The background is a dark, textured field of fine, intersecting lines in shades of blue and purple. Overlaid on this are several glowing, semi-transparent geometric shapes, including cubes and spheres, some of which have internal patterns or textures. The overall effect is a complex, crystalline or molecular structure.

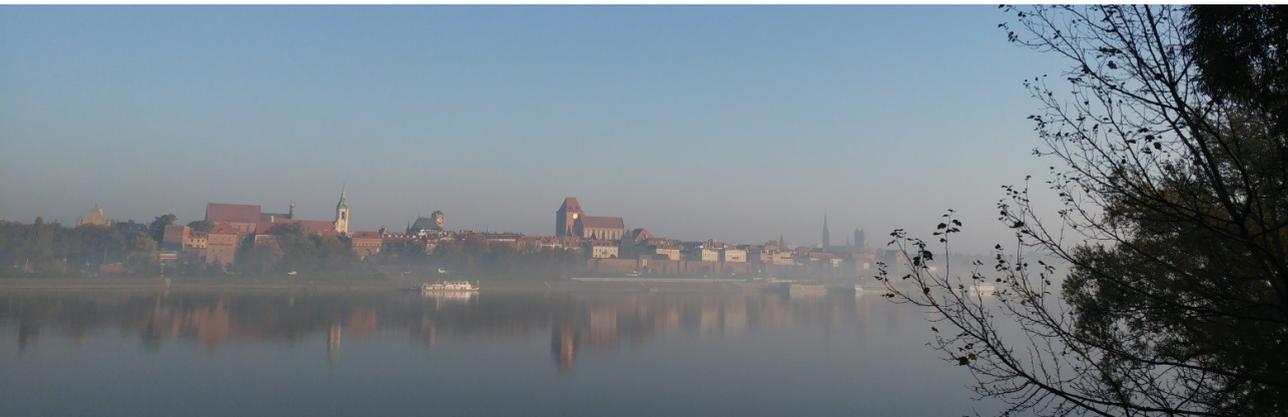
**PHYSICS**  
**ASTRONOMY**  
**INFORMATICS &**  
**TECHNICAL SCIENCES**

at  
Nicolaus Copernicus University in Toruń

# OUR **ROOTS** and **MISSION**

Nicolaus Copernicus University in Toruń was founded in 1945 and named after the famous Polish astronomer who proved that the Sun is at the center of our Solar System. The scientific focus of our physics and astronomy research was shaped by two early leaders: Aleksander Jabłoński, who set grounds for understanding luminescence in molecules, and Wilhelmina Iwanowska, who demonstrated how the chemical composition of stars reveals when and where stars have formed in our Galaxy.

The highest priority of our Faculty is a balanced combination of cutting-edge research and efficient education. We achieve this goal by combining in-house traditions, our experience in international collaborations, and innovations in technology and new methodologies. Our activities aim to influence both the regional and global economy and industry. Successful careers of our alumni are at the heart of our mission.



# COMMUNITY

The faculty comprises 130 scientists working in interdisciplinary research fields encompassing physics, astronomy, computer science, and automation and robotics. About 600 students and 60 Ph.D. students are enrolled in our programs.

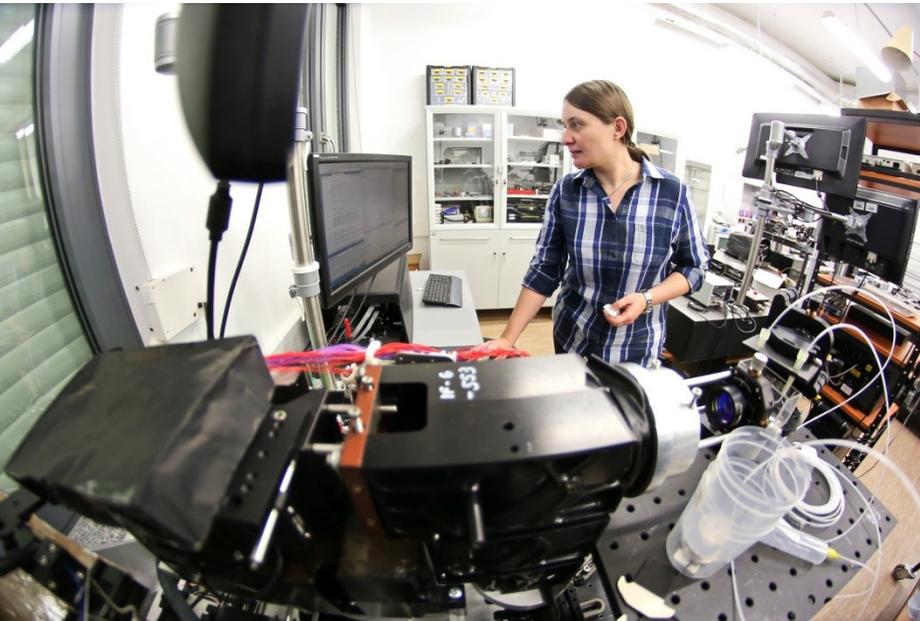
The organisational units of the Faculty are: Institute of Physics, Centre for Astronomy, Department of Automation and Measuring Systems, and Department of Informatics.



# LABORATORIES

Our faculty is home to key Polish laboratories: the National Laboratory for Atomic, Molecular and Optical Physics; Centre for Quantum Optics; and the National Laboratory for Quantum Technologies. We run laboratories in the Centre for Modern Interdisciplinary Technologies and have access to computer clusters with more than 10 000 CPU cores.

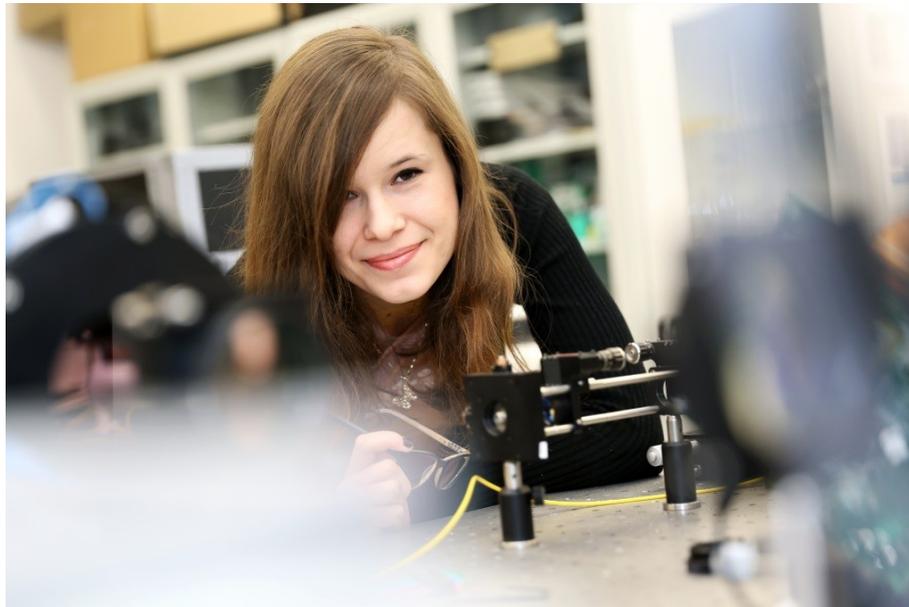
We operate the largest astronomical observatory in Poland equipped with a 32 m radiotelescope and a few one-meter class optical telescopes. The radio dish is a part of the world-wide Very Long Baseline Interferometry (VLBI) networks that give us an unprecedented view of the most distant and dusty Universe.



# RESEARCH

Among the main research areas are quantum physics, nanoplasmonics, biophysics, and artificial intelligence. We specialise in optical clocks technologies and spectroscopy of cold atoms. Ultra-precise measurements are supported by quantum chemical calculations of molecules. This is also applicable in astrochemistry, which is a new field developed here, complementary to our long-standing international projects aimed to discover planets around other suns.

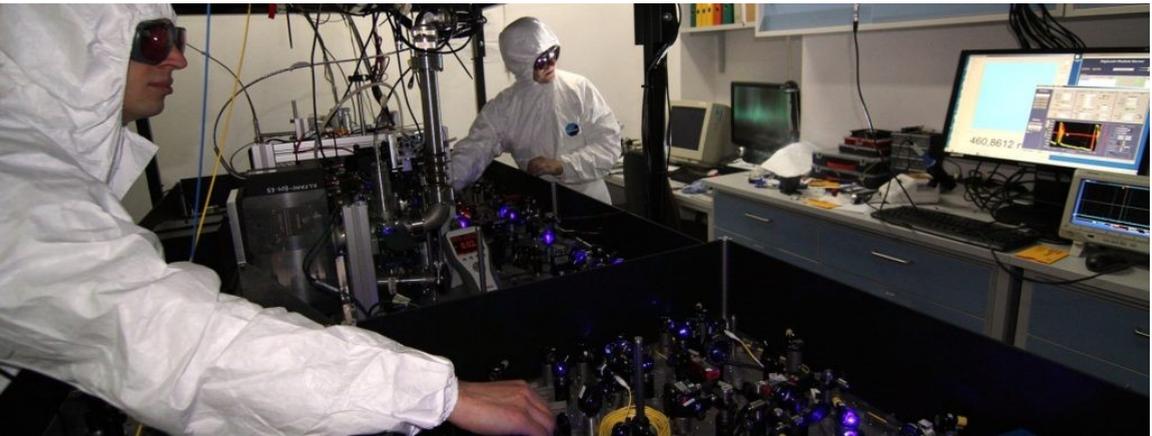
We also optimise methods of energy transfer between proteins and nanoparticles or graphene, with potential applications for sensors and artificial photosynthesis. In bioinformatics, we model proteins and biological molecules, use neural networks in genetic research, and apply artificial intelligence to study the cognitive activity of the brain.



# INNOVATIONS

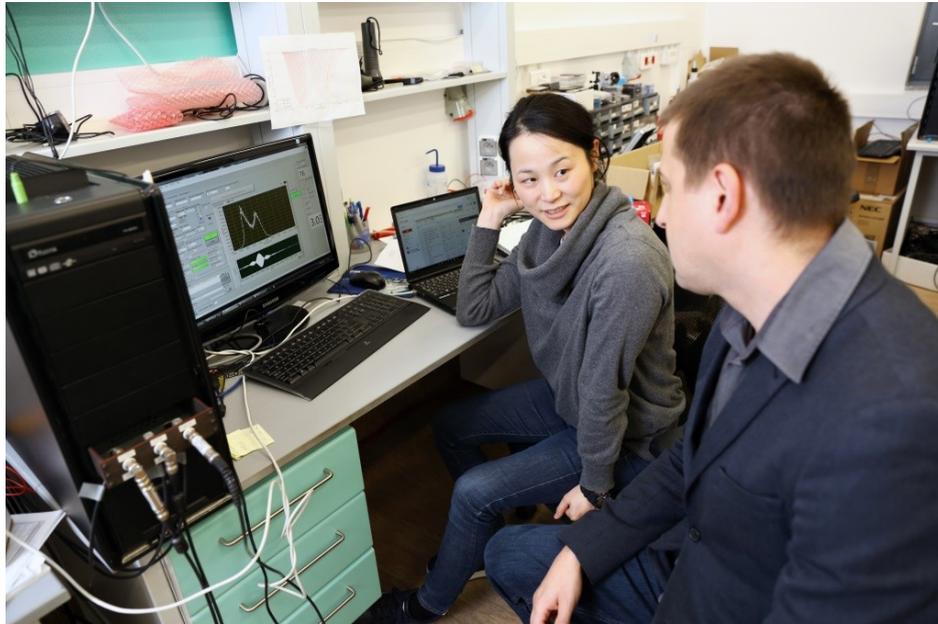
Progress in science and technology requires precise measurements of time. The Polish Optical Atomic Clock is developed in collaboration with Warsaw and Jagiellonian Universities and located in the cellar of our faculty. The clock can reach a precision of attoseconds ( $10^{-18}$  s), which allows the laboratory to test the variation of fundamental constants, search for dark matter and study Lorentz Invariance.

High precision in space and time is also critical for the analysis of the human eye and diagnosis of its diseases. We constructed and brought to the market the Optical Coherent Tomograph, which is now manufactured by Canon and used in hospitals around the globe. The Canon company located their R&D laboratories in our Faculty building to tighten and expand our collaboration.



# INTERNATIONAL COLLABORATION

We maintain a widespread international collaboration in research and education. Our precise optical atomic clock and the radiotelescope involve collaborations with many institutions around the globe. In total, we are involved in about 40 international research projects in collaboration with more than 130 foreign institutions from about 40 countries. Our international collaborations are enhanced by the Polish membership in the European Southern Observatory (ESO) and the European Space Agency (ESA).



# CONFERENCES

## SCHOOLS and WORKSHOPS

We organise several international conferences per year including the annual Symposium of Mathematical Physics (since 1969) and Bioinformatics in Toruń (since 2000). Our Toruń Astrophysics / Physics Summer program attracts each year talented students from the entire world willing to spend summer in our laboratories. We also organize courses in modern physics for international students who wish to increase their theoretical knowledge and practical skills and to spend part of their holidays in Poland.



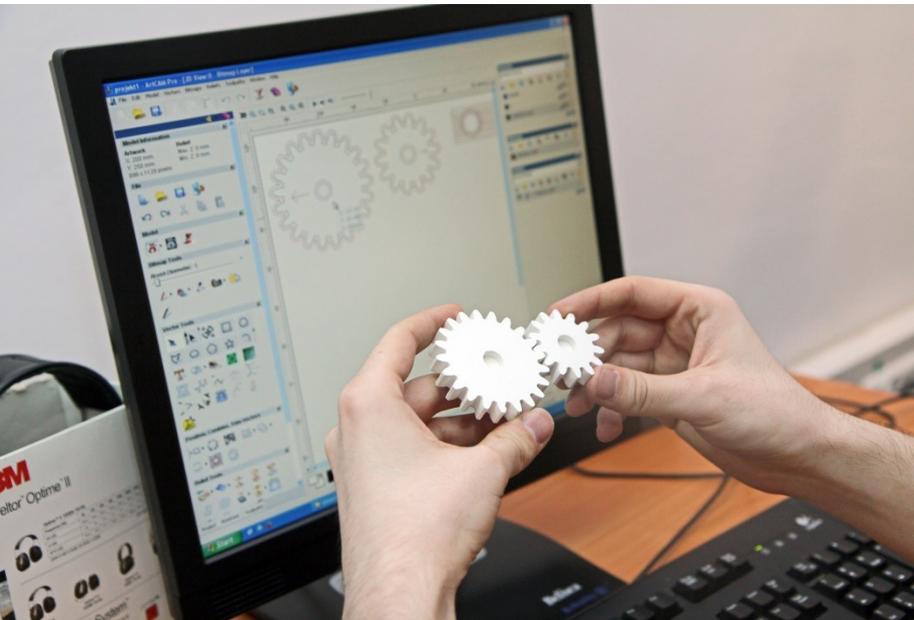
# STUDY with us

- **Physics, Astronomy** (B.Sc., M.Sc.)  
theoretical physics, experimental physics, astronomy
- **Informatics** (Eng., M.Sc.)  
data mining, web mobile apps, computer networks, game design,  
industrial informatics, programmable automatic systems
- **Automation and Robotics** (Eng.)  
industrial automation, microprocessor systems
- **Technical Physics** (Eng., M.Sc.)  
control systems, optoelectronics, biomedical engineering, mechatronics
- **PhD Interdisciplinary Studies**  
physics, biophysics, astronomy, informatics, technical sciences



# OUR START-UPS and PRODUCTS

Several spin-off companies were established by our staff with the aim to commercialize innovative products that emerged from research projects. Our flagship R&D activities include noninvasive imaging using Optical Coherence Tomography (company AM2M) and luminescence methods used for the determination of the age of archeological and geological objects (LumiDatis). The company RCBM deals with strength tests of new construction materials and construction elements using innovative manufacturing technologies.



# FACULTY FOUNDATION

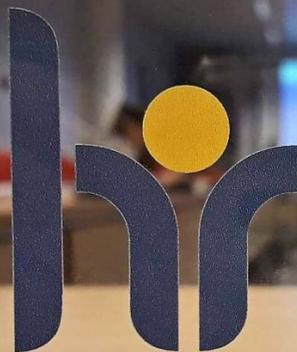
Collaborations with external partners bring our faculty the recognition at the regional level and provide the opportunity to support outstanding students and young scientists via dedicated scholarships and travel grants. The **Aleksander Jabłoński Foundation** connects scientists with companies, organizes conferences and workshops, and actively promotes science among children and the youth. The mission of this unique foundation is the development of our faculty and the faculty's strategic goals.

Scholarships  
sponsors

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APATOR





HR EXCELLENCE IN RESEARCH



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