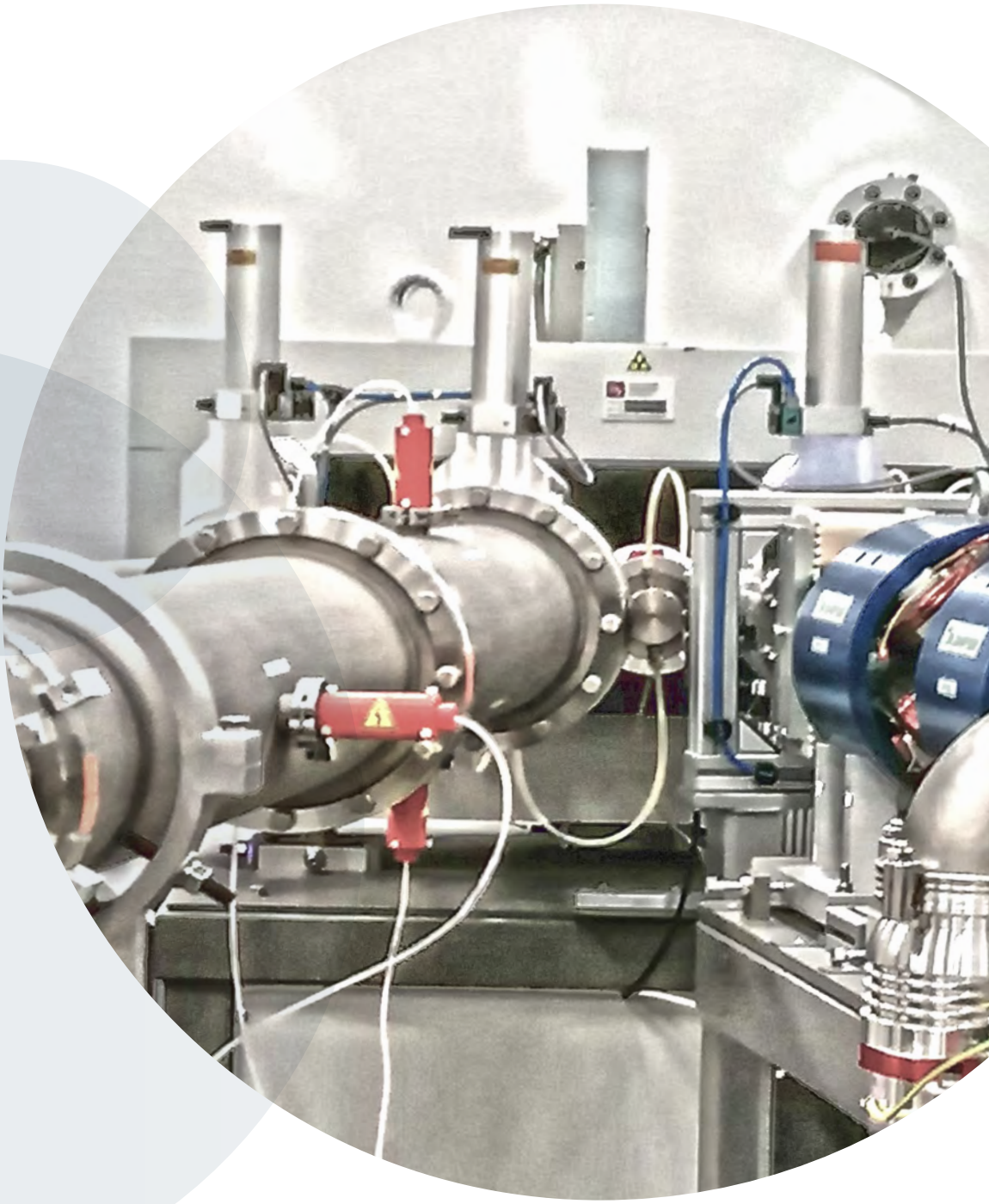
Annual Report 2022



STU

SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA

STU

Rector's address

In 2022, the Slovak University of Technology (STU) in Bratislava commemorated the 85th anniversary of its establishment. Its tradition, however, goes back to the Mining Academy founded in Banská Štiavnica in 1762, the first technical school of university-type in the territory of today's Slovakia.

The activity of the University at the beginning of the year 2022 was partially affected by the fading COVID-19 pandemic. The winter semester examination period was conducted in a combined distant and face-to-face way, while the summer semester was fully carried out face-to-face.

Many STU activities were significantly affected by the war conflict in Ukraine. Humanitarian and support activities were organized at STU to help the STU students from the afflicted regions, their family members and other people in need.

Number of Ukrainian students interested in studying at STU increased considerably. Out of a total of 2,424 applicants from Ukraine, 950 enrolled, thereby significantly increasing the number of STU foreign students. The total number of registered Bachelor degree students thus increased by 4% year-on-year, while also increasing the total number of STU students.

STU was ranked in three important world rankings. The best achievement is the position between 801-1000 out of 1422 evaluated universities in the QS World University Rankings®. Also, STU successfully joined the European Union scientific institutions that have received the label of "HR Excellence in Research".

Despite the difficult conditions, STU successfully managed to conduct research activities. The STU share in the total volume of funds from domestic and foreign grants makes 18%. In the field of international scientific research programs, STU belongs to the most successful institutions in Slovakia.

Oliver Moravčík
Rector

KEY FIGURES 2022

174 133
graduates

10 976
students

1 407
teaching and research staff

489
Erasmus+ agreements

384
contractual research projects

324
study programmes

180
international projects

150
research projects

82
framework agreements with foreign universities

7+1
faculties (schools) + university institute


SLOVENSKÁ VYSOKÁ ŠKOLA TECHNICKÁ

The Slovak University of Technology in Bratislava offers university education in engineering disciplines. The STU education system is based on scientific research, as well as on artistic, engineering and other creative activities. The STU faculties, departments, institutes and experts cooperate directly with industrial companies and social organisations, actively taking part in international cooperation.

Vision

The Slovak University of Technology in Bratislava strives to be an internationally recognized, research-oriented technical university. It seeks to provide a high quality, internationally comparable education to a broad spectrum of students of the young generation in promising fields, based on independent and critical thinking, entrepreneurship and creativity, while regarding practical application and success in life, and taking into account the human aspects of education and technological progress. The University aims at contributing to the economic and social development of the Region.

Mission

As a research-oriented technical university, the STU's mission is to apply and disseminate new knowledge achieved in scientific research, engineering and other creative work, and educate and enlighten the young generation in the spirit of the principles of humanism and philanthropy. Thus, STU develops harmony, knowledge, wisdom, altruism and creativity in a person, and contributes to the development of education, science, culture and health for the good of society as a whole, thereby contributing also to the development of a knowledge-based society.

Rector:
Moravčík Oliver,
Dr. h. c., Prof. h. c., Prof. Dr. Ing.

Chair
of the Academic Senate:
Peciar Marián, Prof. Ing., PhD.

Chair
of the Administration Board:
Slezák Vladimír, Ing.

Faculties & Institutes

- **FACULTY OF CIVIL ENGINEERING**
  www.svf.stuba.sk
  Building constructions, services and technologies; geodesy and cartography; land constructions; transportation constructions; mathematical-computational modelling; water constructions and water systems

- **FACULTY OF MECHANICAL ENGINEERING**
  www.sjf.stuba.sk
  Applied mechanics & mechatronics; automation of machines; automobiles & mobile machines; chemical and food machinery; metrology & production quality systems; thermal, hydraulic and production machinery

- **FACULTY OF ELECTRICAL ENGINEERING AND INFORMATION TECHNOLOGY**
  www.fei.stuba.sk
  Applied informatics & communication systems; cybernetics, robotics & smart technologies; electronics; electrical engineering; nuclear & physical engineering, power engineering

- **FACULTY OF CHEMICAL AND FOOD TECHNOLOGY**
  www.fchpt.stuba.sk
  Biotechnologies; chemical engineering; environmental engineering; food chemistry & technologies, fuels & polymers; inorganic & organic technologies; inorganic, organic, analytical & physical chemistry

- **FACULTY OF ARCHITECTURE AND DESIGN**
  www.fad.stuba.sk
  Architecture & urban development; product design

- **FACULTY OF MATERIALS SCIENCE AND TECHNOLOGY**
  www.mtf.stuba.sk
  Automation & informatics in industry; industrial management; materials engineering; processing and application of non-metals; production machinery and systems; production technologies

- **FACULTY OF INFORMATICS AND INFORMATION TECHNOLOGIES**
  www.fiit.stuba.sk
  Computer engineering; information security; information systems; security; internet technologies

- **INSTITUTE OF MANAGEMENT**
  www.stuba.sk
  Entrepreneurship; investment planning; spatial planning

HR EXCELLENCE IN RESEARCH

Highlights of 2022

STU IN THE WORLD RANKINGS

The Slovak University of Technology in Bratislava has ranked among the leading research universities in Slovakia for many years, which also confirms its position in the world rankings of universities.

STU appeared in three important world rankings.

In the QS World University Rankings®, STU achieved the position between 801 – 1000 out of 1422 evaluated universities; besides STU, also five other Slovak universities appeared in the ranking.

In THE World University Rankings, STU was ranked 1501-1800 out of 2345 evaluated universities; besides STU, also other eight Slovak universities ranked there, too.

The U.S. News Best Global Universities has been comparing American universities with the world ones for 30 years. Five universities from Slovakia, including STU, appeared in the ranking.

Apart from THE, other rankings rate STU as the best university of a technical focus in Slovakia.

STU was ranked second out of 32 evaluated universities in Slovakia in the UniRank which evaluates the quality, credibility and popularity of university websites and profiles on social networks.

HR Excellence in Research is a prestigious award granted by the European Commission to the institutions having demonstrated their commitment to complying with the 40 principles and principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers within the Human Resources Strategy for Researchers - HRS4R)

SIGNIFICANT RESULTS IN THE FIELD OF SCIENCE, TECHNOLOGY AND ART

L'Oréal - UNESCO Program For women in science in Slovakia, category of engineering science and technology
winner: Xiaolu Hou, Bc., Ph.D. ● ; is devoted to researching possible attacks and countermeasures in the implementation of artificial intelligence in embedded devices

ESET Science Award in the category of Outstanding Personality of higher education in 2022
finalist: Andrea Šagátová, doc. Ing., PhD. ● ; deals with the topics of nuclear physics and technology

The best scientific contribution in the field of quality for the year 2022 evaluated by the Office for Standardization, Metrology and Testing of the Slovak Republic
Institute of Production Systems, Environmental Technology and Quality Management ●

Award in the "MOST original contribution" category for the year 2021 of the Slovak Welding Society as a member of the Association of Slovak Scientific and Technical Societies
Roman Koleňák, Prof. Ing., PhD. ●

Medal of St. Gorazd
Miroslava Mališová, Ing. ●
3rd year PhD. student

Doctor honoris causa
approval of two proposals: Bernard L. Feringa and Jean-Marie Lehn, the Nobel Prize winners

Professors
Appointment of four STU professors ● ● ●

Granted 17 patents, registered 27 utility models, signed the first ever license agreement for invention utilisation (Particulate material granulator with matrix) ●

Education

STU holds the **ECTS Label** (as one of three universities in the Slovak Republic) and the **DS Label** (as one of five universities in the Slovak Republic). It provides attractive and high-quality higher education, which is evidenced by the high employment rate of its graduates, reaching almost 100%, while their starting salaries being the highest in the economy of Slovakia. A long-term positive trend in the STU education is its cooperation with practice, as evidenced by the numerous awarded STU students.

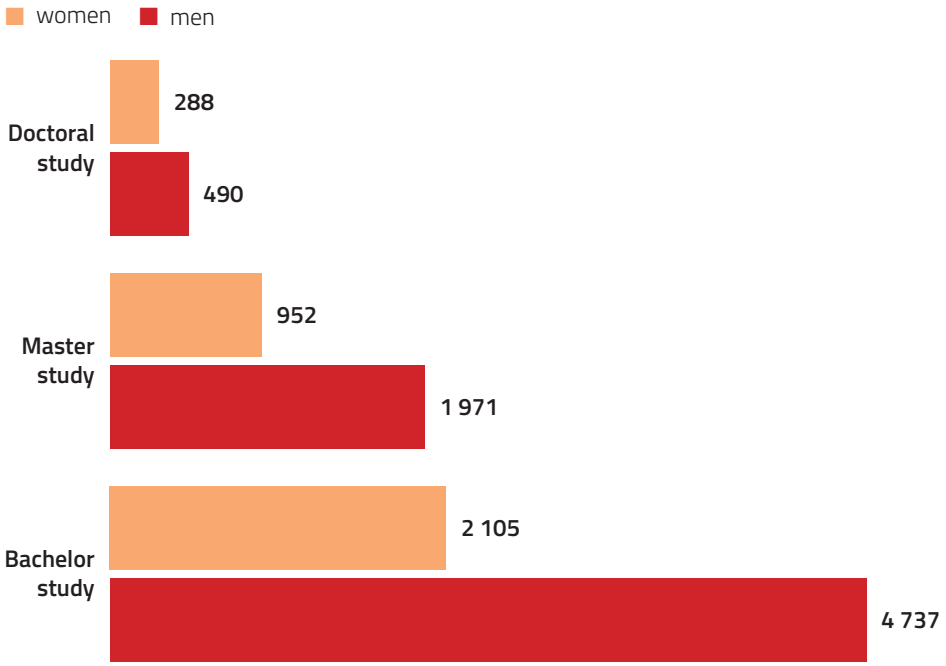
In the academic year 2021/2022, education and training were carried out in a total of 167 full-time study programmes (58 Bachelor degree, 57 Master degree and 53 Doctoral degree), either in the Slovak language or in combination of Slovak and English languages, also possibly in combination of the Slovak and English and Czech.

Only 43 Doctoral study programmes were conducted in external form of study.

The number of study programmes delivered in English was 43; out of those, there were 4 full-time Bachelor degree, 4 full-time Master degree, as well as 7 full-time and 6 external Doctoral degree study programmes. STU also offers a professionally oriented Bachelor degree study programme of "Operating Technician of Transport and Production Technology" at the STU Faculty of Mechanical Engineering in cooperation with VOLKSWAGEN SLOVAKIA, a. s.

In the academic year 2021/2022, a total number of the STU students was 10,543 students, of which there were 6,842 Bachelor students, 2,923 Master students and 778 Doctoral students (608 full-time and 170 external).

STU students in the academic year 2021/2022



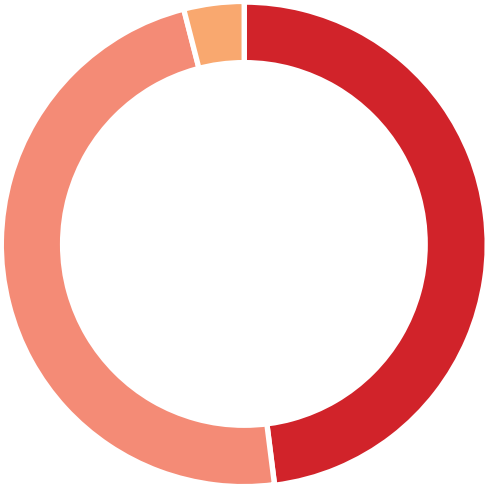
On the national scale, there are only 18.7% of students from the Bratislava region, while 16.3% are from the Trnava region (the residence of STU MTF).

Compared to the academic year 2020/2021, there was an increase of 34% of foreign students;
in the academic year 2021/2022, there was 9.4% of foreign students out of the total number of STU students;
most of them came from Ukraine (489 out of a total of 987 foreign students).

In the academic year 2021/2022, the STU students received a total of 152 prestigious awards on the national level outside the University, and 22 awards on the international level.

In the academic year 2021/2022, as many as 2,689 graduates completed their studies at STU,
of which 1,386 were Bachelor graduates, 1,172 Master graduates, and 131 PhD. graduates
(109 in full-time and 22 in external study forms).

STU graduates in the academic year 2021/2022

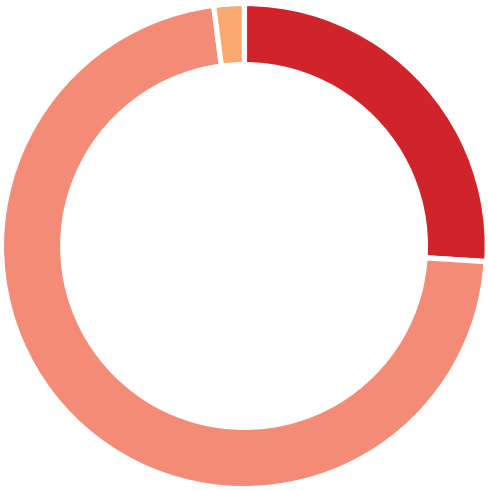


- Bachelor study (1 386)
- Master study (1 172)
- Doctoral study (131)

Source: STU

Since its establishment until the end of 2022, STU provided higher education to 174,133 graduates,
of which there were 45,094 Bachelor degree graduates, 124,908 Master degree graduates
and 4,131 Doctoral degree graduates.

The total number of graduates since the University establishment until the end of 2022



- Bachelor study (45 094)
- Master study (124 908)
- Doctoral study (4 131)

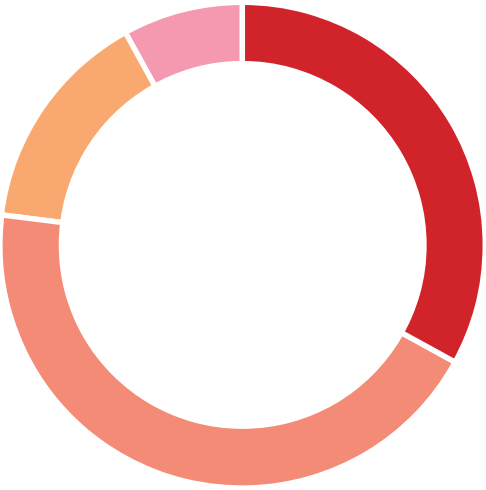
Source: STU

INTERNATIONAL ACADEMIC MOBILITY

In the academic year 2021/2022, STU registered a total number of 463 students participating in academic mobility, including 255 outbound STU students and 208 inbound foreign students. Compared to the academic year 2020/2021, this represents an increase of 158 students.

STU accomplished the highest number of international mobility through the Erasmus+ program. Erasmus+ academic mobility was implemented in 30 countries participating in the program.

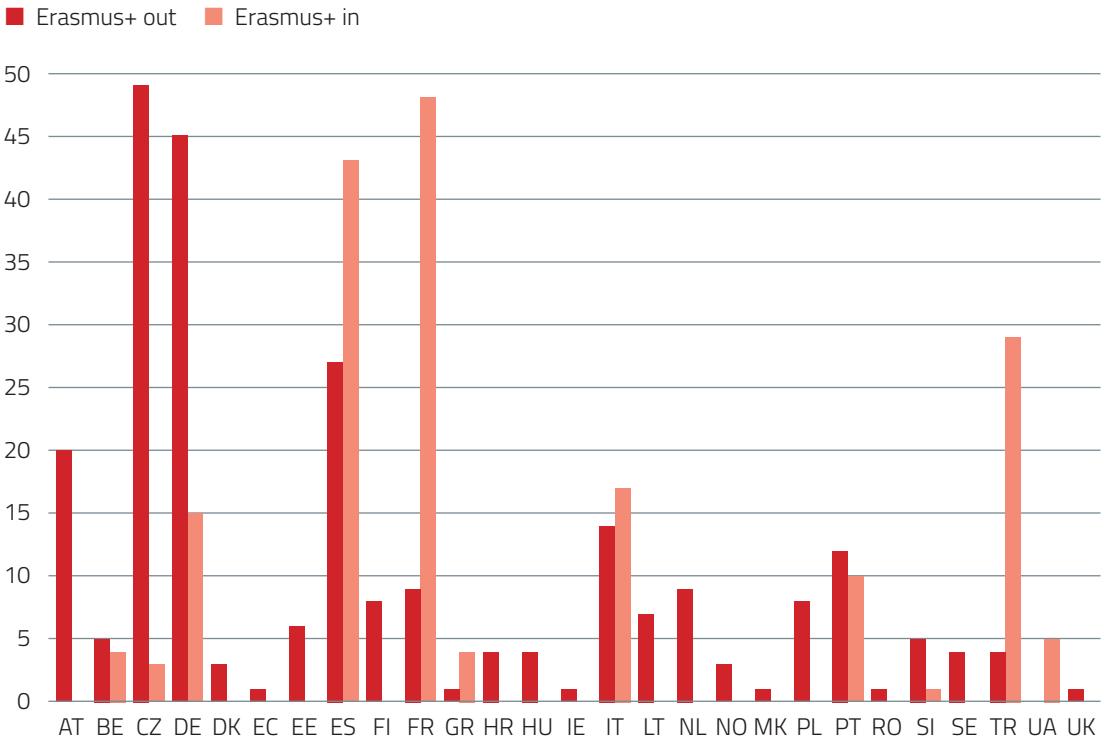
Percentage of the outbound STU students/graduates within the Erasmus+ program, according to study degree in the academic year 2021/2022



- Bachelor study (33%)
- Master study (44%)
- Doctoral study (15%)
- Graduates (8%)

Source: STU

Overview of the Erasmus+ outbound and inbound students in the academic year 2021/2022 according to country



Source: STU

FURTHER EDUCATION

In the academic year 2021/2022, a total of 3,855 STU students participated in 130 courses of further education programmes (38 accredited and 92 non-accredited). The educational programmes took place in both, distant and face-to-face forms.

Together with TU Wien, STU continued providing an accredited two-year combined distance education Professional MBA Automotive Industry delivered in English with e-learning support. More than 100 graduates of the course involved managers of important manufacturing and non-manufacturing global companies from 29 countries in Asia, Europe, Africa and America.

In the academic year 2021/2022, a total of 516 participants joined the educational programmes in the 1st general year and in 22 other courses provided by the STU **University of the Third Age (UTV)**. Despite the demanding pandemic situation, interest in this form of education increased significantly compared to the academic year 2020/2021 (by 264 online participants). The UTV offer was enhanced by six new educational programmes.

The **Language Centre** of the Institute of Lifelong Education provides educational language programmes and vocational training for foreign students interested in studying in the Slovak language. In the academic year 2021/2022, 44 foreign students completed the Slovak language course.


BERTHOLD
LB 6411

Research

Research plays a key role in the education process. Thanks to research, the University is able to prepare well educated and highly trained experts. The STU graduates have mastered the up-to-date knowledge and received hands-on experience with the advanced technologies, while discovering new knowledge and inventing original technical solutions. Current interesting projects include robotics, wastewater monitoring of coronavirus, development of ecological plastics, spatial planning etc.

Current interesting projects addressing the contemporary challenges:

BEST PRACTICES IN ROBOTICS

Bin-picking, Medical environment, Drones in indoor environment, Highly variable production

WASTEWATER MONITORING OF CORONAVIRUS

Early warning tool to alert COVID-19 presence: Speed of definition of COVID-19 outbreak, Possibility to measure trends in COVID-19 disease, Real time overview of the COVID-19 widespread, Development of smart microsensors for online detection

GENERATIONS OF ECOLOGICAL PLASTICS

NonOilen®: Based full on biobased polymers, Full biodegradable, Improved mechanical properties

OTHER INTERESTING PROJECTS

Digital Water Technology, Post-Quantum Cryptography, Ion Beam Technology, Blockchain, Smart Mobility, Spatial Planning, Nuclear Engineering

GRANT SCHEMES

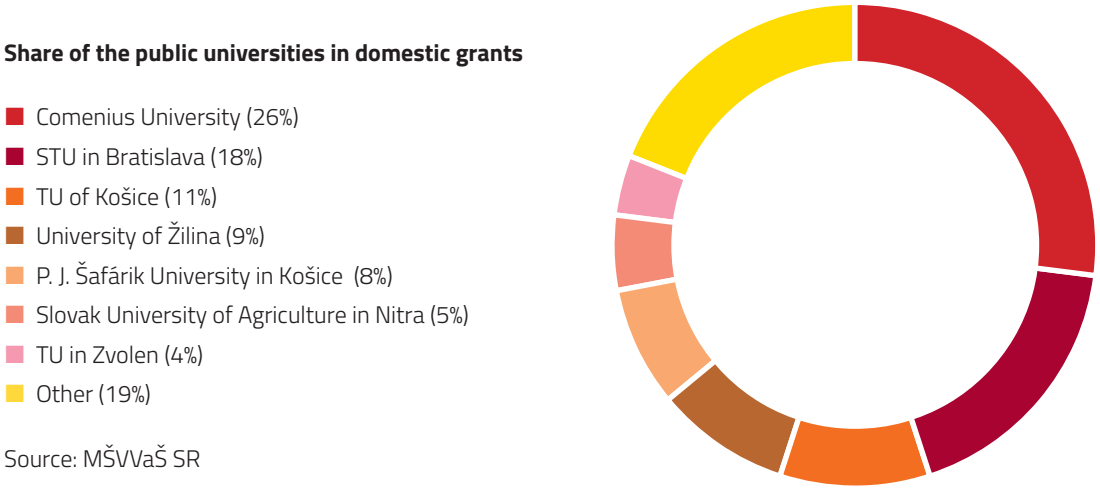
The basic prerequisites for implementation of scientific and research activities are the funds obtained from the budget, based on the external factors determined by evaluation of the University (comprehensive accreditation; the University share of the indicators determining the subsidy distribution in the current calendar year).

Internal factors include the existing research capacity of the University, its instrument base or infrastructure of workplaces. In the light of these indicators, STU belongs to the best universities in Slovakia.

Domestic Research Grants

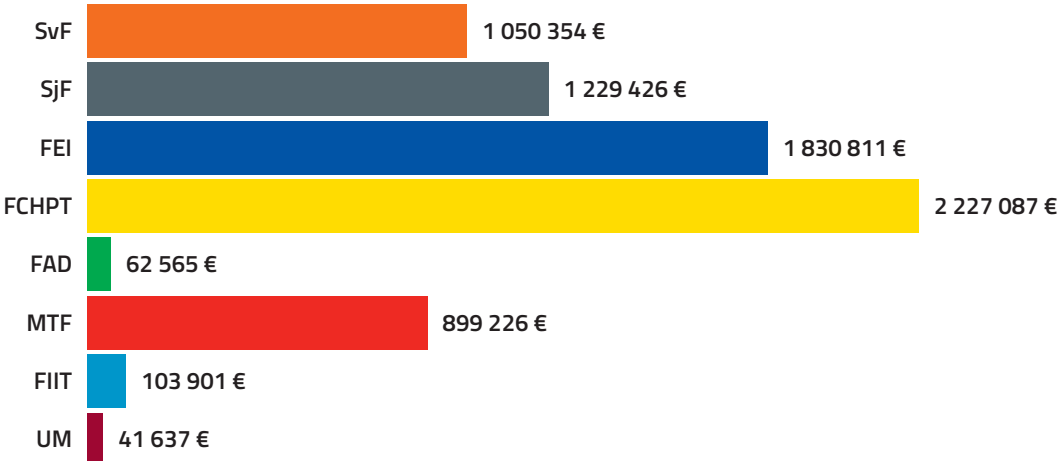
Seven Slovak higher education institutions obtained 81 % of financial funds.
STU gained 18 % out of the total volume of the above-mentioned financial means.

Share of the public universities in domestic grants



Source: MŠVVaŠ SR

Financial means from the domestic grant agencies according to individual STU parts in the year 2022



Source: STU

Foreign Research Grants

Up to 83% of the funds was obtained by seven universities, while the STU's share represents 18%.
In other foreign grants, STU ranks second with its 9%-share in the total amount of the funds received.

Share of public universities in the foreign research grants

- Comenius University (19%)
- STU in Bratislava (18%)
- TU of Košice (12%)
- A. Dubček University of Trenčín (15%)
- University of Žilina (5%)
- Slovak University of Agriculture in Nitra (8%)
- P. J. Šafárik University in Košice (6%)
- Other (17%)

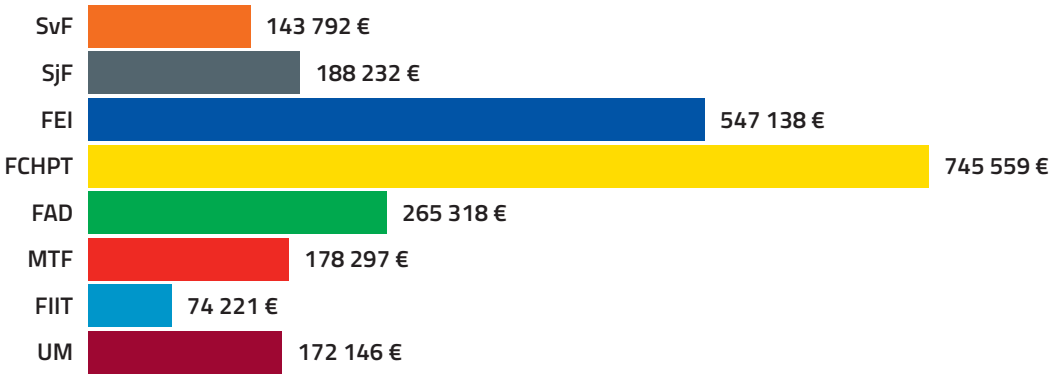
Source: MŠVVaŠ SR

Share of the public universities in other foreign grants

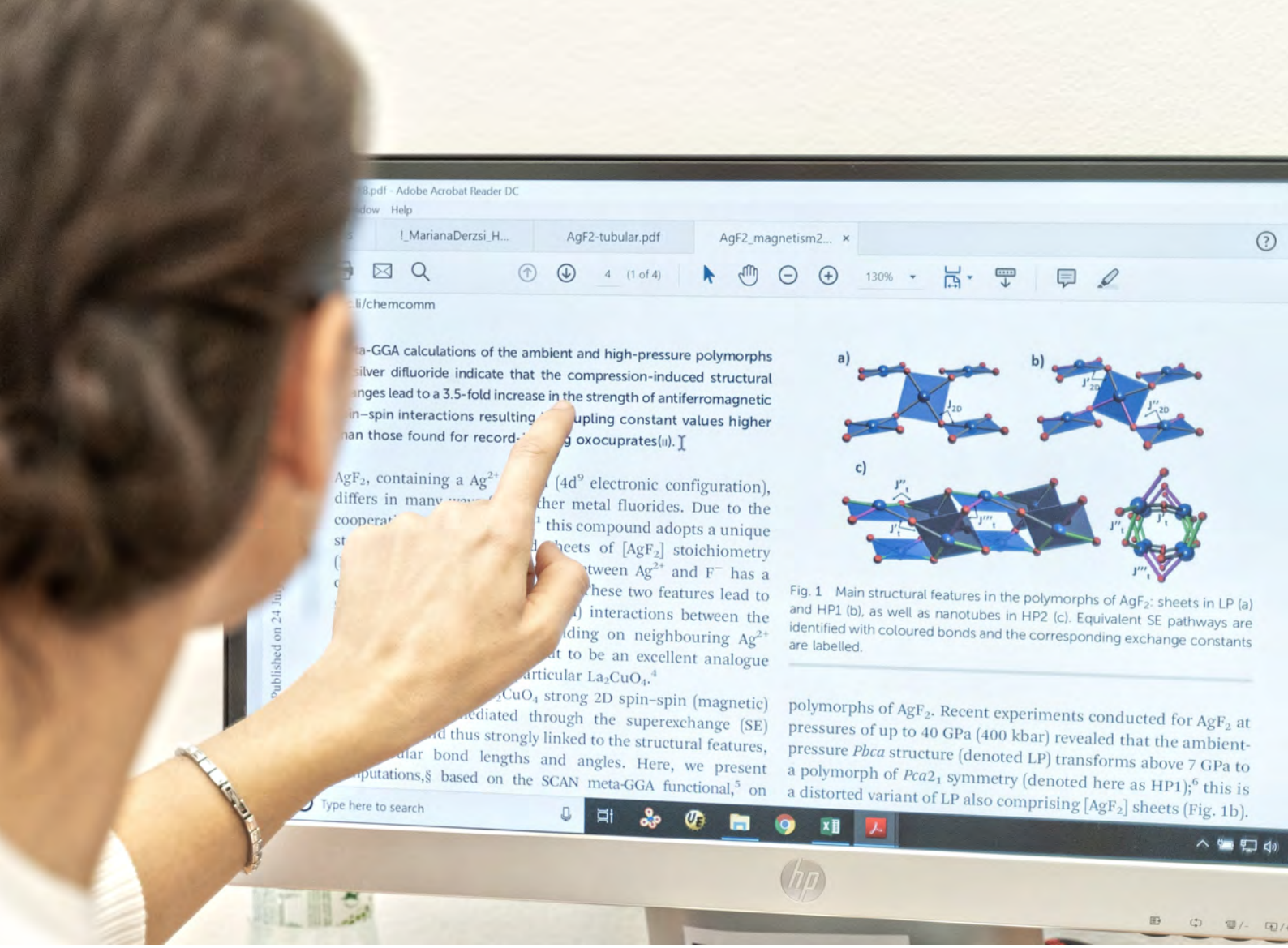
- Comenius University (5%)
- University of Prešov (5%)
- J. Selye University (5%)
- University of Ss. Cyril and Methodius in Trnava (5%)
- STU in Bratislava (9%)
- University of Žilina (8%)
- Constantine the Philosopher University in Nitra (7%)
- TU of Košice (8%)
- University of Economics in Bratislava (8%)
- Slovak University of Agriculture in Nitra (20%)
- Other (20%)

Source: MŠVVaŠ SR

Share of the STU parts in foreign grants



Source: MŠVVaŠ SR



H2020 AND HORIZON EUROPE

Having been involved in international scientific research programs for many years, STU belongs to the most successful organizations in Slovakia in terms of the number of funded projects as well as the volume of the received contribution from the EC within the Horizon 2020 and Horizon Europe framework programs.

Projects solved

	●	●	●	●	●	●	●	●**	Σ
H 2020	2	/	18	/	3	1	2	1	**27**
Horizon Európa	1	/	7*	1	2*	/	/	/	**10**

Source: Funding & tender opportunities portal, Single Electronic Data Interchange Area (SEDIA)
* a joint project ●● / ** STU ●

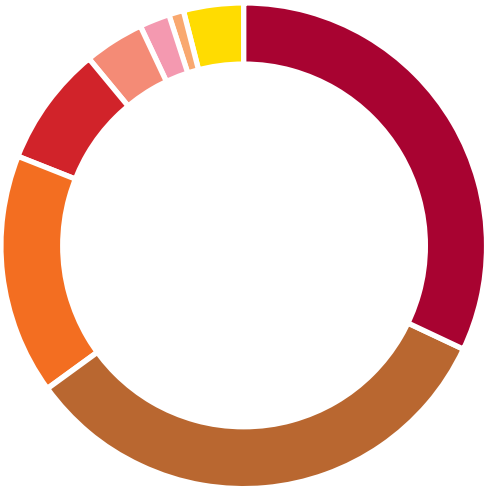
The Horizon 2020 and Horizon Europe projects implemented in the year 2022 are listed in the Table Appendix in page 33.

CONTRACTUAL RESEARCH

Departments of the STU faculties in Bratislava deal with the research projects for domestic and foreign economic entities in the form of contractual research which is obtained in a competitive form with exactly defined subject of performance and form of output, while the research results are usually handed over upon the review of the results. In he year 2022, 384 contractual research projects for industrial practice were solved at STU.

Share of the public universities in the research projects from other subjects

- STU in Bratislava (32%)
- University of Žilina (33%)
- TU of Košice (16%)
- Comenius University (8%)
- Slovak University of Agriculture in Nitra (4%)
- University of Economics in Bratislava (2%)
- P. J. Šafárik University in Košice (1%)
- Other (4%)



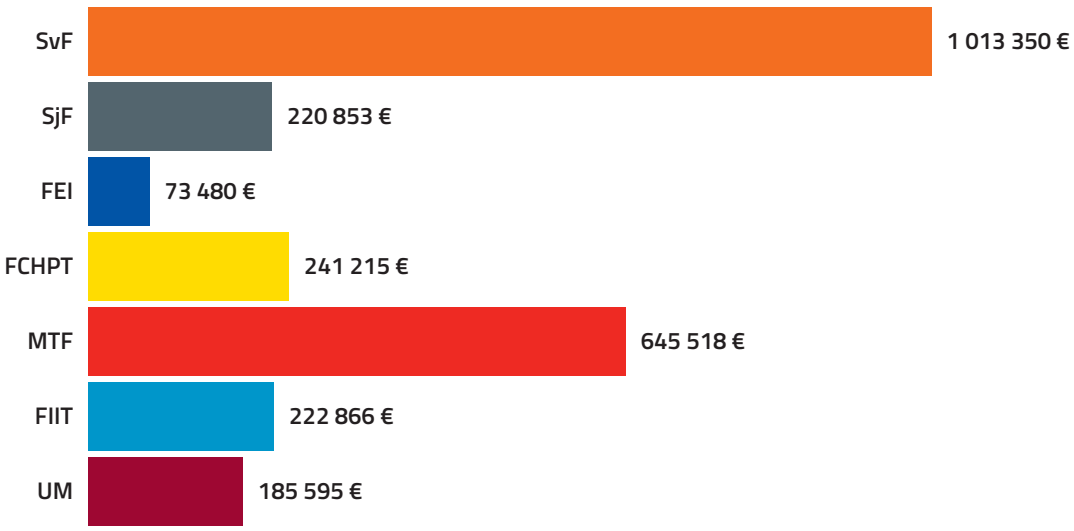
Source: MŠVVaŠ SR

Contractual research projects

	●	●	●	●	●	●	●	Σ
No. of projects	49	16	8	26	271	4	2	**384**

Source: STU

Research contracts for work in the year 2021

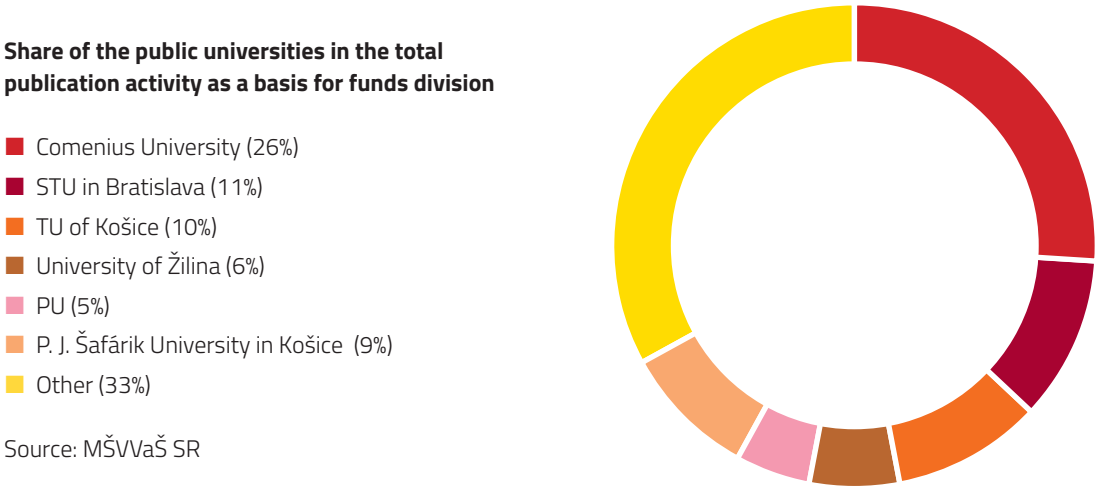


Source: STU

OUTPUT OF CREATIVE ACTIVITY

Quality of the creative activity outputs is a decisive factor in the evaluation of the scientific and artistic activity of each university. STU's share in the total publication output of the Slovak universities represents 11%. STU is thus the second most productive university.

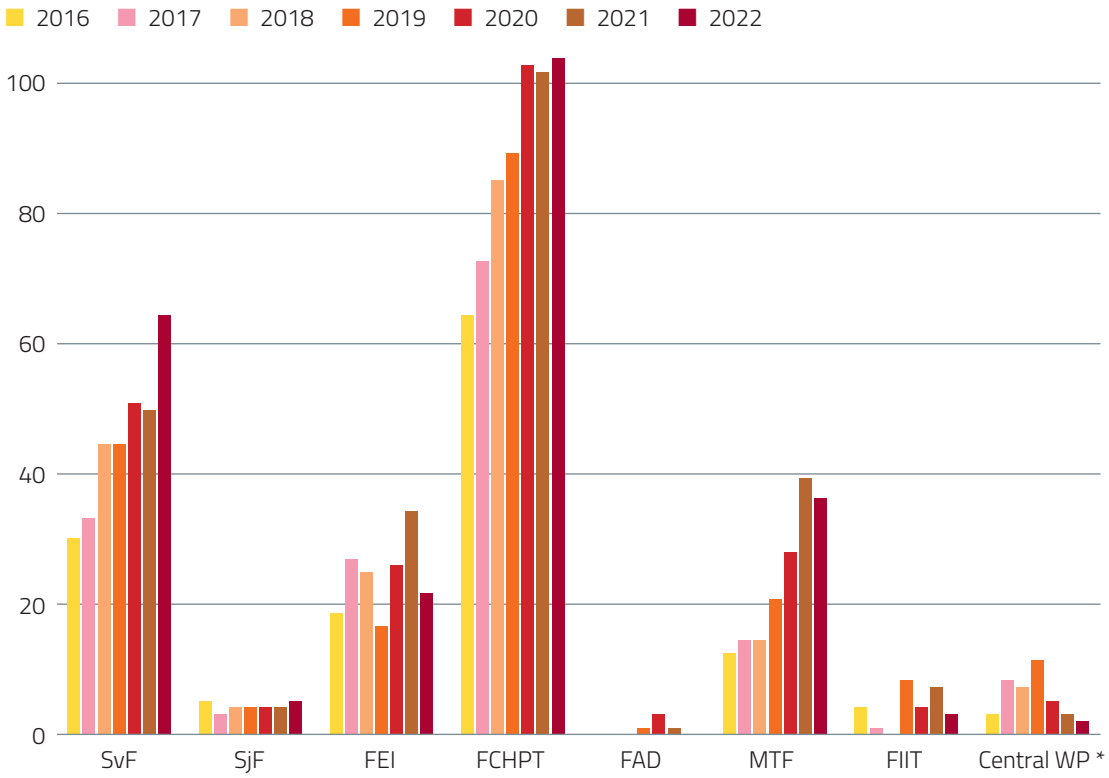
Share of the public universities in the total publication activity as a basis for funds division



Source: MŠVVaŠ SR

The number of publications of individual STU faculties indexed in the Web of Science in Q1 proves the highest number of indexed records attributed to the Faculty of Chemical and Food Technology; the trend keeps rising since 2016. The second highest share is ascribed to the Faculty of Architecture and Design.

Number of publications of individual STU faculties in Web of Science v Q1



Source: ARL Library system / * Central workplaces

Number of publications of individual STU faculties in Scopus, registered in ARL

	●	●	●	●	●	●	●	●	Σ
2016	186	60	238	34	30	124	68	24	**732**
2017	275	87	191	15	22	163	59	27	**816**
2018	212	87	248	51	25	137	48	9	**780**
2019	302	86	231	138	43	180	78	31	**1045**
2020	274	65	224	210	23	180	43	15	**1001**
2021	150	36	191	189	24	145	23	11	**737**
2022	212	41	246	207	30	146	51	15	**948**

Source: ARL Library system

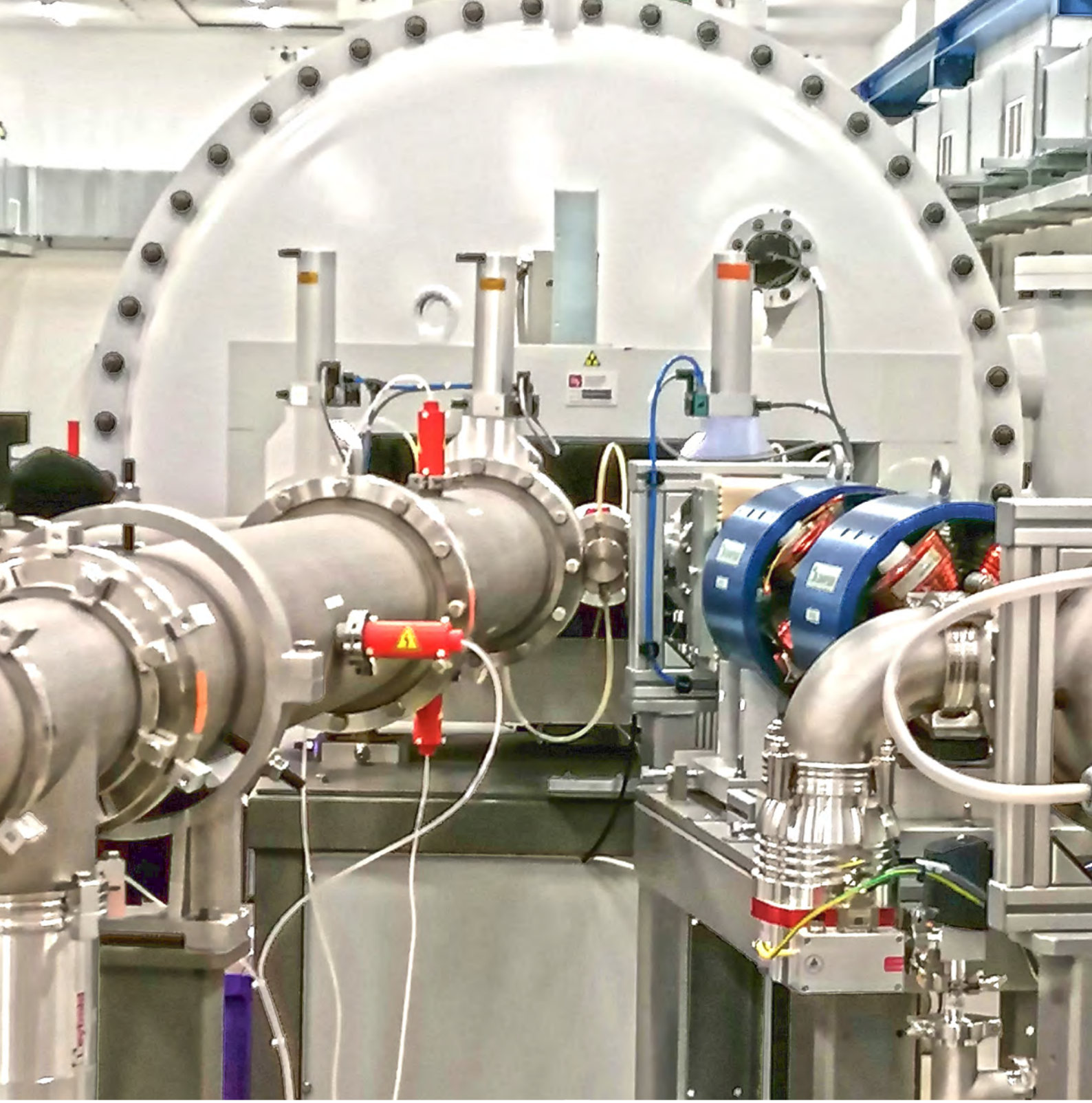
EXCELLENT ACHIEVEMENTS OF THE STU AUTHORS

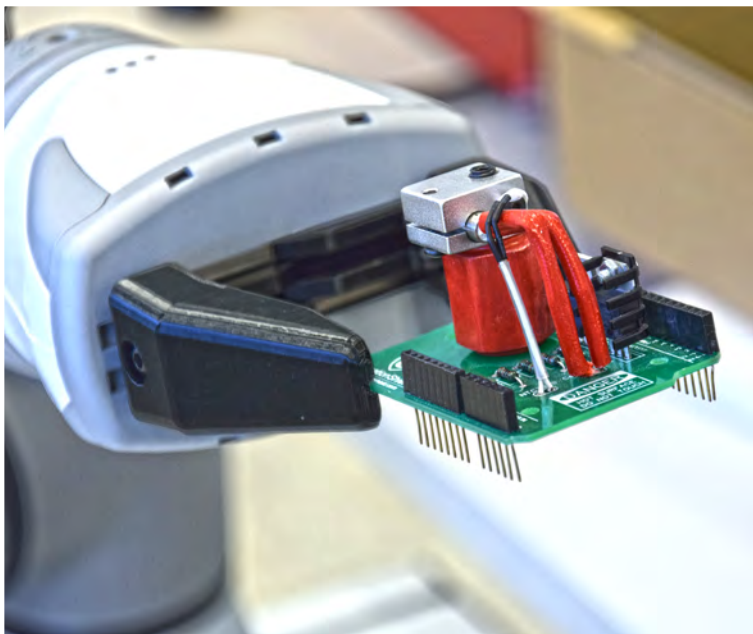
Rector's Award for the best publications in the year 2022

- Category of Publications published in 2020 – 2022 and attributed as a highly cited paper in the WOS database:
  Ján Kruželák, Andrea Kvasničáková, Klaudia Hložeková (Jeszeová) and Ivan Hudec (2021) ●:
  "Progress in polymers and polymer composites used as efficient materials for EMI shielding."
  Nanoscale Advances 3(1): 123-172
  Milan Sokol ●: "A new self-adaptive quasi-oppositional stochastic fractal search for the inverse problem of structural damage assessment"
  Alexandria Engineering Journal, Vol. 61, Iss. 3 (2022), 1992-1936

Rector's Award for an original artistic or architectonic work in the year 2022

- Category of Original artistic work
  Monika Stacho ●: Cycle of Sacral Stories
- Category of Original architectonic work
  Alexander Schleicher (et al.) ●: Study on an Ambulant Device





INTERNAL SCHEMES OF SUPPORTING CREATIVE ACTIVITY IN STU

STU continuously strives to identify and support both, individuals and excellent research teams via several internal mechanisms. Those include the schemes of supporting excellent teams of young researchers and the offer of postdoctoral positions.

Projects for supporting young researchers
The program for supporting young researchers is one of the STU several motivational tools. In 2022, young scientists succeeded for the twelfth time in the competition within the scheme of the Program for the Young Researchers Support, and won grants from STU for their scientific research projects. In accordance with the current Directive, young employees (PhD students and employees under the age of 30) submitted a total of 102 projects. Of those, 90 projects were financed, while 40 of which were implemented by women and 50 by men.

Excellent teams of young researchers
Additional support for young researchers is the extension of the Grant scheme to support excellent teams of young researchers under the conditions of STU in Bratislava. In 2022, the 8th year of the program involved 18 teams formed of the representatives of all STU parts, while 7 projects received the support. The programme to support young researchers is one of several STU motivational tools. In 2021, for the eleventh year in a row, the projects of young researchers succeeded in the competition within the scheme of the Programme for the Young Researchers Support and won grants from STU for their scientific research projects. In accordance with the current Directive, young staff (PhD students and staff under 30) submitted a total of 133 projects, while 51 projects were funded, of which 20 projects were submitted by women and 31 men.

The highest rated projects:

Biochar as an effective material for the development of miniaturized sensors for water disinfection
Principal investigator: Katarína Nemčeková, Ing., PhD.,

Combining molecular docking and spectroscopy to elucidate the behaviour of flavonoids in the presence of redox-active metals - a path to the treatment of civilization diseases
Principal investigator: Miriama Šimunková, Ing., PhD.

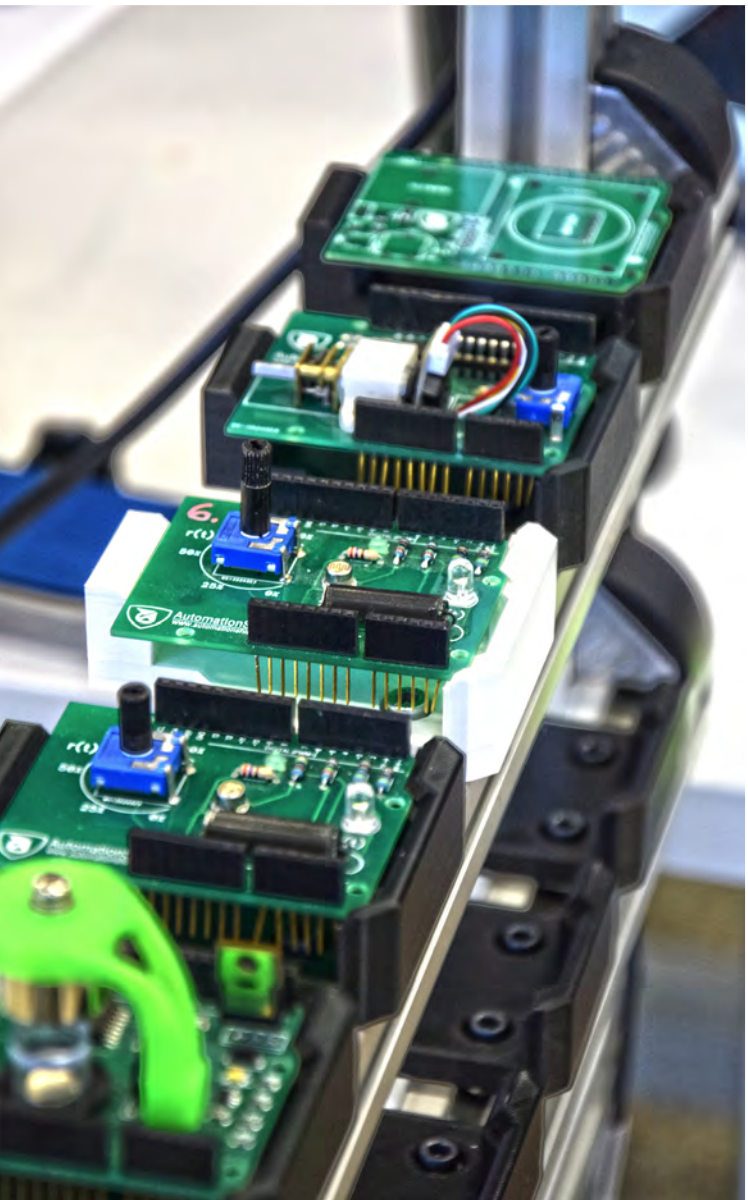
Research and development of the PV and PCM integration into the facade element and characterization of physical properties
Principal investigator: Jakub Čurpek, Ing., PhD.

Elastomeric composite materials with absorption shielding effects of electromagnetic radiation
Principal investigator: Andrea Kvasničáková, Ing., PhD.

Complex Collaborative HRI workplace
Principal investigator: Marek Čorňák, Ing.

Indoor autonomous vehicle navigation using artificial intelligence
Principal investigator: Lukáš Hudec, Ing.,PhD.

Solving beverage authenticity problems by combining analytical chemistry methods with chemometric procedures
Principal investigator: Liudmyla Khvalbota, Mgr., PhD.




M200F
Atomic Resolution
analytical Microscope

Post-doc working positions

The STU program of Postdoctoral Work Stays was replaced by the SASPRO 2 program. Its goal is to strengthen the scientific organization of the Slovak Academy of Sciences (SAS) and the faculties of STU and Comenius University (UK) with the researchers from the top foreign workplaces, improve the quality of cooperation between scientific and applied sectors, and support multidisciplinary approaches to project solutions. The project also attempts to intensify the mutual links between SAS, STU and UK, supporting their cooperation with foreign workplaces and building a network of contacts facilitating international cooperation.

In 2022, nine researchers working at STU within SASPRO 2 dealt with the following projects:

- **Hardware security of neural networks**
  Xiaolu Hou, Bc., Ph.D.
- **AIpology - Artificial intelligence for personalised oncology**
  Michal Kováč, doc. Mgr., MSc., PhD.
- **Advances in guidelines for responsible machine learning**
  Amirhosein Mosavi, Dr.,PhD.
- **Numerical methods for computationally evolving manifolds**
  Jooyoung Hahn, MSc., PhD.
- **Green analytical approaches to the wine industry quality control based on digital imaging and chemometrics**
  Adriano De Araújo Gomes, Dr.
- **Common aspects of theoretical physics and technical sciences**
  Veronika Gáliková, Mgr., PhD.
- **Graphic carbon nitride - advanced nanomaterials in wastewater treatment**
  Tomáš Homola, doc. RNDr., PhD.
- **Research into regional innovative capacity**
  Sila Ceren Varis Husar, Ing., PhD.
- **Atomic 2D layers of quaternary and ternary alloys for innovative photocatalysis**
  Ravi Kumar Biroju, Dr.

STU Doctoral School

The STU Doctoral School covers interdisciplinary educational activities for the development of scientific and research competencies of doctoral students and young researchers in the areas such as publishing, presentation skills and communication, research funding and grant writing, career development, research ethics, intellectual property protection, etc.

In the summer semester 2021/2022, various seminars were organized for Doctoral students within the subject of Methodology of scientific work 2; in the winter semester 2022/2023, seminars/webinars were organized within the subject of Methodology of scientific work 1.


DOCTOR
HONORIS
CAUSA
SLOVENSKÁ • VYSOKÁ • ŠKOLA • TECHNICKÁ
19 38

Awards granted to STU employees

STU Plaque

Pavol Fellner, Prof. Ing., DrSc.

STU Scientific Personality for the year 2022 in the "Significant scientific contribution" category

Tomáš Mackuľak, doc. Ing., PhD.

STU Scientific Personality for the year 2022 in the "Young scientist" category

Ján Janošovský, Ing., PhD.

Anton Kuzma, Ing., PhD.

Habilitation and inauguration proceedings

Four proposals for nomination of professors were approved at the meetings of the STU Scientific Board (VR STU) in 2022. Subsequently, the President of the Slovak Republic appointed the following professors:

Peter Košťál, doc. Ing., PhD. (Manufacturing Technology)

Martin Kusý, doc. Ing., PhD. (Materials)

Tomáš Mackuľak, doc. Ing., PhD. (Chemical Technologies)

Jaroslav Sandanus, doc. Ing., PhD. (Engineering Structures and Transport Buildings)

"Doctor honoris causa"

Proposals for awarding the title of "doctor honoris causa" to Prof. Bernard L. Feringa and Prof. Jean-Marie Lehn were discussed and approved at the meeting of the STU Scientific Board on 19 October 2022. Both named are holders of the Nobel Prize for Chemistry. The ceremony of awarding honorary degrees took place in March 2023.

Support Services in the Field of Research

Access to databases of scientific knowledge is an essential part of the work of scientists in the current global and interdisciplinary science and research. STU creates conditions to support creative activity of its employees and students by providing services, particularly that of the University Library, to the scientific workplaces and units of international scientific and technical cooperation.

Research Integrity, Open Science, Open Access, STU OA Institutional Repository
STU are committed to fulfilling the obligations defined in the national document of Declaration on strengthening the scientific integrity in Slovakia, the aim of which is the observance of the highest ethical standards in the area of research and education integrity, as well as the support for Scientific Integrity in the National Code of Ethics.

STU Concept of open science
In the year 2022, STU continued implementing the Open Access policy in accordance with the European Commission's Recommendation on Open Access to Scientific Information.

HR Excellence in Research
In 2022, STU successfully joined the scientific institutions of the European Union that received the "HR Excellence in Research" label. It is a prestigious award granted by the European Commission to the institutions that have demonstrated their commitment to complying with the 40 principles and principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers within the Human Resources Strategy for Researchers (HRS4R).

Utilisation of the creative activity results in practice
Protection of industrial property at STU is ensured by the Office of Cooperation with Practice. The Office provides professional advice to the authors of industrial property objects in the field of industrial property protection, filing applications at the Slovak Republic Industrial Property Office, promoting the results of research and development applicable in practice, searching for and negotiating with partners from industry, etc.

39 Author's notice on creating an object of industrial property

25 Patent applicattions

17 Granted patents

31 Applications of utility models

21 Registrered utility models

2 Granted patents (CZ)

2 European patent applications

1 National patent application (Japan)

1 National patent application (USA)

1 National patent application (China)

In 2022, the first ever license agreement on the use of the invention of "Granulator of particulate material with a matrix" was signed. The team of authors comprised the STU Faculty of Mechanical Engineering employees: doc. Ing. Peter Peciar, PhD., Prof. Ing. Roman Fekete, PhD., Prof. Ing. Marián Peciar, PhD. and Ing. Oliver Macho, PhD.

STU Technology Incubator

A total of 88 companies have been incubated in the STU Technology Incubator since its inception in 2005. Of those, 55 are still active. Their total revenue in 2022 reached 42.76 million euros. In 2022, 30 projects were incubated within the ŠTART program and 9 startups within the INQB program.

Nanodi s.r.o. startup that elaborated the design of a disinfectant stand and air purifier using diamond layer technology won the 2022 People's Choice Award at the Demo Day of the Challenger acceleration program of the CIVITTA Slovakia consulting company.

By 2022, STU Technology Incubator had signed cooperation agreements with 24 active mentors and companies working without entitlement to a fee.

STU Scientific, s.r.o.

Mission of the STU Scientific, s.r.o. is to support the economic valorisation and appreciation of the STU intellectual property, members of its academic community and other partners in the business sphere. Currently, there are the following spin-off companies established on the University premises, benefiting from the STU scientific research potential:

- **STUVITAL, s.r.o.**
  Research and preparation of fortified particularly cereal products via applying innovative technology of recovery of cereal by-products and original recipe ingredients.

- **IVMA STU, s.r.o.**
  Design of electrodes for spot resistance welding of galvanized sheets. The research was conducted in cooperation with Matador Vráble, a future user of the research results. Further activity is focused on the field of base and applied research of Electro Spark Deposition (ESD) along with implementation of the ESD research results in industrial practice.

- **SMME - STU, s.r.o.**
  Research and development in the field of mechatronic systems utilising the latest knowledge and trends in the information, communication and control technologies.

- **Hydrotechnika STU, s.r.o.**
  Transfer of the research and development knowledge in the field of water structures into practice.

- **Neural medical s.r.o.**
  The main activity of the Company is the analysis, processing and evaluation of data from wearable biometric and medical devices, the design of new algorithms for the processing of measured data representing the health status of patients, based on the utilisation of artificial neural networks (UNS) and machine learning.

- **InnoSTU s.r.o.**
  The main focus of the Company is provision of services in the fields of industrial automation, applied informatics and cyber security. Its goal is to bidirectionally connect the academic sphere with practice, and thus provide support to the companies interested in developing and increasing the efficiency of their technological processes. Ensuring efficient utilisation of resources via automation and artificial intelligence is the only option to remain competitive.

- **ENFEI s.r.o.**
  Operation of the electricity system with a focus on optimizing the development and operation of electrical networks of all voltage levels, as well as the source base of the electricity system of the Slovak Republic. In the area of smart grids, it concerns mainly the preparation of pilot projects, technology designs as well as the testing and verification of systems.

- **B&J NUCLEAR, s.r.o.**
  The Company focuses on implementation of the research findings in the field of reactor physics to engineering applications. It specializes in analyses of safe operation of nuclear reactors, optimization of radiation shielding and operation of current and advanced nuclear fuel. The Company activities are performed in the form of expert analyses, development of methodologies and safety analyses of selected states and configurations of nuclear facilities. The Company is also actively involved in the national and international projects, the research and development in the field of natural and technical sciences, the field of nuclear energy in particular.

- **MicroPoll s. r. o.**
  The Company's key activities comprise the standard analyses of basic parameters (organic, inorganic and microbial pollution) of various types of water, soil and air, the chemical analyses aimed at the occurrence of micro and nanoplastics and micropollutants, the occurrence of pathogens and resistance genes, the development of new types of sensors used in the diagnosis of diseases and in the analysis of pollutants and military agents, the new types of detectors aimed at analysing water, soil and air pollution, the research into the development of new types of materials (e.g. micro and nanofibres usable as e-textiles, sensors in the form of textiles and products made of them) or for the production of self-cleaning materials and suits designed particularly for security forces and athletes.

Table Appendix

Awards of individual students or students teams won at the international level

K. Štulík Award				1		
Iceland Lake Myvath Community					1	
Inspireli Awards					1	
IT SPY semi-finalist			2			
Student Research Conference at VŠCHT Prague				2		
Xella 2022					2	
University World Championships in swimming (1st place for 50m free style)			1			
University World Championships in swimming (1st place for 100m butterfly)			1			
University World Championships in swimming (2nd place for 200m butterfly)			1			
Proskill Project, Gliwice						1
János Zambó International Case Study Competition						1
Paris International open IBJJF Jiu-Jitsu Championships 2022			1			
∑			**6**	**3**	**4**	**2**

Statistics of appointed Associate Professors (docent)

								∑
I./2022	2	1						**3**
III./2022	1					1	3	**5**
IV./2022					1	1		**2**
VI./2022			1					**1**
IX./2022	1	1		2				**4**
XI./2022	4	2	1	2	1	2	3	**15**
∑	**7**	**4**	**9**	**10**	**7**	**7**	**3**	**47**

Number of publications of individual STU faculties in Web of Science v Q1, Q2, Q3 and Q4 registered in ARL

	2016				2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	29	22	13	6	32	13	19	8	43	18	5	10
	5	3	1	4	3	4	2	9	4	2	5	6
	18	21	19	25	26	22	39	34	24	18	28	32
	62	51	47	23	70	81	45	39	82	62	51	22
	0	0	0	0	0	1	1	0	0	0	0	1
	12	11	15	8	14	11	17	14	14	8	23	13
	4	3	3	4	1	0	0	7	0	2	6	3
	3	4	3	0	8	5	6	3	7	2	2	1

	2019				2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	43	21	14	6	49	28	16	5
	4	1	3	10	4	6	5	5
	16	25	16	28	25	24	16	40
	86	73	44	22	105	73	52	23
	1	0	0	0	3	0	0	0
	20	32	17	11	27	28	14	12
	8	5	3	4	4	3	5	1
	11	12	1	0	5	7	2	2

	2021				2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	48	41	12	9	62	30	14	12
	4	17	3	2	5	9	2	2
	33	58	23	20	21	36	19	16
	103	95	27	9	106	62	31	27
	1	2	0	0	0	3	0	0
	38	43	8	9	35	32	10	4
	7	1	1	3	3	5	4	1
	3	9	2	2	2	1	0	0

Source: ARL Library system

The H2020 projects and Horizont Europa projects realised in 2022

The Horizont Europa projects

	Project title	Acronym	Principle investigator	Faculty	Call identifier	Finance scheme
1	Sustainable Transition to the Agile and Green Enterprise	STAGE	Kuruc Marcel, doc. Ing., PhD.	● / ●	HORIZON-CL4-2021-RESILIENCE-01-29"	CSA
2	Acoustic and Thermal Retrofit of Office Building Stock in EU	ActaReBuild	Chmelík Vojtech, doc. Ing., PhD.	●	HORIZON-MSCA-2021-DN-01	MSCA
3	DELISA-LTO: DEscription of the extended LIfetime and its influence on the SAfety operation and construction materials performance – Long Term Operation with no compromises in the safety	DELISA-LTO	Slugeň Vladimír, Prof. Ing., DrSc.	●	HORIZON-EURATOM-2021-NRT-01	EURATOM
4	"Building European Nuclear Competence through continuous Advanced and Structured Education and Training Actions"	ENEN2plus	Čerba Štefan, Ing., PhD.	●	HORIZON-EURATOM-2021-NRT-01	EURATOM
5	European Sodium Fast Reactor - Safety by Innovative Monitoring, Power Level flexibility and Experimental research	ESFR-SIMPLE	Vrban Branislav, Ing., PhD.	●	HORIZON-EURATOM-2021-NRT-01	EURATOM
6	Innovative Structural Materials for Fission and Fusion	INNUMAT	Kršjak Vladimír, Ing., PhD.	●	HORIZON-EURATOM-2021-NRT-01	EURATOM
7	Establishment of a Network providing improved professionalised services and support to Euratom National Contact Points and programme applicants.	NetEuratom	Slugeň Vladimír, Prof. Ing., DrSc.	●	HORIZON-EURATOM-2021-NRT-01	EURATOM
8	eurOpean platForm For accEssing nucleaR R&d facilities	OFFERR	Vrban Branislav, Ing., PhD.	●	HORIZON-EURATOM-2021-NRT-01	EURATOM
9	Fostering Opportunities Towards Slovak Excellence in Advanced Control for Smart Industries	FrontSeat	Fikar Miroslav, Prof. Ing., DrSc.	●	HORIZON-WIDERA-2021-ACCESS-03	CSA
10	Novel optical nanocomposite sensors for analysis of micro and macro elements in corn plants	SENS4-CORN	Sahul Martin, Ing., PhD.	●	HORIZON-MSCA-2021-SE-01	MSCA

The H2020 projects and Horizont Europa projects realised in 2022

The H2020 projects

	Project title	Acronym	Principle investigator	Faculty	Call identifier	Finance scheme
1	Mitigating Environmentally Assissted Cracking Through Optimisation of Surface Condition	MEACTOS	Slugeň Vladimír, Prof. Ing., DrSc.	●	EURATOM FISSION NFRP-2016-2017-1	RIA
2	Energy efficient pathway for the city transformation: enabling a positive future	MAKING-CITY	Maroš Finka, Prof. Ing. arch., PhD.	●**	H2020-LC-SC3-2018-ES-SCC	IA
3	European Nuclear Experimental Educational Platform (ENEEP)	ENEEP	Haščík Ján, doc. Ing., PhD. Vrban Branislav, Ing., PhD.	●	NFRP-2018	CSA
4	European Joint Programme on Radioactive Waste Management	EURAD	Slugeň Vladimír, Prof. Ing., DrSc.	●	NFRP-2018	COFUND-EJP
5	Directional Composites through Manufacturing Innovation	DiCoMI	Morovič Ladislav, doc. Ing., PhD.	●	H2020-MSCA-RISE-2017	MSCA - RISE
6	The CALIPER project: Linking research and innovation for gender equality	CALIPER	Cagáňová Dagmar, doc., Mgr., PhD.	●	H2020-SwafS-2019-1	CSA
7	Joint European Canadian Chinese development of Small Modular Reactor Technology	ECC-SMART	Degmová Jarmila, Ing., PhD.	●	NFRP-2019-2020	RIA
8	Fracture mechanics testing of irradiated RPV steels by means of sub-sized specimens (FRACTESUS)	FRACTESUS	Slugeň Vladimír, Prof. Ing., DrSc.	●	NFRP-2019-2020	IA
9	Safety of GFR through innovative materials, technologies and processes	SafeG	Slugeň Vladimír, Prof. Ing., DrSc.	●	NFRP-2019-2020	RIA
10	STRUctural MATerials research for safe Long Term Operation of LWR NPPs	STRUMAT-LTO	Degmová Jarmila, Ing., PhD.	●	NFRP-2019-2020	RIA
11	Targeting Real chemical accuracy at the Exascale	TREX	Dubecký Matúš, Ing., PhD.	●	H2020-INFRAEDI-2019-1	RIA
12	DIH-World - Accelerating deployment and matureness of DIHs for the benefit of Digitisation of European SMEs	DIH-World	Duchoň František, Prof. Ing., PhD.	●	H2020-DT-2019-2	IA
13	Boost Of Organic Solar Technology for European Radiance	BOOSTER	Weis Martin, prof. Ing., DrSc.	●	H2020-LC-SC3-2020-RES-IA-CSA	IA
14	Training European Experts in Inflammation: from the molecular players to animal models and the bedside	INFLANET	Mikula Karol, Prof. RNDr., DrSc.	●	H2020-MSCA-ITN-2020	MSCA-ITN-ETN

	Project title	Acronym	Principle investigator	Faculty	Call identifier	Finance scheme
15	Promotion of rural museums and heritage sites in the vicinity of European pilgrimage routes	rurALLURE	Hrčková Andrea, Mgr., PhD. Vranić Valentino, doc. Ing., PhD.	●	H2020-SC6-TRANS-FORMATIONS-2020	CSA
16	Biodiversity and Infrastructure Synergies and Opportunities for European Transport Networks	BISON	Finka Maroš, Prof. Ing. arch., PhD.	●**	H2020-MG-2020-SingleStage-INEA	CSA
17	Innovation Fostering in Accelerator Science and Technology	I.FAST	Šagátová Andrea, doc. Ing., PhD.	●	H2020-INFRAINNOV-2020-2	RIA
18	Sustainable EnErgy Skills in construction: Visible, Validated, Valuable	SEEtheSkills	Funtík Tomáš, Ing., PhD.	●	H2020-LC-SC3-EE-2020-2	CSA
19	Slovak Academic and Scientific PROgramme for experienced researchers	SASPRO 2	Búciová Mária, Ing. Mgr. Takáč Andrej, Ing.	●*	H2020-MSCA-COFUND-2019	MSCA-COFUND-FP
20	300mm Pilot Line for Smart Power and Power Discretes	R3-PowerUP	Donoval Daniel, Prof. Ing., DrSc.	●	H2020-ECSEL-2016-2-IA-two-stage	ECSEL-IA
21	Advanced RF Transceivers for 5G base stations based on GaN Technology	5G_GaN2	Donoval Daniel, Prof. Ing., DrSc.	●	H2020-ECSEL-2017-2-RIA-two-stage	ECSEL-RIA
22	first and euRopEAn siC eigTh Inches pilOt liNe	REACTION	Donoval Daniel, Prof. Ing., DrSc.	●	H2020-ECSEL-2017-1-IA-two-stage	ECSEL-IA
23	The next-generation silicon-based power solutions in mobility, industry and grid for sustainable decarbonisation in the next decade	Power2-Power	Donoval Daniel, Prof. Ing., DrSc.	●	H2020-ECSEL-2018-1-IA-two-stage	ECSEL-IA
24	Research for GaN technologies, devices, packages and applications to address the challenges of the future GaN roadmap	Ultimate-GaN	Donoval Daniel, Prof. Ing., DrSc. Marek Juraj, Ing., PhD.	●	H2020-ECSEL-2018-2-RIA-two-stage-1	ECSEL-RIA
25	Intelligent Reliability 4.0	iRel40	Šatka Alexander, Prof. Ing., CSc. Donoval Daniel, Prof. Ing., DrSc.	●	H2020-ECSEL-2019-1-IA	ECSEL-IA
26	Highly efficient and trustworthy components and systems for the next generation energy supply infrastructure	Progressus	Stopjaková Viera, Prof. Ing., PhD.	●	H2020-ECSEL-2019-2-RIA	ECSEL-RIA
27	Highly EFFICIENT and reliable electric drivetrains based on modular, intelligent and highly integrated wide band gap power electronics modules	HiEFFICIENT	Marek Juraj, Ing. PhD.	●	H2020-ECSEL-2020-2-RIA-two-stage	ECSEL-RIA

* Department of Management / ** Rectors Office

Projects implemented in 2022

	Project title	Acronym	Principle investigator	Faculty	Call identifier	Finance scheme
1	Training European Experts in Multilevel Bioimaging, Analysis and Modelling of Vertebrate Development and Disease	ImageInLife	Mikula Karol, Prof. RNDr., DrSc.		H2020-MSCA-ITN-2016	MSCA-ITN-ETN
2	European Human Biomonitoring Initiative	EHBMI	Špánik Ivan, Prof. Ing., DrSc.		H2020-SC1-2016-RTD	COFUND-EJP
3	Mitigating Environmentally Assissted Cracking Through Optimisation of Surface Condition	MEACTOS	Slugeň Vladimír, Prof. Ing., DrSc.		EURATOM FISSION NFRP-2016-2017-1	RIA
4	Energy efficient pathway for the city transformation: enabling a positive future	MAKING-CITY	Finka Maroš, Prof. Ing. arch., PhD.		H2020-LC-SC3-2018-ES-SCC	IA
5	European Nuclear Experimental Educational Platform	ENEEP	Haščík Ján, doc. Ing., PhD. Vrban Branislav, Ing., PhD.		NFRP-2018	CSA
6	European Joint Programme on Radioactive Waste Management	EURAD	Slugeň Vladimír, Prof. Ing., DrSc.		NFRP-2018	COFUND-EJP
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8	The CALIPER project: Linking research and innovation for gender equality	CALIPER	Cagáňová Dagmar, doc., Mgr., PhD.		H2020-SwafS-2019-1	CSA
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13	Targeting Real chemical accuracy at the Exascale	TREX	Dubecký Matúš, Ing., PhD.		H2020-INFRAEDI-2019-1	RIA
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20	Sustainable EnErgy Skills in construction: Visible, Validated, Valuable	SEEtheSkills	Funtík Tomáš, Ing., PhD.	●	H2020-LC-SC3-EE-2020-2	CSA
21	Innovative smart components, modules and appliances for a truly connected, efficient and secure smart grid	CONNECT	Stopjaková Viera, Prof. Ing., PhD.	●	H2020-ECSEL-2016-1-RIA-two-stage	ECSEL-RIA
22	300mm Pilot Line for Smart Power and Power Discretes	R3-PowerUP	Donoval Daniel, Prof. Ing., DrSc.	●	H2020-ECSEL-2016-2-IA-two-stage	ECSEL-IA
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24	High performant Wide Band Gap Power Electronics for Reliable, energy eFficient drivetrains and Optimization thRough Multi-physics simulation	HiPERFORM	Marek Juraj, Ing. PhD.	●	H2020-ECSEL-2017-2-RIA-two-stage	ECSEL-RIA
25	first and euRopEAn siC eigTh Inches pilOt liNe	REACTION	Donoval Daniel, Prof. Ing., DrSc.	●	H2020-ECSEL-2017-1-IA-two-stage	ECSEL-IA
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