



TECHNISCHE UNIVERSITÄT
BERGAKADEMIE FREIBERG

Die Ressourcenuniversität. Seit 1765.

TU Bergakademie Freiberg: a Place to Study and a Possible Partner for Research and Development



Michael Schlömann
Presentation for German-Peruvian Resource Forum
26.8.2021

PROFILE

- **Founded in 1765** – oldest mine science university worldwide
- **Clear profile** GEOSCIENCES – MATERIALS – ENERGY – ENVIRONMENT
- **Top research university**: university with the most external funds in the new German states (ca. 59 million € in 2019)
Rank 17 in QS World University Rankings in Mineral & Mining Engineering
- **Scientific location Freiberg**: Helmholtz Institute Freiberg for Resource Technology (HIF)
- **Specials**
Foundations, own teaching and research mine
- **Campus university** – short distances

FACTS AND FIGURES

2021

- 6 Faculties
- 13 Central facilities
- 42 Institutes
- 73 Courses of study
- 1.114 Freshmen
- 4.000 Students (39% international)
- 59 Million € in external funds
- 89 Professors
- 2.169 University employees



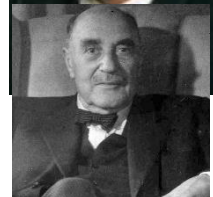
TERRA MINERALIA – MOST IMPORTANT MINERAL COLLECTION WORLDWIDE



- Exhibition of over 5000 minerals, precious stones and meteorites from five continents
- Since 2012 Mineralogical Collection Germany in KRÜGERHAUS

FAMOUS STUDENTS AND PROFESSORS

- **Abraham Gottlob Werner** (1749-1817)
most important teacher at the Bergakademie
- **Alexander von Humboldt** (1769-1859)
natural scientist, polymath
- **Ferdinand Reich** (1799-1882), **Hieronymus Richter** (1824-1896)
discoverers of indium
- **Clemens Alexander Winkler** (1838-1904)
discoverer of germanium
- **Moritz Hochschild ("Don Mauricio")** (1881-1965)
tin mining in Bolivia, rescued many jews in Nazi time



STUDYING AT TU BERGAKADEMIE FREIBERG

- **No tuition, administrative fee 94 € per semester**
- **Bachelor, Master and Diploma Programs in German**
Bachelor 3 (or 3.5) years
Master 2 (or 1.5) years, requirement Bachelor
Diploma 5 years, comprises Bachelor and Master
- **Master Programs in English**
1.5 or 2 years, requirement Bachelor or Licenciado
- **Research and Studies for Doctor Degree**
Usual requirement Master or Diploma

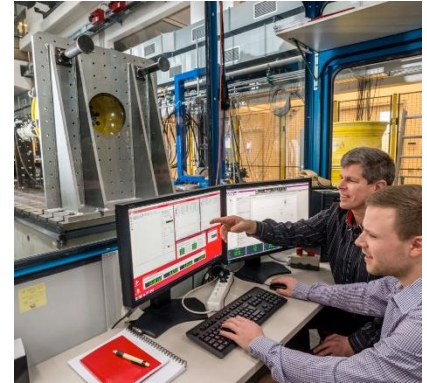
GERMAN PROGRAMS: GEOSCIENCES AND GEOENGINEERING

- Geoinformatics/Geophysics (B, M)
- Geology/Mineralogy (B)
- Geosciences (M)
- Geoecology (B, M)
- Geotechnology/Mining (D)
- Surveying and Applied Geodesy (D)



GERMAN PROGRAMS: ENGINEERING (SELECTION)

- Engineering (B)
- Mechanical Engineering (D, M)
- Process Engineering (D, M)
- Ceramics, Glass and Construction Materials Engineering (D, M)
- Environmental Engineering (M)
- Additive Transformation (Techn.,Material,Design) (B)
- Energy Technology (M)
- Materials Science and Materials Technology (D)
- Foundry Technology (B, M)
- Advanced Components: Materials for Mobility (D)
- Nanotechnology (D, M)



ENGLISH MASTER PROGRAMS: GEOSCIENCES, MINING

- Sustainable Mining and Remediation Management
- Advanced Mineral Resources Development (with Leoben and other universities)
- Geosciences
- Geomatics for Mineral Resource Management
- Groundwater Management
- Sustainable and Innovative Natural Resource Management (SINReM) (with Ghent and Uppsala)



ENGLISH MASTER PROGRAMS: ENGINEERING, BUSINESS

- Metallic Materials Technology
- Mechanical and Process Engineering
- Technology and Application of Inorganic Engineering Materials
- Advanced Material Analysis
- Computational Material Science
- Business Analytics
- International Business and Resources in Emerging Markets



TUBAF-PERU EXCHANGE

- Currently contracts with:
 - International Exchange Program with Pontificia Universidad Católica del Peru in San Miguel, Lima
 - Catholic University of Santa María in Arequipa



RESEARCH AND STUDIES FOR DOCTOR DEGREE: GENERAL

- Germany in general very open for foreign doctoral “students”
- Usual requirement: Master or “Diploma”
- Doctoral “students” usually seen as coworkers
- Formal doctoral “programs” not common, however classes of master programs open and special courses offered
- Funding usually by project or fellowship (e.g. by DAAD)
- No tuition fee

RESEARCH AND STUDIES FOR DOCTOR DEGREE: TUBAF

- At TUBAF special courses organized by Centre of Advanced Study and Research (GraFA)
- **Option of “external doctorate”:**
candidates work at company or research institute, but pursue doctorate at university
- Agreement with Universidad de Santiago de Chile on **Jointly Awarded Double Doctorates**

First defense 6.12.2018

Second defense on Tuesday 24.8.2021



FOR TOMORROW'S TOP RESEARCHERS



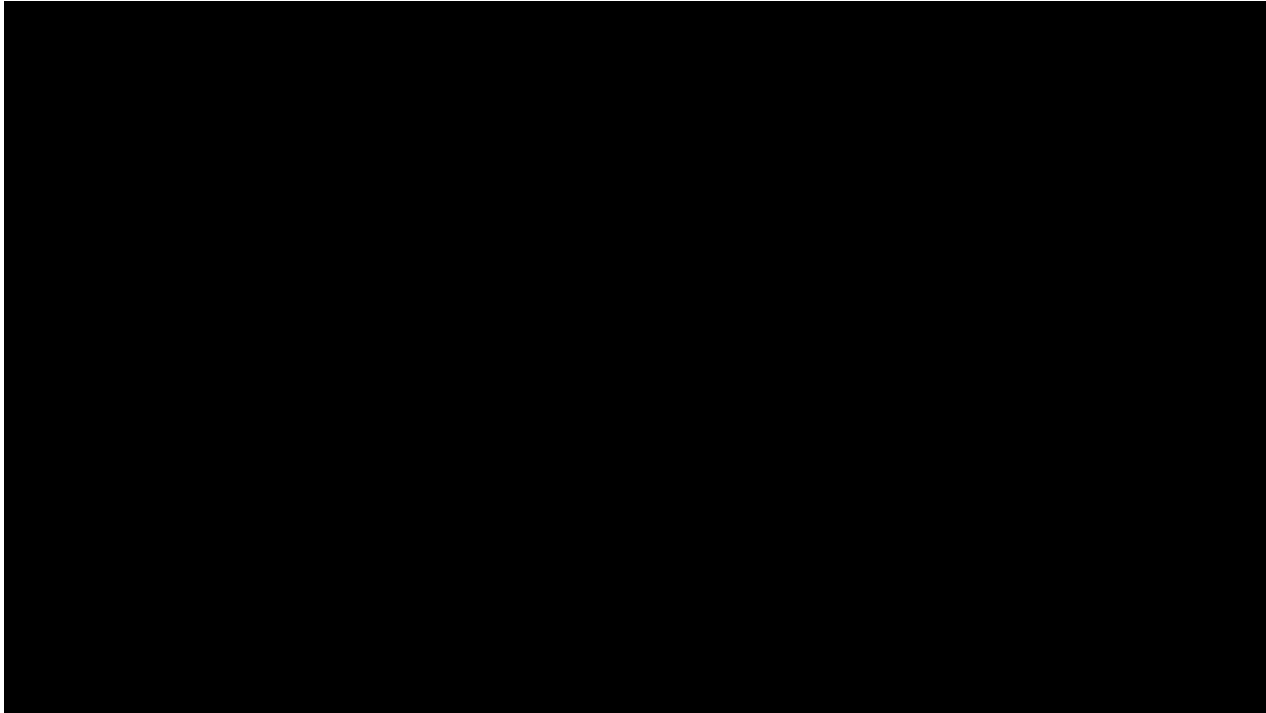
**GRADUIERTEN- UND
FORSCHUNGS-AKADEMIE**
CENTRE OF ADVANCED
STUDY AND RESEARCH



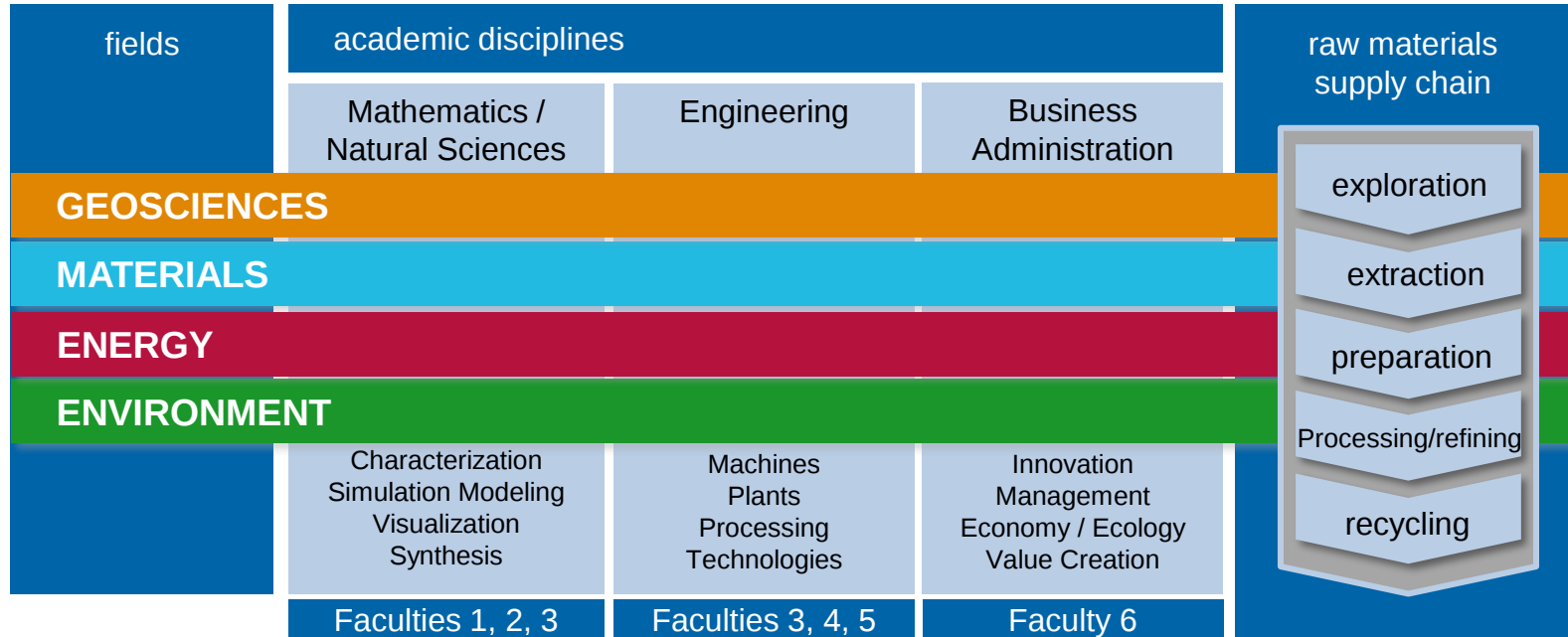
- Umbrella organization for doctoral candidates in all subjects
- Counseling and further training in interdisciplinary competence areas
- Promotion of multifaceted personality development
- Promotion of speedy completion of doctoral studies
- Promotion of self-sufficiency and responsibility in the doctoral candidates

EXPERIECE REPORT BY A STUDENT FROM COLOMBIA

- <https://youtu.be/F2ba16M8DkE>



ACADEMIC PROFILE



Faculty 1: **Mathematics and Informatics**, Faculty 2: **Chemistry and Physics**, Faculty 3: **Geosciences, Geotechnology, Mining**,
 Faculty 4: **Mechanical Engineering, Processing and Energy Technology**, Faculty 5: **Materials and Material Technology**, Faculty 6: **Business Administration**

INSTITUTE OF BIOSCIENCES

- Professors: Schlömann, Hedrich, Heilmeyer
- Bioleaching minerals:
 - arsenic containing ores of Cu, Co, Zn ...
 - complex sulfidic concentrate
 - bioleaching in presence of chloride
 - bioleaching of chalcopyrite
 - platinum-group elements
 - attachment to minerals
- Bioleaching for recycling of WEEE
- Biological treatment of mine waters: iron oxidation
sulfate reduction
- Plant-microbe interaction for metal uptake into plants
("phytomining")



INSTITUTE OF CHEMICAL TECHNOLOGY

- Professor: Bertau
- Phosphorous winning and recycling
- Winning of valuable metals from primary and secondary resources, e.g.: Recycling and winning of indium from leaching solution
- Valorization of waste and by-products: geopolymers, valuable compounds from heaps, ashes or red mud



INSTITUTE OF MECHANICAL PROCESS ENGINEERING AND BENEFICATION TECHNOLOGY

- Professor: Peuker
- Recycling of lithium ion batteries
- Sorting processes in battery recycling
- Modelling of agglomeration
- Characterization of particle systems



INSTITUTE FOR MINING AND SPECIAL SUBSURFACE CONSTRUCTION

- Professors: Mischo, Drebenstedt, Kudla, Dahlhaus
- Winning of metals from mine water by ion exchange
- Cutting extraction
- *in situ*-bioleaching
- Underground storage of radioactive wastes



INSTITUTE FOR NON-FERROUS METALLURGY

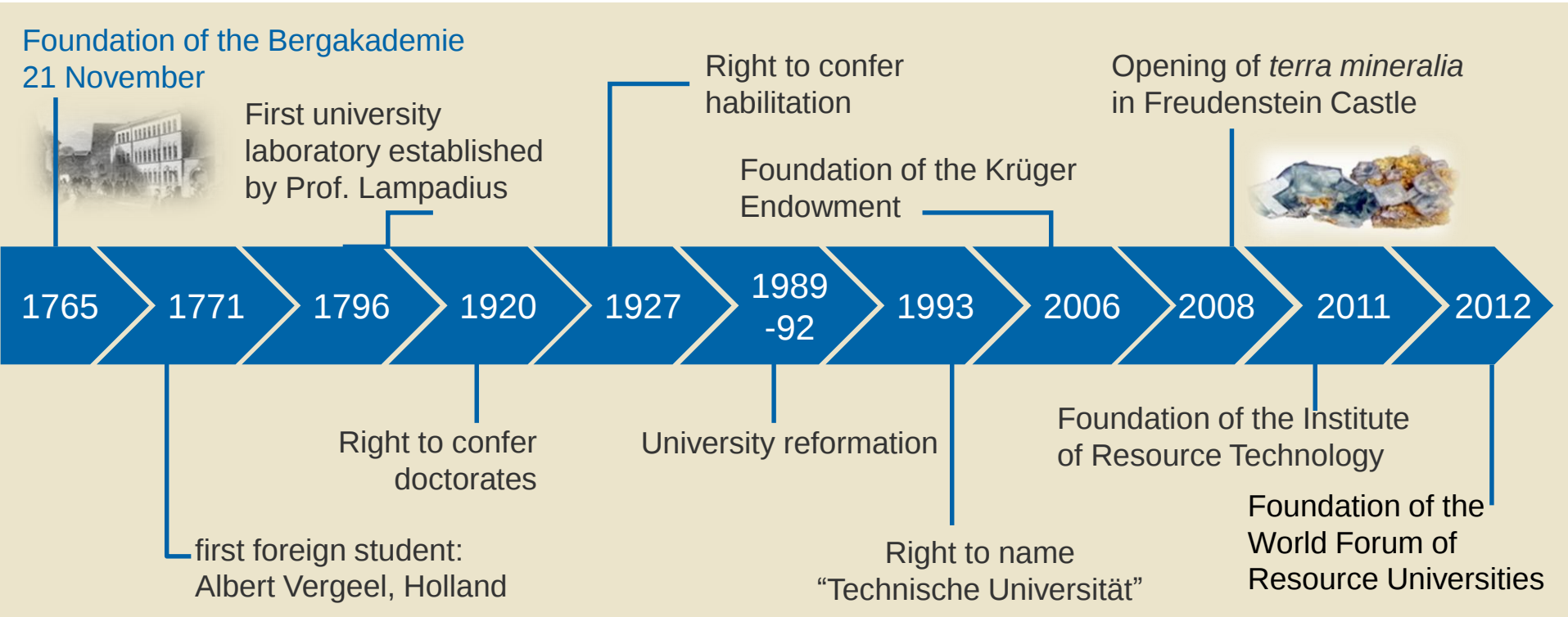
- Professor: Charitos
- Alkaline arsenic leaching from sulfidic concentrates
- Slag characterization for optimization of pyrometallurgical processes
- Purification of aluminum melts



**Thank you
for your attention!**

Glückauf!

250 YEARS OF HISTORY



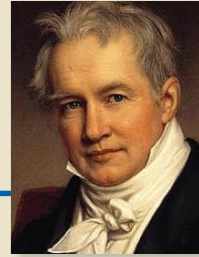
PERSONALITIES OF INTERNATIONAL STANDING



1711-1765

**Michail Wassiljewitsch
Lomonossow**

Russian polymath, 1739 – 1740
student in the laboratories of mining
councilor Johann Friedrich Henkel



1769-1859

Alexander von Humboldt

Natural scientist and
humanist, studied geology
with Abraham Gottlob Werner

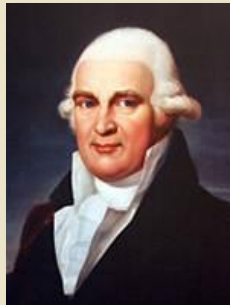
176
5

1739

1769

1791

1873



1749-1817

Abraham Gottlob Werner

Most important teacher at the
Mining Academy; considered as
the originator of the science of the
structure and composition of the
earth's crust



1838-1904

Clemens Winkler

From 1873 on professor
of chemistry at the Mining
Academy, 1886 discovery
of germanium

CAMPUS AND UNIVERSITY CITY



Campus and university city



New Cafeteria on the campus

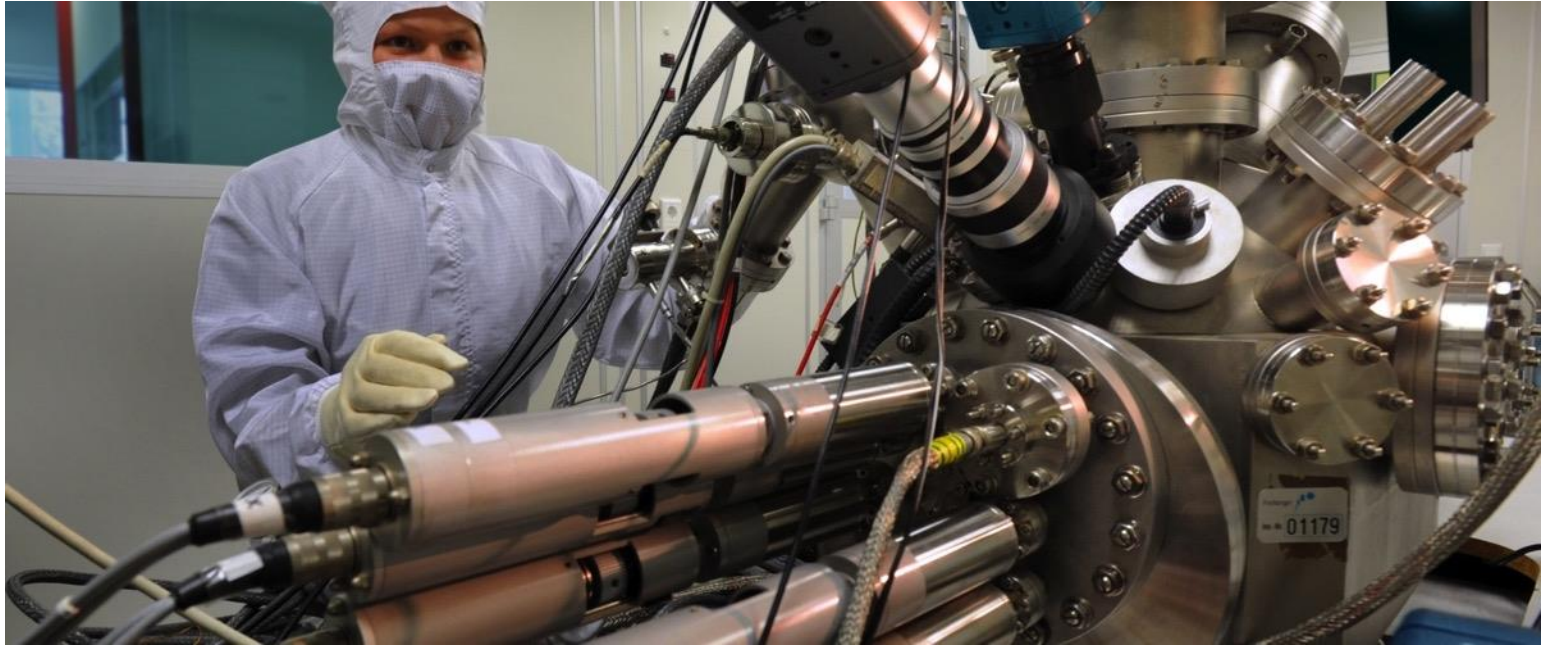
Campus and university city



About 1000 dorm rooms are available directly on campus in the dormitories of Studentenwerk Freiberg.



Julius Weisbach Building for the Faculty of Mechanical Engineering and Processing and Energy Technology



Ultra-clean room at the Faculty of Chemistry and Physics



Technikum for Machine and Processing Development at the Faculty of Mechanical Engineering and Processing and Energy Technology



Stratigraphical Collection, Humboldt Building

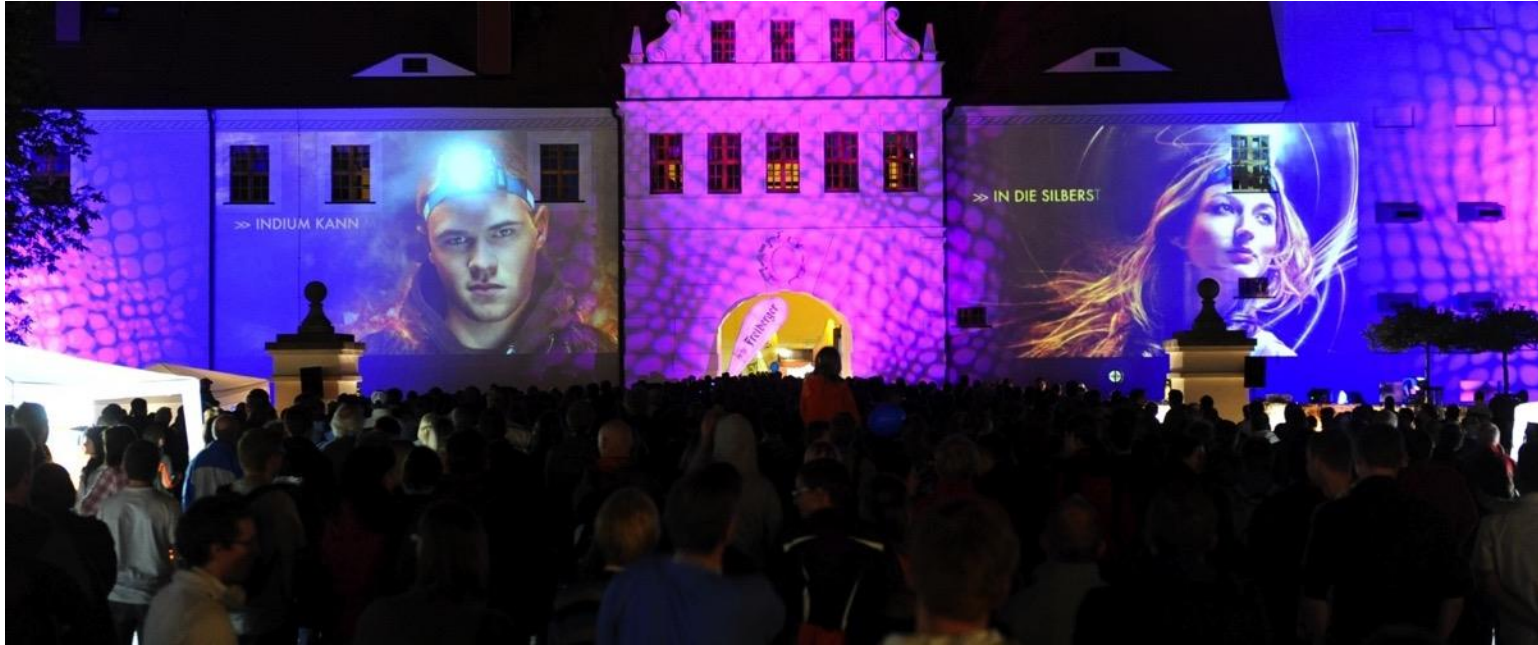


Mineralogical Collection, Werner Building



terra mineralia, endowment collection at the TU Bergakademie
displayed in Freudenstein Castle, Freiberg

Campus and university city



Science in the heart of the city – presented during the Night of Science and Business



KRÜGERHAUS

“Mineralogical Collection Germany”

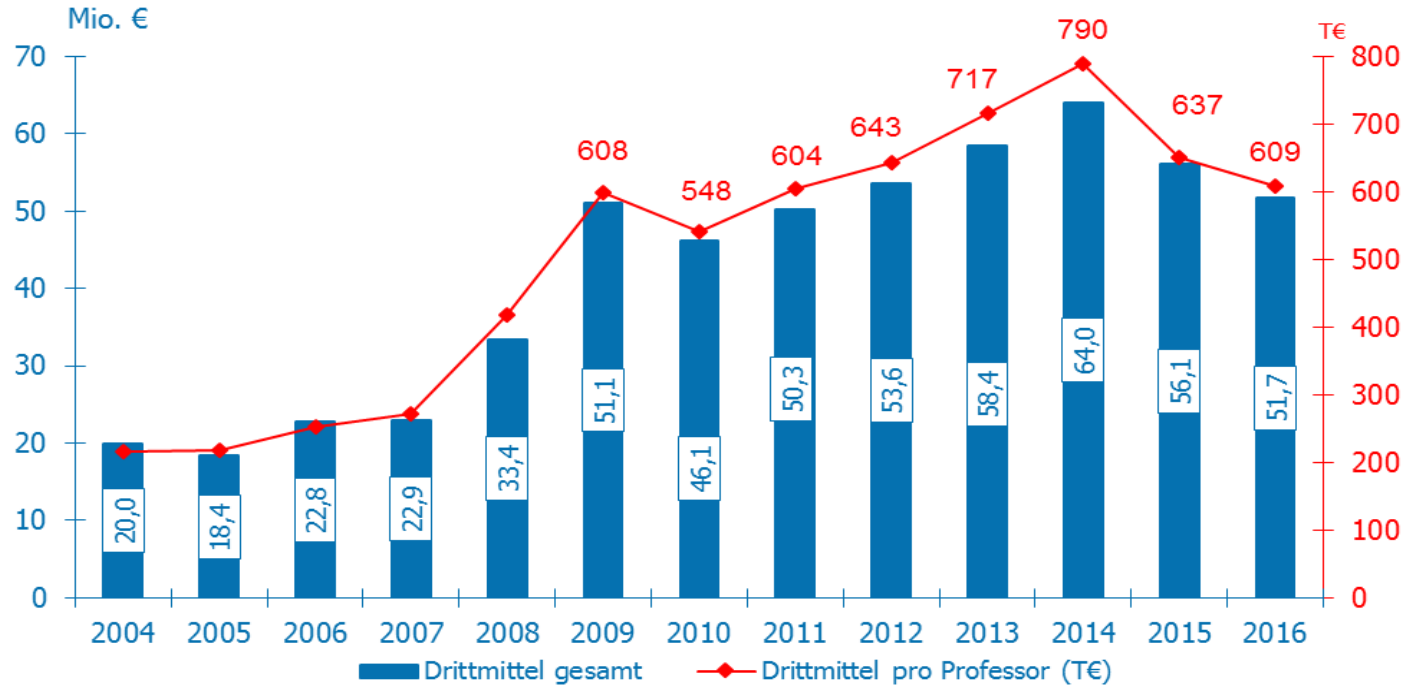


Research and Teaching Mine
Campus "Reiche Zeche"



Race Technology Team – one of the top five in the world in the international competition Formula Student

Facts and figures



Total external funding at TU Bergakademie in Million €



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**WELTOFFENE
HOCHSCHULEN**
GEGEN FREMDEN-
FEINDLICHKEIT