission for the Defence of Dissertation Theses in the field 010600 - Biological Sciences to grant the scientific degree of Doctor of Biological Sciences to RNDr. Dana Jurkovičová, PhD.,

#### **forwarded**

- the proposal of the Commission for the Defence of Dissertation Theses in the field 010600 – Biological Sciences for the award of the scientific degree of Doctor of Biological Sciences to RNDr. Dana Jurkovičová, PhD., an independent researcher at the Cancer Research Institute of the Biomedical Research Center SAS in Bratislava, to the SAS Presidium, as the competent body, for a decision.

Since not enough materials were submitted to the agenda of the Scientific Council's meeting, which was planned for 11. 9. 2024, this meeting was not held.

### **At its meeting on November 13, 2024, the SAS Scientific Council**

#### **approved**

- changes to the Criteria for awarding scientific qualification levels IIa and I,

- amendments to the Criteria for awarding scientific qualification levels IIa and I,

**took note**

- of the opinion of the SKVH not to approve the proposal to award the honorary scientific degree of Doctor of Medical Sciences (DrSc. H. c.), to prof. Roberto Bolli, M. D., D. Sc., (Hon.) FAHA, FACC,

**awarded**

- the SAS Gold Medal to prof. RNDr. Eva Zažímalová, CSc., Dr. h. c., President of the Czech Academy of Sciences.

Prof. RNDr. Karol Marhold, DrSc., President of the Slovak Commission for Scientific Degrees (SKVH), informed that at its meeting on 8. 11. 2024, the SKVH adopted a resolution, by which under § 55, Section 2, letter d) of the Decree of the Slovak Commission for Scientific Degrees No. 65/1977 Coll. on the procedure for awarding scientific degrees, it declared the SAS Scientific Council to be the body authorized to decide on the award of the scientific degree of Doctor of Sciences, if the defence of the doctoral dissertation took place before a commission operating within the organization of the Slovak Academy of Sciences.

In 2024, the SAS Scientific Council consisted of:

President:

prof. RNDr. Pavol Šajgalík, DrSc., President of the SAS

Vice-President:

prof. JUDr. Marek Števíček, PhD., rector of the Comenius University in Bratislava

Ex-offo members: (members of the SAS Presidium according to § 9 (3) of Act No. 133/2002 Coll. on the Slovak Academy of Sciences, as amended):

prof. RNDr. Peter Samuely, DrSc., Vice President for Science, Research and Innovations

prof. MVDr. Juraj Koppel, DrSc., Vice-Chairman for Economy and Legislation

Mgr. Zuzana Panczová, PhD., Vice President of the SAS for International Relations

Mgr. Martin Venhart, PhD., Vice President for Scientific Section 1

prof. RNDr. Karol Marhold, DrSc., Vice President for Scientific Section 2

RNDr. Miroslav Morovics, Csc., Vice President for Scientific Section 3

Ing. Ivana Budinská, PhD.

RNDr. Pavol Siman, PhD.

Dr. Ing. František Simančík

MUDr. Mgr. Tomáš Hromádka, PhD.

prof. RNDr. Ľubica Lacinová, DrSc.

Mgr. Róbert Karul, PhD.

Mgr. Michal Kšiňan, PhD.

Ing. Marek Radvanský, PhD.

External members of the SAS Scientific Council:

prof. Ing. Peter Mésároš, PhD., rector of the Technical University of Košice

Dr. h. c. prof. h. c., Dr. Ing. Oliver Moravčík, rector of the Slovak University of Technology in Bratislava

prof. MUDr. Daniel Pella, PhD., rector of the Pavol Jozef Šafárik University in Košice

doc. Dr. Ing. Peter Vrábek, technical director, RONA, a.s., Lednické Rovne

prof. RNDr. Eva Zažímalová, Csc., President of the Czech Academy of Sciences

prof. MUDr. Tomáš Zima, DrSc., MBA, Charles University in Prague, Czech Republic

### 8.4 The Learned Society of Slovakia

In 2024, the Learned Society of Slovakia (UČSS) fulfilled its mission to support science, research and education in Slovakia.

The Council of UČSS composed of J. Noga (President), D. Ježová (Vice-President), F. Gömöry (Secretary), M. Fikar, E. Kowalská, Ľ. Lacinová, Ľ. Tomáška deliberated remotely 6 times on 26. 1., 12. 3., 1. 7., 18. 9., 21. 10. and 5. 11. 2024. Two General Assemblies were held remotely on 8.10. and in person on 20. 11. 2024.

#### Media activities of the Learned Society of Slovakia

In 2024, cooperation with the Aktuality.sk portal continued on the regular column "Science, research - our chance", initiated in 2021 by academician Peter Moczo who engages in it with great energy. 32 articles covering a wide range of scientific disciplines were published at weekly intervals. They are accessible online at <https://www.aktuality.sk/tema/veda-vyskum-nasa-sanca/>.

On June 20, 2024, the Council joined the Open Call to the Government of the Slovak Republic to respect scientific knowledge in the field of public health. It thus responded to the repeated unscientific and unprofessional decisions of some members of the executive branch in this area, which push the image of our homeland far into the past and are, by their very nature, extremely dangerous to the nation.

The Council supported the statement published on 13. 8. 2024 by representatives of leading scientific and educational institutions. It expressed disagreement with the steps taken by the leadership of the Ministry of Culture of the Slovak Republic towards the top national cultural institutions – the Slovak National Gallery and the Slovak National Theatre. It pointed out that it considers attempts to direct management and censorship of artistic activities to be an unacceptable gamble with creative potential that threatens the future of the entire society.

On 7. 10. 2024, the Council issued a statement in which it strongly rejected several false and misleading statements made on 2. 10. 2024 at a press conference by the Authorized Representative of the Government of the Slovak Republic for the Review and Management of Resources during the COVID-19 Pandemic, Peter Kotlár.

### **Lectures for the public, co-organization of events**

On the initiative of academician Ľuba Lacinová, UČSS began organizing lectures for the public. In the first year, it held two events, hosted by Jaroslav Valent at the Old Seminary - Open Society Laboratory on Konventná Street in Bratislava.

23. 4. 2024: Epidemics in history, present and future

(panelists: historian Tünde Lengyel of the Institute of History SAS, epidemiologist Alexandra Bražinová of the Faculty of Medicine of the Comenius University and virologist - UČSS academician Boris Klempa)

22. 10. 2024: A city in times of climate and other changes: what is Bratislava like and what could it be like? (panelists: Henrieta Moravčíková, UČSS academician, Pavel Šuška of the Institute of Geography SAS, and Marek Semelbauer of the Institute of Zoology SAS)

### **ESET Science Award Nominations**

The Council actively approached the possibility of nominating candidates for the ESET Science Award. The submitted nomination for the award to Igor Farkaš in the category "Outstanding Scientist" was successful.

### **Falling Walls Lab Slovakia 2024**

UČSS academicians significantly contributed to the successful conduct of the scientific talent competition "Falling Walls Lab Slovakia 2024 (FWLS 4)", under the auspices of Academician Peter Moczo. The jury, led by academician Vladimír Bužek, included academicians Katarína Mikušová, Silvia Pastoreková, Ivo Petráš and Ján Svák.

### **Award for extraordinary interdisciplinary scientific output**

In the 2nd year of the competition, the Council expanded the circle of proposers to include university representatives. Of the two proposals submitted, it was decided in a secret ballot to award the team of prof. Ján Slezák for the work "Molecular hydrogen in the prevention and treatment of cardiovascular diseases".

### **Involvement in the "VER" evaluation**

Based on the initiative of the advisor to the State Secretary, academician Jozef Masaryk, the UČSS was approached as a subject that would participate in the preparation of the VER26 evaluation.

### **The issue of the mission of universities**

Academician Ľubomír Tomáška initiated the creation of a working group focused on the issue of the mission of universities in Slovakia. The first meeting took place on 9. 4. 2024 in the early evening at the Faculty of Natural Sciences of the Comenius University, and was attended by academicians Vladimír Bužek, Miroslav Fikar, Fedor Gömöry, Daniela Ježová, Eva Kowalská, Ľubica Lacinová, Katarína Mikušová, Henrieta Moravčíková, Jozef Noga, Jozef Nosek, Ľubomír Tomáška and Miroslav Urban. They discussed the intention to organize thematically focused colloquia, with the participation of experts (regardless of UčSS membership) with an overlap into all relevant areas (including representatives of the arts/humanities).

### **Election of new members**

At the General Assembly on 8. 10. 2024, the following were elected as members of the Learned Society of Slovakia in a secret ballot:

doc. PhDr. Gabriel Bianchi, DrSc.  
prof. RNDr. Juraj Bujdák DrSc.  
prof. RNDr. Peter Fedor, DrSc.  
prof. Ing. Dušan Galusek, DrSc.  
Dr. h. c. prof. RNDr. Ivan Glesk, DrSc.  
doc. MUDr. Richard Imrich, DrSc.  
prof. RNDr. Renáta Oriňaková, DrSc.  
prof. RNDr. Daniel Ševčovič, DrSc.  
Mgr. Adam Tomašových, DrSc.  
prof. RNDr. Vladimír Zeleňák, DrSc.  
Dr. h. c. mult. prof. Ing. Jozef Živčák, DrSc., MPH  
prof. RNDr. Ladislav Mucina, PhD.

The president of the UčSS presented diplomas to the newly elected academicians at the General Assembly on 20. 12. 2024, which took place in the Comenius University Science Park. In the second part, a lecture by academician Štefan Vilček was given on the topic: "SARS-CoV-2: Five years of searching for the origins of a mysterious virus". After the end of the meeting, the UčSS Annual Dinner was held.

The activities of the Learned Society of Slovakia are documented by news and official documents on the website of the Learned Society of Slovakia [www.learned.sk](http://www.learned.sk)



## 9 COMMUNICATION WITH THE PUBLIC AND PROMOTION OF SAS RESULTS

The communication of the Slovak Academy of Sciences with the public is overseen by members of the SAS Presidium, several committees serving as advisory and auxiliary bodies, and last but not least, the Department of Communication and Media of the SAS Office. In 2024, the Department (RKM) actively communicated the academy's main topics to the public, participated in the promotion and organization of popularization, promotional, ceremonial and professional events (press conferences, International SAS Award, SAS Awards, Seminar of prominent SAS personalities, etc.). In addition, the Department provided information about meetings and receptions at the SAS Presidium level, about upcoming events, provided media service, as well as photo, audio and video recordings. The Department provides documentation and promotional services to all departments of the SAS Office, institutes and centres.

The main communication channel of the SAS towards the professional and general public is the website [www.sav.sk](http://www.sav.sk), the SAS social networks, the YouTube channel and the regular SAS podcast. The Department uses the expanded section of the SAS website – MEDIA, in which it regularly publishes press releases and a photo gallery from events. The Department monitors daily the appearances of SAS scientists in journalistic electronic media, which it then publishes on the SAS subpage in the media. In 2024, the number of fans of SAS social networks, listeners of the SAS Science Podcast, media outputs and viewers on YouTube grew.

### 9.1 SAS popularization events and activities

#### **We Are SAS**

SAS organized its largest popularization event, *We Are SAS* (formerly Weekend with the SAS), for the fourth time in 2024, this time at Hviezdoslavovo námestie in Bratislava. 30 SAS institutes and centers from all over Slovakia presented themselves at the two-day event. The accompanying program, in the spirit of combining science, art, and entertainment, was hosted by SAS employees. Part of the event, which connected the scientific community with the general public, was a series of interactive ten-minute lectures on stage, in which 12 speakers representing all three SAS Scientific Sections introduced themselves during the first day.

The event was also held in Trnava in a similar format in 2024, with the intention of continuing in other cities. The event aims to popularise science and research in Slovakia's regions,

introducing the public to the work of scientists in an attractive, visual, and experiential way, and emphasising the importance of scientific knowledge for society. More than a third of SAS institutes were represented in 14 stands in Trnava, primarily institutes specialising in the physical and earth sciences, as well as the social sciences and humanities. Scientists from 11 SAS science departments discussed current topics of their research with visitors.

### **Vivat Scientia! Long live science!**

In 2024, SAS continued with a popularization project, *Vivat Scientia! Long live science!*, in Lučenec. Its goal is to introduce and raise the profile of the academy in regions where there are no universities or SAS scientific institutions. In 2024, nine speakers lectured in Lučenec about current topics. An article, photo gallery and video were created for each event. These are posted on the SAS website and are also available for listening.

### **SAVinci Cafés in Bratislava and Science Cafés in Košice**

SAVinci Science Cafés have found their new place in the Bratislava cultural centre Kácečko. In 2024, seven successful Science Cafés took place, a video of which was made and published on the SAS YouTube channel. It turned out that Kácečko is a convenient place for this event. SAVinci Cafés have been looking for a suitable location for the past few years. A similar format called Science Cafés is very successful in Košice.

### **SAS as a STARMUS partner**

SAS became a partner of the STARMUS event - an exceptional festival of science and art in May 2024. In the SAS Main Hall at Patrónka, four lectures by world-renowned scientists were given as part of the event, including the Nobel Prize winner for physics. The SAS was also present at the STARMUS Science Camp – a stand presentation on Bratislava's Main Square – and during the entire festival week, 5 institutes presented the results of their research activities there. Several SAS scientists appeared on stage – visitors could listen to (and watch) a live recording of the SAS Science Podcast on the materials of the future. No less interesting was a dynamic lecture on artificial and natural intelligence.

### **Doctoral Storm**

The SAS Strategic Development Department, in cooperation with the SAS Young Scientists platform, organized an event called Doctoral Storm in May 2025 at the SAS premises in Bratislava's Patrónka. It was mainly addressed to young scientists, doctoral students and students who are considering doctoral studies. The main part of the event included the presentation of doctoral studies, scientific teams and clusters from various SAS institutes. The poster section, presented in both English and Slovak, provided information on works from more than 20 SAS institutes. There was also a discussion with experts on mental health, an

interactive Quiz for the Curious, and a musical and entertainment program in the SAS Main Hall.

### **Participation in the Science Fair in Prague**

The SAS was present at the Science Fair 2024 in Prague, the largest popular-science event in the Czech Republic. The academy presented several of its departments at the PVA exhibition center in Letňany. The following institutes were presented within the exhibition: the Institute of Construction and Architecture SAS; the Institute

of Animal Physiology of the Centre of Biosciences SAS; the Centre of Experimental Medicine SAS and the Institute of History SAS.

### **Participation in the international exhibition Agrokomplex in Nitra**

SAS is a regular exhibitor at the international agricultural and food exhibition Agrokomplex in Nitra. It was also present at its 49th year in 2024. The academy presented several research topics and results in the field of plant genetics and biotechnology, parasitology, landscape ecology, information on the life of farm animals, trends in their nutrition and treatment. The SAS was represented by the Plant Science and Biodiversity Centre SAS (CBRB SAV), the Centre of Biosciences SAS and the Institute of Landscape Ecology SAS: The live, plant and flower decoration of the stand was provided by the Mlyňany Arboretum - Institute of Forest Ecology SAS.

### **Other popularization activities**

On the occasion of the commemoration of November 1989, we organized an event for high school students, which included a discussion with participants in the November events, who were also employees of the Slovak Academy of Sciences. The SAS Young Scientists platform is becoming increasingly active in promoting science.

SAS institutes and centers once again participated in traditional national and international events (Science and Technology Week, AMAVET festival, European Researchers' Night and others). Several institutes organized the Summer School for Young Scientists.

### **SAS in the media**

The Slovak Academy of Sciences has been active in the media, as evidenced by the number of outputs in the past year, which has a significantly increasing trend compared to 2023. The total number of articles with the keyword Slovak Academy of Sciences that appeared in the media last year exceeded 21,240. Compared to last year, this is an increase of more than 50%.

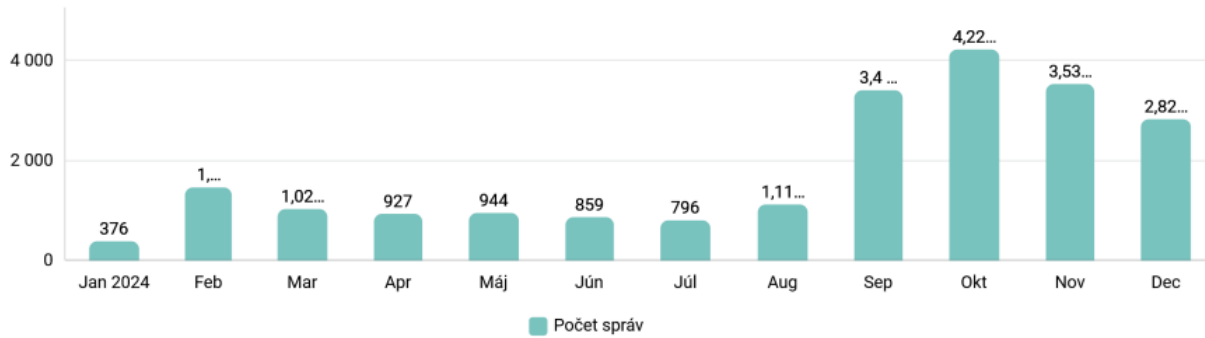


Fig. 9.1 : Number of published articles related to SAS in the media in 2024

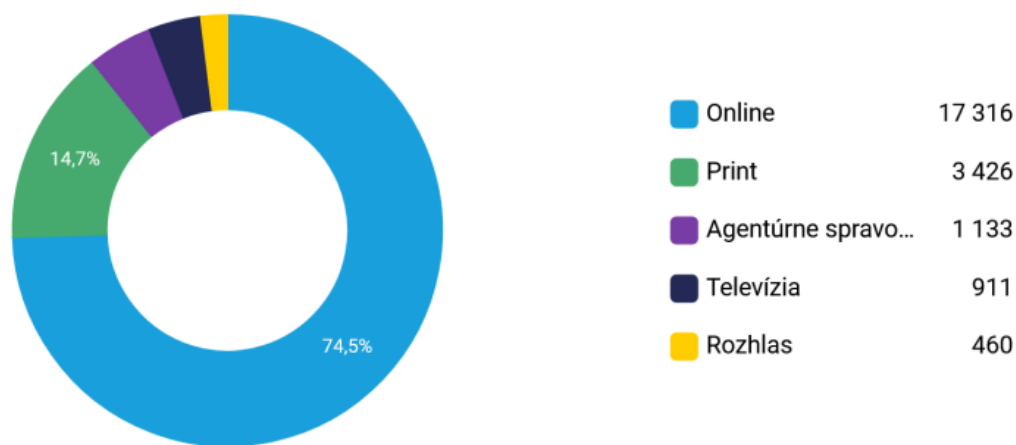


Fig. 9.2 : Types of media in which outputs about SAS appeared

### Academy Journal - SAS News

In 2024, six issues of the Academy Journal/SAS News were published. The focus of the journal remains unchanged - the basis is interviews with established scientific figures, and the upcoming generation of scientists is also given space. The SAS scientific community, as well as the general public, has the opportunity to gain a better overview of projects and work in individual institutes. The interviews are complemented by reports from scientific and popularization events and reports on successful SAS scientific results. The journal has a circulation of 500 copies and is distributed to SAS institutes, as well as to various public institutions.

In the first half of the year, the journal's website <https://akademia.sav.sk/> underwent significant changes. The original simple layout with an online archive of issues in PDF format has been replaced by a new layout, and separate articles published via the WordPress system have been added to the archive of issues. This step changed the accessibility of the journal's content and increased the website's traffic. Currently, the most-read article on the website has over 5,000 views.

## 9.2 Open Academy

In 2024, the SAS Open Academy program focused on supporting the publication of popular science periodicals, the main goal of which is to make the results of scientific research available to a wider professional and lay public. This activity reflects the efforts of the SAS to strengthen the social impact of science and to connect academic research with public discourse. In this spirit, two important journals were supported within the Open Academy program, which have long played a significant role in the popularization of the humanities and social sciences.

The first of the supported periodicals is the journal *Kultúra slova*, published by the Ľudovít Štúr Institute of Linguistics SAS. This peer-reviewed journal is unique in Slovakia, as it is the only one that systematically addresses issues of language culture and terminology. It includes not only professional studies, but also articles reflecting current language phenomena, recommendations for language practice, interviews with linguists, and overviews of important terminology activities. Thanks to its openness to the practical use of knowledge, it is of fundamental importance for teachers, editors, officials and all those who work with standard Slovak in their profession.

The second important periodical that received support is *História. Revue o dejinách spoločnosti*, published by the Institute of History SAS. This journal includes engaging popular science articles from the field of history and related humanities. The aim of the journal is not only to inform about the latest results of historical research, but also to contextualize them within the framework of current social and cultural issues. The journal thus creates a bridge between academia and a wider audience interested in history, while emphasizing the importance of historical reflection for understanding today's challenges.

Part of the Open Academy's activities is also the support of an editorial series of thematic brochures aimed at clarifying current and socially significant problems with an emphasis on the usability of knowledge in decision-making practice. In 2024, the brochure *Doba plastová. Polyméry okolo nás (The Age of Plastics. Polymers Around Us)* was published in this series, which addresses the issue of plastics from an interdisciplinary perspective. The authors focus on various aspects associated with the production, use and recycling of polymer materials, while reflecting on the ecological, technological, economic and health impacts of their mass distribution. The brochure is intended not only for the professional public, but also for the decision-making sphere, i.e. representatives of state administration and local government, to whom it offers information for informed decision-making in the field of environment and industrial policy.

Overall, in 2024, the Open Academy contributed to the recognition of Slovak science, deepening public awareness of research activities, and strengthening the dialogue between

science and society. Supporting high-quality popularization and publication activities remains one of its main tools for fulfilling this mission.

### 9.3 SAS on social networks

#### SAS website

The SAS website is an important communication channel of the academy, not only in relation to its employees and the scientific community, but also to the general public. It is divided into five main sections: News, Press releases, SAS in the media, Photo gallery, SAS Science Podcast.

Regular content creation and updating of the contents is ensured by the Department of Communication and Media of the SAS Office, some materials are also provided by SAS institutes and centers.

The portal published information about the latest research results and various projects, calls, invitations, as well as interviews and reports from events at the academy. Compared to 2023, the number of reports published on the website increased from 550 to 645, which is 12 reports per week on average. The SAS published 118 reports on the English section of the website - in 2023, it was 78.

#### SAS Science Podcast



In 2024, 21 episodes of the SAS Science Podcast were released, reaching a total of 44,817 listens throughout the year. 2,134 listeners listened to one episode on average. Since the podcast was launched in 2020, 95 episodes have been released and have reached almost 134,500 listeners during this period (data updated as of 21. 2. 2025, source: PodBean, YouTube).

The SAS Science Podcast is a part of the SME podcast family and is also published on the [SAS YouTube channel](#).

## 9. COMMUNICATION WITH THE PUBLIC AND PROMOTION OF SAS RESULTS

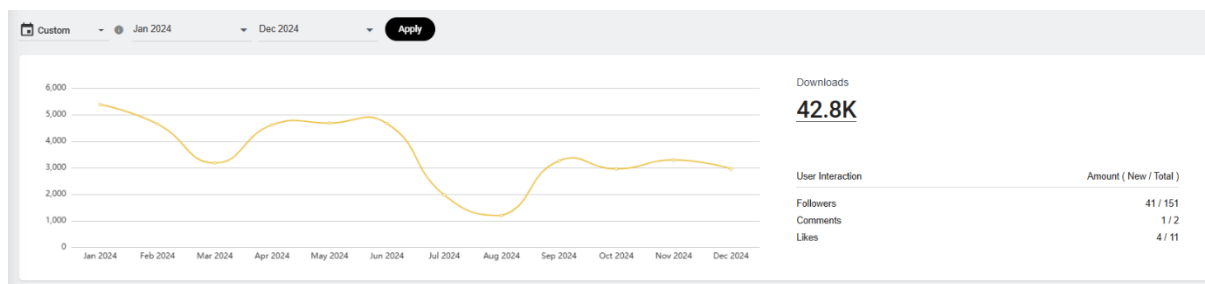


Fig. 9.3: Listeners of the SAS Science Podcast in 2024 (source: PodBean)



Fig. 9.4 a-b: Recording of SAS Science Podcast interviews within the STARMUS and We Are SAS events

### SAS YouTube Channel

The SAS YouTube channel has become the main platform for sharing video content from the academy. People can watch various genres of videos with scientific themes, such as: reports from academy events, recordings of scientific lectures, video podcasts, videos from current projects of the academy's institutes, as well as reports on current situations in the country with a scientific emphasis and short profiles of scientists.

The process of creating content for columns with regular periodicity continued: SAS Science Podcast (1-2x per month), recordings of scientific lectures - VIVAT SCIENTIA (1x per month), Košice Science Café (4x per year), SAVinci (1x per month), and short profiles of scientists from the SASPRO and IMPULZ projects (1-2x per month).

In addition to fulfilling regular popularization columns, the Department of Communication and Media team also produced videos for current needs of the SAS (e.g. the SAS International Award) and videos on current situations.

Table 9.1: *SAS YouTube channel statistics*

Statistics	Total views	Subscribers	Total viewing time (hours)	Published videos
<b>2023</b>	27,834	1,235	2,920	74
<b>2024</b>	37,884 (+36%)	1,540 (+305)	4,150 (+44%)	94

All viewership metrics increased in 2024, partly attributable to the higher number of videos posted (94 in 2024 vs. 74 in 2023):

Subscriber growth was about 66% better (compared to 2023), total watch time increased about 44%, and total views increased about 36%. One interesting thing is the number of views of our YouTube content – the offer for viewers to click on our video, so we could achieve "native" reach (without external links or paid contributions) - this value increased to 655,274, which is an increase of 67% compared to 2023.

## SAS on Social Media

### Facebook SAS

<https://www.facebook.com/SlovenskaAkademiaVied>

The number of followers of the SAS Facebook profile has increased from 15,000 to almost 18,000 over the past year. We have published more than 500 posts highlighting the achievements of the Slovak Academy of Sciences and its scientists. We have experienced the greatest success with posts related to social events and SAS public statements.

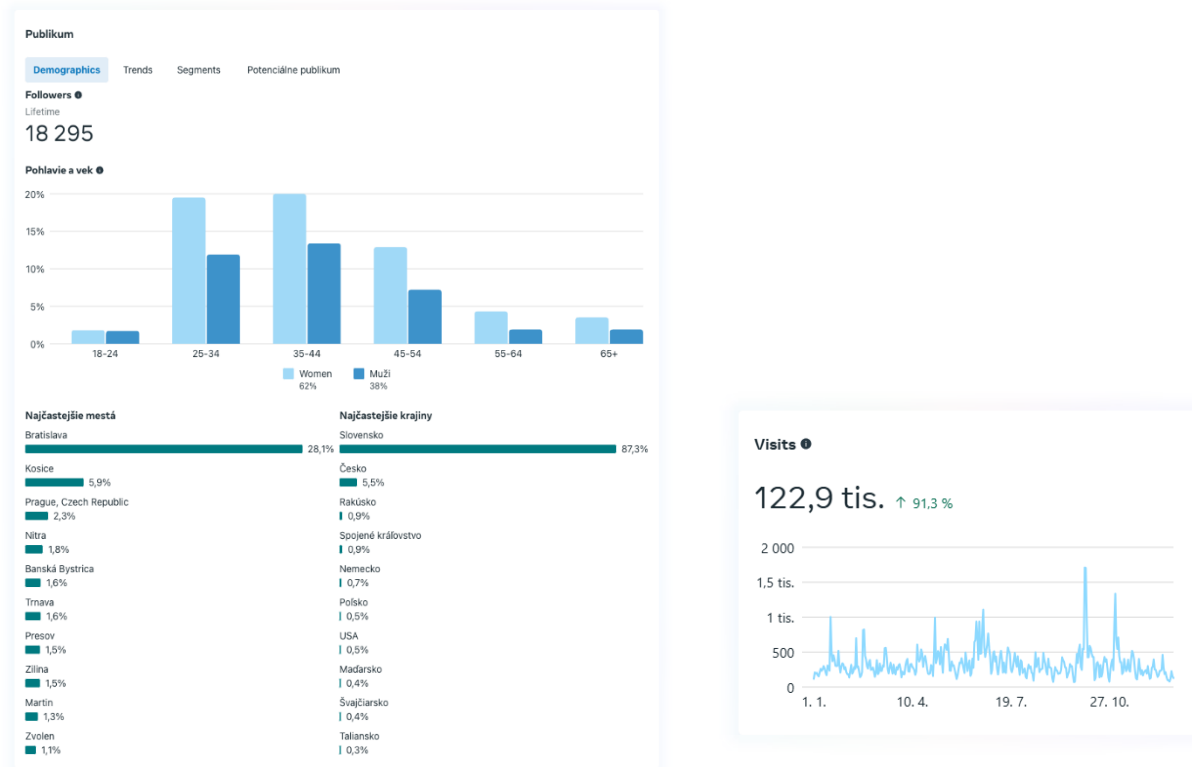


Fig. 9.5 a-b: Facebook followers statistics – SAS profile

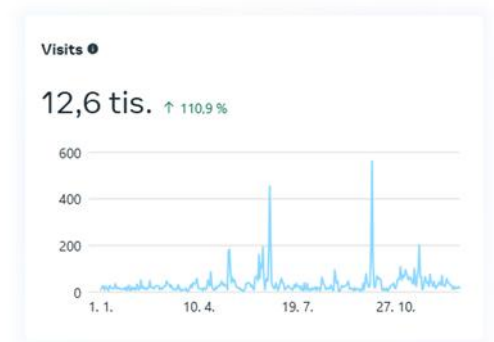
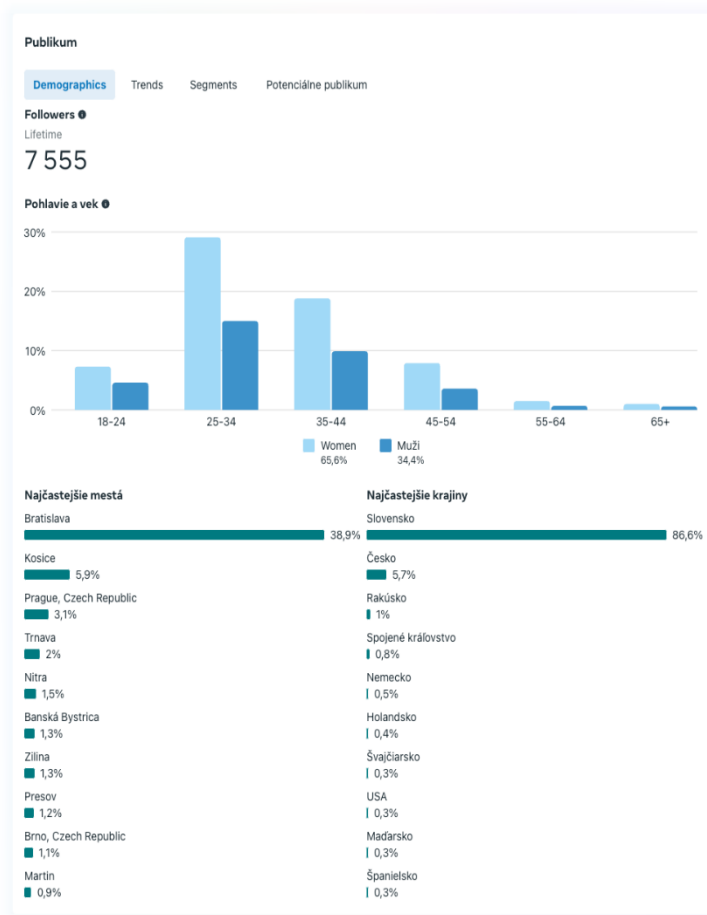
The profile is followed by 62% of women and 38% of men, most followers are from Slovakia, Bratislava.

The number of profile visits increased by 91.3% in 2024. The number of new followers is 2,772, which represents an increase of 196.8% compared to 2023

### Instagram SAS

<https://www.instagram.com/akademiavied/>

The number of fans of the SAS Instagram account has increased to 6,835 followers. More than 350 posts were published on the account. The greatest success and impact were recorded by posts related to social topics and fundamental statements of the SAS. We recorded high reach and interactions in the form of short videos (reels).



Data from February 2025

Fig. 9.6 a-b: Statistics of the SAS Instagram page's follower base

The page is followed by 65.6% of women and 34.4% of men, with the most followers coming from Slovakia and Bratislava. The number of visits to the page increased by **110.9%** in 2024.

**LinkedIn SAS**

<https://sk.linkedin.com/company/akademiavied>

The number of SAS fans has increased by more than 820 people in the last year. The composition of the fan base corresponds to what it is intended for. The profile is mainly followed by people working in research and education. Here, fans can find information, especially about job opportunities at the Slovak Academy of Sciences, professional courses or grant calls. We had 1,086 unique visitors and 2,147 profile views.

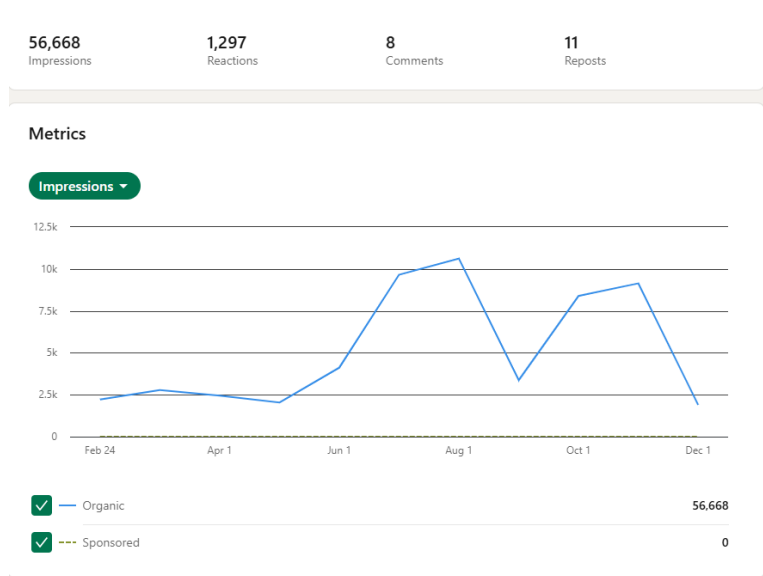


Fig. 9.7: *Statistics of impressions and reactions on the SAS LinkedIn profile for 2024*