

VÝKONNOSTNÉ ZMLUVY SAV 2024–2026



Stratégia organizácie SAV

Fyzikálny ústav, v. v. i.

Základné informácie o v. v. i.

Názov

Fyzikálny ústav SAV, v. v. i.

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STRATÉGIA Fyzikálneho ústavu SAV, v. v. i.

This document defines the long-term vision of Institute of Physics. It identifies weaknesses, strengths, challenges and formulates the key goals and objectives that will be addressed in the following decade. Strategy names the tools and measures that might help to achieve this goal. The planning assumes the existence of reasonable and predictable state/academy politics regarding research support.

MISSION

- Basic research in cutting-edge physical sciences reflecting both global and local societal challenges with direct impact on other sciences.
- Open laboratories for potential academic and industry partners without any borders.
- Dissemination of physics-related results among stakeholders, scholars and public.

CURRENT STATUS

Our qualitative SWOT follows from the quantitative data analysis and internal discussions.

weaknesses

Number of research topics
Inbalanced age/experience structure
Administration processes
Condition of IPSAS facilities

challenges

Environment attractiveness
Outreach and visibility
Identification of research leaders
Training and qualification

strengths

Internationalisation
Innovative support programs
Research performance
Modern research infrastructure

opportunities

Generation phase transition
New internal development programs
Planned state/academic/EC strategies
Academic and industry partnerships

STRATEGIC VISION

The consolidation of research teams and departments to enter the decade 2030-2040 with flat age/experience structure (PhD students = postdocs = permanent << leaders). The institute will focus on novel material research (nanostructures and metals) for environmental societal challenges, development of quantum technologies (foundations, communication and simulations) for security-related societal challenges and experimental and theoretical nuclear research. IPSAS programs are aiming to bring novel and fresh research subjects, but also exchange experiences. The outreach activities will be aiming to strengthen the Slovak Academy of Sciences brand and focus on talent support (high school programs), talent attraction (incoming experienced researchers) and development of diaspora connections.

STRATEGIC GOALS

1. Flexible and sustainable qualification and research structure

Current age structure is strongly biased towards researchers of age 60+ that form 1/3 of all researchers (including PhD students who form 1/4 of all researchers). Naturally, this seniority of researchers is linked with diversity of research topics – weakness identified in the last academic evaluation. On the other side, it also means the institute is reaching the point of “generation phase transition”. Therefore, the key researchers and the key research areas that will be forming the institute in the following decade need to be identified. This will automatically reduce the fragmentation of research topics, and will certainly have a positive effect on the structure of departments. There is a need to increase the number of short-term postdoctoral positions and medium-term tenure positions for potential junior researchers and team leaders. These positions shall be splitted to strengthen existing research teams (sustainability and stability), but some of them will be open for fresh promising research directions (flexibility). In the last two decades only very few permanent positions were open at the institute, but still the number of existing permanent positions is relatively large (more than a half without counting PhD students and small number of postdocs). The goal for the considered decade 2030-2040 is to achieve that at most half of the positions will be permanent, but also this type of position will be more uniformly age-distributed among experienced researchers.

2. Research excellence

The excellence depends on the quality of the researchers, funding opportunities and access to infrastructure. The key researchers should be provided with sufficient and stable institutional funding, but also have the responsibility to secure additional funding through their activity in projects. Especially, on top of the national projects also in international grant schemes that are currently more stable and reasonable than the experienced national funding opportunities. The institute has created a specific support scheme for preparation of ERC-like grant proposals and identified team leaders are expected to participate at such calls. The processes for selections of PhD students and researchers are defined, but open for practise-induced modifications in order to optimize the budget .

3. Attractive research environment

Attracting students and researchers to join, or visit the institute, is directly linked with the quality of research. The above strategic goals are meant to provide the necessary conditions. However, this is not sufficient. We plan to extend the existing institutional support programs for mobility exchanges, students internships and IPSAS fellowships. The mobility exchange program is meant to support our starting researchers to gain experience from medium-term visits at other institutes, but also support longer research stays of other researchers at our institute. Student internships are meant to support talent and identify potential future colleagues. IPSAS fellowships bring new research expertise and ideas. Another goal in the direction of increasing the attractivity is to establish institutional colloquia that will be open for students.

4. Outreach and visibility

We plan to continue our popularisation activities plus organize school clubs activities for high school students. Currently our capacities for dissemination are quite saturated, however, the expected rejuvenation might increase our dedication. The potential impact of social media is unprecedented, however, it is questionable whether they are really suitable for communication of scientific content directly by researchers. We plan to work with researchers, make the popularisation attractive and educate them in this field. We need to increase public awariness of activities of the Institute under the umbrella and trademark of Slovak Academy of Sciences.

RESEARCH AGENDA

Running projects are focused on the following research tasks.

- development of quantum communication infrastructures,
- in-operando diagnostics of batteries,
- optimisation of halide perovskite solar cells,
- experimental study of atomic nuclei with odd nucleon mass number,
- quantum simulation and computing algorithms,
- development of theory of higher-order quantum structures,
- bioconjugation of nanostructures for theranostics,
- development of unique low energy electron detector,
- operational quantum thermodynamics,
- development of recycling processes for metallic materials,
- development of microscopy infrastructure,
- development of phenomenological models of elementary particles,
- statistics of Coulomb interacting systems.

ACTION PLAN

- IPSAS mobility program (running) – mid-term research visits 8 months/year
- IPSAS internship program (running) – 12 internships /year
- IPSAS project support program (running) – ERC submissions 3x
- IPSAS fellow - call (Q3/2025-2029), selection (Q4/2025-2029) – 1-3 persons / year
- Improvement of management and administration processes (Q4/2025)
- Institutional colloquia (starting Q1/2026) – monthly frequency
- Preparation of IPSAS consolidator program – scheme for promising young researcher (ERC consolidator type) to establish small research team (postdoc and PhD) for 5 years (Q2/2026). Call and selection in Q2/2027. Starting in Q3/2027. Estimated budget 200 000 / year.
- Identification of key researchers (Q3/2026) – expected 8-10
- Evaluation of departments performance (Q3/2026)

- Action plan for IPSAS facilities in Piešťany (Q4/2026, depends on VZ continuation)
- Selection of heads of departments (until 2032) – (Q2/2027)
- Biannual action plan revision (Q3/2027)
- Sustainability of research infrastructure (Q1/2028) – support program?
- Revision of IPSAS consolidator program (Q2/2029)