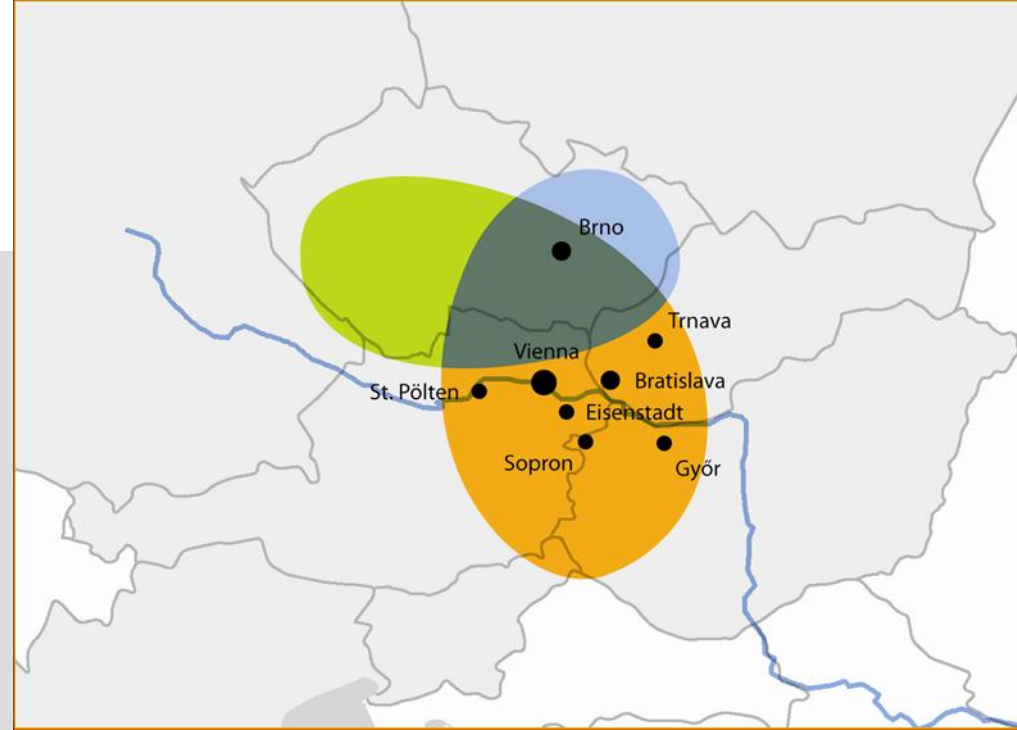


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South Moravian R&D profile

Content

- Regional overview
- Brno University of Technology
- Masaryk University
- Veterinary and Pharmaceutical University
- Academy of Sciences Czech Republic
- Big regional R&D projects

Regional Overview

- 1,1 mil. citizens (Brno – 400.000)
- 270 technological companies
 - e.g. IBM, Honeywell, FEI, Tescan etc.
- R&D environment:
 - 6 (14) universities
 - 80.000 students
 - >5.000 scientists
- 4 competitive clusters
 - *ICT*
 - *Electrotechnics*
 - *Precise engineering*
 - *Life-Sciences*

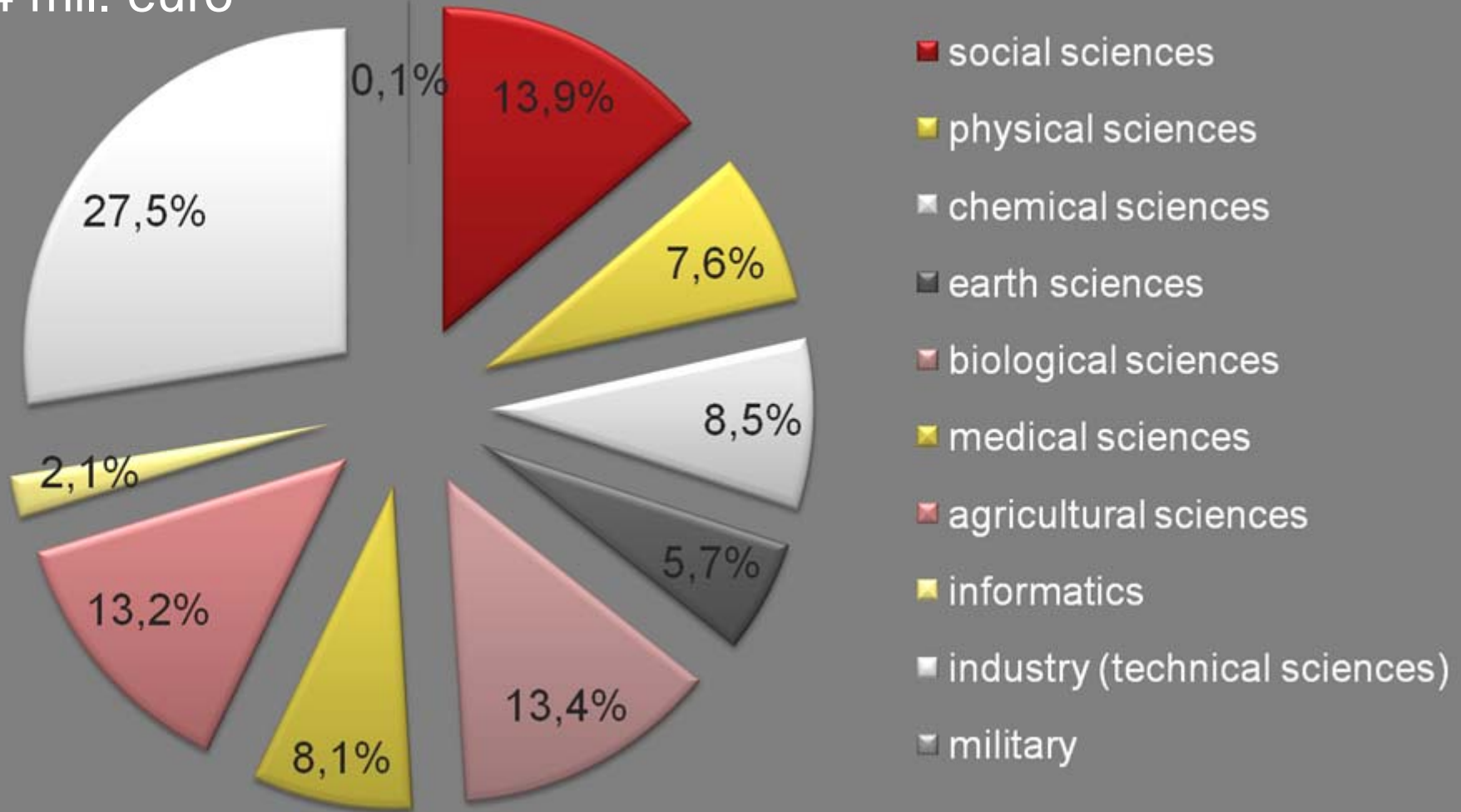


Regional Overview

- The most prospective scientific branches in SMR
 - **Molecular biology**
 - Materials
 - Scientific instruments
 - Informatics
 - Mechanical engineering
 - Electrotechnics
- 4 competitive clusters
 - *ICT*
 - *Electrotechnics*
 - *Precise engineering*
 - *Life-Sciences*

Public support on universities in SMR

Total: 54 mil. euro



Brno University of Technology

■ Faculty of Mechanical Engineering

- Energy Institute
- Heat Transfer and Fluid Flow Laboratory
- Institute of Aerospace Engineering
- Institute of Machine and Industrial Design
- Institute of Materials Science and Engineering
- Institute of Process and Environmental Engineering

■ Faculty of Chemistry

- Institute of Physical and Applied Chemistry
- Institute of Materials Chemistry

■ Faculty of Information Technology

- Department of Computer Graphics and Multimedia

■ Faculty of Electrical Engineering and Communication

- Department of Biomedical Engineering
- Department of Radio Electronics
- Department of Microelectronics



Masaryk University

■ Faculty of Informatics

- Institute of Computer Science (Supercomputing Centre)
- Centre for Biomedical Image Analysis (Department of Computer Graphics and Design)
- Department of Computer Systems and Communications

■ Faculty of Science

- RECETOX - Research Centre for Toxic Compounds in the Environment
- Department of Experimental Biology
 - ◆ Functional Genomics and Proteomics Research Group
 - ◆ Protein Engineering Group

- Department of Physical Electronics
- National Centre for Biomolecular Research
- Department of Theoretical Physics and Astrophysics
- Department of Chemistry

■ Faculty of Medicine

- Institute of Biostatistics and Analyses
- NCBR – Laboratory of Recombination and DNA Repair (LORD)
- First Department of Neurology
- Department of Biology

Veterinary and Pharmaceutical University

- Cardiovascular animal research centre (ICRC) – development of biological alternates of human organs
- Molecular Veterinary Medicine (CEITEC)
- Section of Patobiology
- Department of Animal Genetics



Academy of Sciences CR – Institutes in Brno

- Institute of Biophysics
- Institute of Analytical Chemistry
- Institute of Physics of Materials
- Institute of Scientific Instruments

Institute of Biophysics

- **Biophysical Chemistry and Molecular Oncology**
- Structure and Dynamics of Nucleic Acids
- **Molecular Biophysics and Pharmacology**
- CD Spectroscopy of Nucleic Acids
- Molecular Epigenetics
- **Molecular Cytology and Cytometry**
- Plant Developmental Genetics
- **Cytokinetics**
- **Free Radical Pathophysiology**

Institute of Physics of Materials

Brittle Fracture Group

■ Research topics:

- Experimental fracture mechanics and brittle fracture of steels
- Fracture of advanced materials

■ projects:

- Microstructural design of high toughness materials
- Multiscale Design of Advanced Materials
- Mechanical and fracture properties of multilayered ceramic/ceramic and ceramic/metal materials with graded layers

Institute of Physics of Materials

Electrical and Magnetic Properties Group

■ Projects:

- Research center of powdered nanomaterials
- Structure, electrical and magnetic properties of nanocrystalline materials composed of carbon and 3d transition metals
- Atomic ordering at surfaces and interfaces of alloys of 3d metals

■ Research topics

- **theoretical studies** of electronic and magnetic properties of disordered alloys, epitaxial multilayers, surfaces and interfaces as well as quantum-mechanical studies of extended defects in metallic materials
- **experimental investigations** of relations among structure and magnetic, transport and mechanical properties in metallic materials

Institute of Analytical Chemistry

Department of Bioanalytical Instrumentation

■ Research focus of the department:

- Capillary separations
- Mass spectrometry coupling
- Miniaturization
- Single cell analysis

■ (selected) projects of the department:

- Nanotechnologies for protein and gene diagnostics
- Integrated bioanalytical technologies for microanalyses and diagnostics with laser induced fluorescence and mass spectrometry coupling
- Nanotechnology in functional diagnostics of apoptotic and tumor cells

Institute of Scientific Instruments

Coherent Lasers and Interferometry II

- Research topics:
 - Laser length standards
 - Laser interferometers and refractometers
 - Absorption gas cells for laser spectroscopy

Institute of Scientific Instruments

Detection Systems Research Group

- Research topics:
 - Cathodoluminescence
 - Scintillators
 - The Monte Carlo Simulation
 - Optimisation of detectors
 - DQE of electron detectors
 - Environmental microscopy
 - Detection of signal electrons

Institute of Scientific Instruments

Measurement and Data Processing in Medicine

■ Research topics:

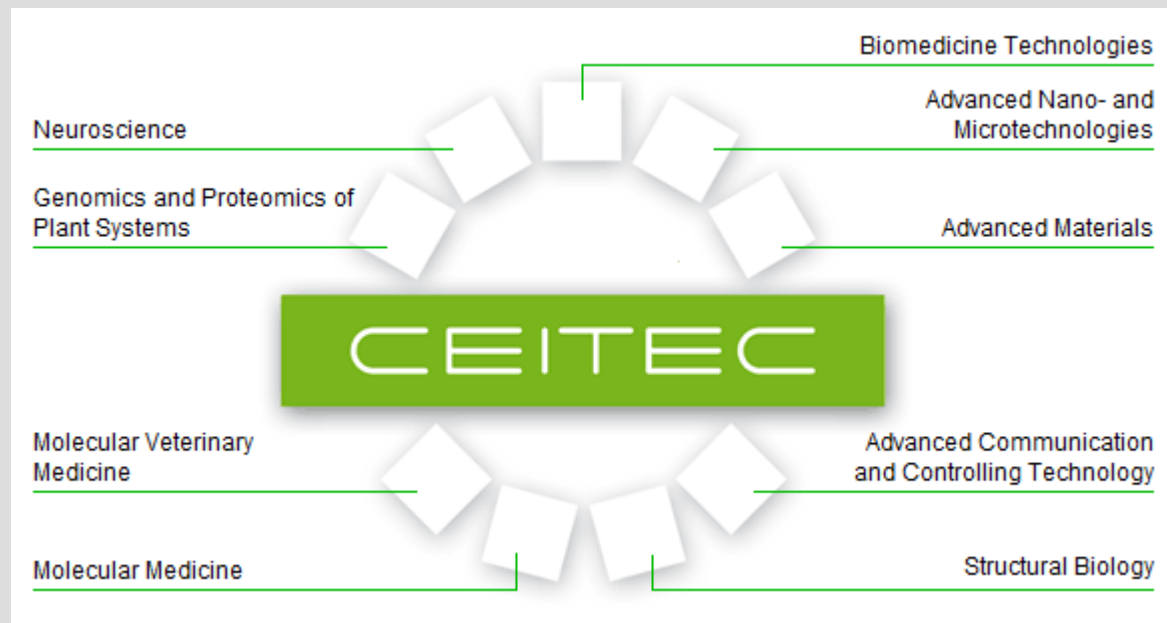
- Cardiovascular diagnostics
- EEG, epilepsy and Parkinson's disease
- Construction of devices
- Digital receiver
- Measurement and analysis of dynamic errors of AD converters

Big regional R&D projects

- CEITEC – Central European Institute of Technology
- ICRC – International Clinical Research Centre
- NETME Centre - New Technologies for Mechanical Engineering
- ALISI - Application Laboratories of Microtechnologies and Nanotechnologies

CEITEC – Central European Intitute of Technology

- 230 mil. euro
- synergies between life and traditional sciences
- CEITEC will become a by-word for innovative research in the field of **Quality of Life and Human Health**



ICRC – International Clinical Research Centre

■ 73 mil. euro

Research Programmes:

- Clinical Research – cardiovascular dis., pancreas dis.
- Preclinical research and development of new technologies
 - artificial heart,
 - biological alternates of human organs,
 - technology for semi-invasive treatment of epilepsy, cerebral tumors and acute stroke using endovascular intervention
- Projects to prevent civilization diseases



NETME Centre - New Technologies for Mechanical Engineering

- Regional and development centre
- 25 mil. euro



- Division of Energy, Process, and Ecology (PPE)
- Division aircraft and automobile technology (AAT)
- Division of Mechatronics (M)
- Division of virtual design and testing (VMDT)
- Division of advanced metallic materials (AMM)

ALISI - Application Laboratories of Microtechnologies and Nanotechnologies

- regional R&D center developing diagnostic methods and technologies focused on microworld and nanoworld
- 20 mil. euro



Research activities:

- the employment of **electron beams** for imaging, diagnostics, lithography, and welding;
- the design of **new pulse sequences for magnetic resonance tomography** and their utilization in the detection of chemical changes in living organisms, including humans;
- the **measurement of thermal radiative properties of materials** at low temperatures; designs of cryogenic systems;
- technologies of **thin films deposition**;
- acquisition and processing of **biosignals in medicine**;
- the utilization of laser beams for welding, spectroscopy, precise measurement of lengths and gas refractive index, **manipulation with microobjects and nanoobjects**.

Useful links

- <http://www.ceitec.cz/>
- <http://www.fnusa.cz/icrc.php>
- <http://alisi.isibrno.cz/>
- <http://www.netme.cz/>
- www.muni.cz
- www.vutbr.cz
- www.vfu.cz
- <http://www.ibp.cz/>
- <http://www.iach.cz/departments/ins/>
- <http://www.ipm.cz/index.html>
- www.isibrno.cz