

Ing. Matúš Sedlák, PhD.

Academic positions held

9/2021 → present, Laboratori Nazionali di Legnaro, Istituto Nazionale di Fisica Nucleare, Italy
Post-doctoral research fellow

10/2019 → 8/2021, Institute of Physics, Slovak Academy of Sciences Slovakia
Post-doctoral researcher
Štefan Schwarz competitive scholarship

Major achievements

Spokesperson of 3 experiments:

- EXP 22.12 @ LNL INFN - commissioning of reversed plunger method for life-time measurement with AGATA - performed
- CTADIR-COM @ LNL INFN - commissioning of the CTADIR cryogenic target at CN accelerator facility - 1st part performed
- EXP 22.76 @ LNL INFN - life-time measurements of neutron-rich Os and Pt isotopes with reversed plunger and AGATA - performed

SAS award for infrastructure development in 2022

Development and testing of the CTADIR cryogenic target

Second generation of the cryogenic target developed for low-energy nuclear physics direct reaction experiments. Cooled by two-stage cryocooler driven by electric power. Developed to contain He gas at 8-10 K within two Havar windows and conical flanges allowing recoils in total angle of 140° in both forward and backward directions.

Development and commissioning of the TATRA beta-decay station at ISOLDE (CERN)

Capable of simultaneous measurement of γ rays and conversion electrons with resolution of 1.6 keV@100keV. Optimized to UHV operation and gamma-ray/X-ray transmission efficiency.

Establishment of new Tandetron laboratory in Piešťany

Member of research team in all phases of construction of the new laboratory (built from scratch).

First ion beam from 2 MV Tandem accelerator in September 2016.

Realisation of experiments: 19 at LNL INFN (IT), 4 at CERN (CH), 4 at JYFL (FI), 1 at iThemba Labs (SA), 1 at MTF STU (SK) and 2 FÚ SAV (SK)

Doctoral Thesis

Gamma-ray and conversion-electron spectroscopy at CERN-ISOLDE facility

Supervisor: Martin Venhart

Description: Experimental study of the shape coexistence of odd-Au isotopes in the neutron mid-shell region. Many new transitions were placed in the level scheme of ^{183}Au , electron-conversion coefficients for 12 transitions were measured, while E0 character was confirmed for two transitions. The level scheme of ^{181}Au as a result of the beta-decay study of ^{181}Hg was constructed for the first time. The TATRA beta-decay station was developed and successfully used in the experiment. Results also published in the Eur. Phys. J. A, J. Phys. G and NIM A.



Contact information

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<https://orcid.org/0000-0001-7470-2652>

Education

PhD.
Experimental nuclear physics
Comenius University
Bratislava, 2015 - 2019

Ing. (MSc. equivalent)
Physical Engineering
Slovak University of Technology
Graduated with Honours
Bratislava, 2013 - 2015

Bc. (bachelor's degree)
Electrical Engineering
Slovak University of Technology
Bratislava, 2010 - 2013

Languages

Slovak - Native
English - Fluent
Italian - Basics

Publications

11 publications in refereed journals
3 publications in annual reports
37 citations registered in WoS
H-index = 4

Professional interests

Gamma-ray spectroscopy
Nuclear structure
Nuclear instrumentation development
GEANT4 simulations
Conversion-electron spectroscopy

Computer skills

Programming C++, Python, bash
ROOT framework - data analysis SW
GEANT4 - Monte-Carlo simulation SW
HDTV - Nuclear spectrum analysis tool
RadWare, CUBIX - Interactive γ -ray coincidence analysis SW
AutoCAD, FreeCad - Technical drawing software
EAGLE, KiCad - electr. scheme and PCB SW

Project participation

Cryogenic Targets for Direct Reactions (CTADIR)

Principal investigator: Andrea Gottardo
Italian MUR, PRIN 2017 call
770 000 €

Nuclear structure in the vicinity of the closed proton shells

Principal investigator: Andrej Herzáň
Slovak grant agency VEGA
2021 - 2023, 83 000 €

Structure of atomic nuclei

Principal investigator: Martin Venhart
Slovak Research and Development Agency
2016 - 2020, 250 000 €

Investigation of nuclear structure and reactions using Tandatron® accelerator

Principal investigator: Martin Venhart
Slovak grant agency VEGA
2017 - 2019, 51 000 €

Shape coexistence in heavy nuclei

Principal investigator: Martin Venhart
Slovak grant agency VEGA
2014 - 2016, 21 000 €

Energy of symmetry in structure of nuclear matter

Principal investigator: Martin Venhart
Slovak Research and Development Agency
2012 - 2015, 203 750 €

Work experience

- Proposing, preparation, simulation, realisation and data analysis of various experiments in the field of low-energy nuclear physics
- Development of experimental infrastructure from design through commissioning to the application, i.e. TATRA (beta-decay station with simultaneous measurement of γ rays and conversion electrons), CTADIR (cryogenic He gas target), gas target at PN SK
- Measurements in the low-energy nuclear physics both in-beam and decay (α , β , p emission) spectroscopy experiments with accelerated stable and radioactive beams performed at LNL INFN (IT), CERN-ISOLDE (CH), JYFL (FI) and iThemba Labs (SA)
- Operation of various DAQ systems and digital electronics
- Software and hardware development for nuclear studies
- Complex nuclear data analysis based on C++/ROOT
- GEANT 4 simulations, LISE++ and GRAZING calculations
- Preparation of scientific articles and proposals (first autor, main author and contributing author)
- Technical drawing in CAD software
- Handling / repair / maintenance of various types of detectors (HPGe, BEGE, scintillation and charged particle detectors etc).
- Maintenance and operation of the Duoplasmatron ion source and the Tandatron Accelerator
- Operation of vacuum systems
- Mentoring of students (12 international internship, 1 undergraduate and 1 master's students)

Conference contributions

Workshop of the [COLL-AGAIN](#), [COPIGAL](#) and [POLITA 2022](#), International, IJCLab (FR)
Talk: Cryogenic Target

[INTDS 2022](#), International, PSI (CH)
Talk: A new cryogenic target at LNL (CTADIR)

[ISOLDE Workshop and Users meeting 2019](#), International, CERN (CH)
Talk: Nuclear structure of odd-Au isotopes

[ISTROS 2017](#), International, Častá-Papiernička (SK)
Talk: HIGH-TATRA Spectrometer

[Eurisol DF, 2016](#), International, Leuven (BE)
Poster: TATRA Spectrometer

[20th Conference of Slovak Physicists, 2013](#), Local, Bratislava (SK)
Talk: Experiment JR115 (In-beam study of ^{177}Au)

Organisational skills

[3x LNL Pre-PAC 2022](#), Italy

[22nd AGATA week workshop 2022](#), Italy

[ISTROS](#), editions: 2013, 2015, 2017 and 2019, Slovakia

[RECFA meeting 2018](#), Slovakia