

Transparencies on KIT:

Contents and Explanations

Status: March 2021

This set of transparencies can be used by all employees of KIT to present KIT - The Research University in the Helmholtz Association at a meeting, conference, or similar event. Please do not transmit these transparencies to third parties or external persons. But, of course, the transparencies can be published as a pdf file in proceedings, provided that the date and source (see KIT Legals) are indicated correctly. The presentation is deliberately structured in a modular manner. It can be used as a whole, but it is also possible to present selected transparencies and to emphasize certain contents for subsequent transition to your own area of research. In this way, target group-specific communication is guaranteed.

Below, you will find some background information on the transparencies:

Transparencies 1-2: Title Page – Two alternatives to convey the same message: KIT – The Research University in the Helmholtz Association (using the tag cloud and the photos, special features and characteristics of KIT can be pointed out). **Folie 3: Zahlen und Fakten** – diese werden in regelmäßigen Abständen aktualisiert, sodass diese stets mit den offiziellen Zahlen und dem Internetauftritt des KIT übereinstimmen. Bitte achten Sie darauf, Ihre Präsentation ebenfalls regelmäßig zu aktualisieren.

Transparency 3: Figures and Facts – These data are updated regularly. They always agree with the official figures and data given on the homepage of KIT. Please update your presentation accordingly.

Transparency 4: KIT Branches and Helmholtz Offices

Transparency 5: KIT excellent again!

Transparency 6: Science Organization of KIT – This transparency is updated as needed. Please update your presentation accordingly for the information given on your transparencies being in agreement with the real structure of KIT.

Transparency 7: KIT Research Profile

Transparency 8: Topics Sharpening the Profile of KIT

The current research portfolio of KIT has developed mainly from the research profiles of its predecessor institutions. KIT Departments embody the research disciplines, while Helmholtz Programmes and KIT Centers stand for the topics covered. On this basis, KIT is predestined for assuming a leading national and highly visible international position in the three areas of demand of society of energy, mobility, and information.

Transparency 9: Research at the interfaces of energy, mobility, and information is of high importance.

Transparency 10-12: Issues covered by the three topics sharpening the profile of KIT: Energy, mobility, information.

Transparency 13: Big Research Infrastructures

Transparency 14-15: KIT Shares in Helmholtz Research

Transparency 14 – Mission of the Helmholtz Association:

- The Helmholtz Association contributes to solving grand challenges facing society, science, and industry. Top-rate research in strategic programs in the fields of energy, earth and environment, health, aeronautics, space and transport, matter, and key technologies [...].
- Germany's largest scientific organization: 34,500 employees at 18 research centers with an annual budget of EUR 4.5 billion [year: 2020].

Transparency 15 – KIT in the Helmholtz Association

- First-class research contributions to solving grand challenges facing society, science, and industry.
- Research and development activities are embedded in the superordinate program structures of the six research fields of the Helmholtz Association.
- Third phase of program-oriented funding (2015-2019): KIT participates in 13 research programs in four of the six research fields.

Transparency 16: Promoting Young Talent at KIT

Set of Transparencies

Transparency 18: International Dimension – These data are updated regularly. They always agree with the official figures and data given on the homepage of KIT. Please update your presentation accordingly.

Transparency 19: Strong in International Competition – This transparency is updated regularly. Please update your presentation accordingly.

Transparency 20: KIT in the TU9 Association

Transparency 21: Organizational Structure

This transparency is updated as needed. Please update your presentation accordingly for the information given on your transparencies being in agreement with the real structure of KIT.

Transparencies 22-24: KIT Departments, Helmholtz Programmes, and KIT Centers

The KIT Departments are responsible for university education, whereas program-oriented research is organized in Helmholtz Programmes. Eight KIT Centers coordinate research and innovation activities across divisions and support interdisciplinary cooperation at KIT.

Transparencies 25-26: Resume – Two alternatives having the identical message: KIT – The Research University in the Helmholtz Association (tag cloud or photos can be used to again highlight the special features of KIT).

Transparencies 28-32: KIT Divisions

KIT is organized in five divisions: Division I: Biology, Chemistry, and Process Engineering; Division II: Informatics, Economics, and Society; Division III: Mechanical and Electrical Engineering; Division IV: Natural and Built Environment; Division V: Physics and Mathematics. These divisions pool the research, teaching, and innovation activities of their respective institutes. Every division is headed by a division head, who is supported by a division council. Higher education is organized in KIT departments assigned to the Vice President for Higher Education and Academic Affairs. Program-oriented research is organized in Helmholtz Programmes assigned to the respective division heads.

Transparencies 34-45: Big Research Infrastructures

Acoustic Four-wheel Roller Dynamometer

- Holistic analysis of vehicles under precisely defined and reproducible conditions.
- “Road in the lab:” Test of novel prototypes in a shielded and secure environment.
- Crown roller dynamometer with a roller diameter of 2000 mm and a roller width of 1350 mm.
- Synchronous engines with a nominal power of 300 kW each.
- Accessible assembly pit.
- Applications: Holistic and precise evaluation of energy consumption of vehicles, performance measurements, acoustic studies.
- Use for a wide range of vehicles: From small vehicles to SUVs, to trucks, to buses, to earth-moving machines, to agricultural vehicles.

Bioliq

- bioliq® pilot project established in 2005.
- Funded by the Federal Ministry of Food and Agriculture (BMEL).
- The plant consists of four process stages.
- First combined operation of all stages in 2014 for the production of gasoline from wheat straw.
- Currently, optimization and further development as well as commercialization of technologies.
- Special features:
 - Exclusive use of residual biomass that does not compete with agriculture and food production for cultivation areas.
 - Complete utilization of the biomass material and energy, biomass being the only renewable carrier of carbon.
 - Apart from gasoline production, a large range of chemicals and (everyday) products can be generated.
 - Major reduction of CO₂ emission, saving of transport costs.
 - Bioliq is part of the Energy Lab 2.0 and of the P2X projects.

Energy Lab 2.0

Main research topics:

- Intelligent energy system.
- Flexible electricity production from chemical energy carriers.
- Energy systems services based on decentralized components.
- Parallel energy-information network.
- Network topologies for a scenario with largely decentralized supply of electricity from renewable sources.

Key components: Smart Energy System Simulation and Control Center (SEnSSiCC).

Function: Network of plants of KIT and external research facilities.

European Zebrafish Resource Center - EZRC

- Opened in 2012.
- 8 employees.
- 12,000 zebrafish stems.
- Unique facility in Europe, the only combination of stem archive and screening center worldwide.
- Advantages:
- Zebrafish as a model organism for biomedical research: Investigation of disease and
 - development processes, reduction of the number of animal experiments with mice and rats.
 - Permanent archiving of zebrafish stems of European researchers, exchange of material with the International Zebrafish Resource Center (ZIRC) in the USA; multiple production of the same stem is no longer required, less experiments and less resources needed for research.
- Services:
 - High-throughput / high-content screening for the systematic investigation of candidate substances and gene mutations in zebrafish.
 - DNA sequencing service.
 - Plasmids (DNA constructs).
 - Online database.

High-performance Computer for Research

- Possibility of processing highly complex application problems of new orders of magnitude.
- Operated by: Steinbuch Centre for Computing (SCC) of KIT.
- New computing center building with innovative cooling technology on Campus North.
- Glass fiber connection.

GridKa

- German center for analyzing and archiving data from various particle physics and astroparticle physics experiments.
- Support of the experiments at the Large Hadron Collider (LHC, CERN), the Belle-II experiment in Japan and others
- One of only six tier-1 centers of the worldwide LHC computing grid (WLCG), which supplies computing power and storage capacity for all four LHC experiments.

KARA Synchrotron Radiation Facility

- 1998: Start of construction of the particle accelerator.
- 2003: Start of national and international user operation of the synchrotron radiation facility for scientific and industrial experiments focusing on soft X, terahertz, and infrared radiation.
- Annular electron storage ring has a diameter of 35 m and a circumference of 110 m.
- Electrons in the storage ring are accelerated to 2.5 GeV (nearly the speed of light).
- Synchrotron radiation produced by the acceleration and deflection of electrons (brilliant radiation of high intensity) is used in 19 beamlines for various analytical studies.
- The investigation methods (imaging and spectroscopic investigation methods) are applied for life sciences, energy research, materials sciences, actinide research, catalysis, micro- and nanotechnologies as well as for technology developments, such as lithography.
- 2015: Reorganization of the synchrotron radiation facility.

Use as:

- Test facility for accelerator research.
- Synchrotron radiation source for internal KIT research in the above areas.

KNMF

- Founded by KIT.
- Associated with Helmholtz Programme.
- Funded by the Helmholtz Association of German Research Centres (HGF) as a Helmholtz research infrastructure.
- Funding period 2015-2019: Annual budget about EUR 10 million.
- Operated as an open innovation user facility since October 2008.
- Open to industry and academia.
- Free access, if results are published.
- Paid access for proprietary usage (exclusive use without publication of results).
- 26 technologies: Micro- and nanostructuring, microscopy and spectroscopy, characterization (a set of physico-chemical characterization methods, e.g. topology, structure, chemical composition, and other properties).
- Close collaboration and solution-oriented approach.

KATRIN

- International collaboration: 130 scientists, engineers, technicians, and students from six countries (D, US, RUS, ES, F, CZ) and 18 institutions.
- 70 m long experiment KATRIN (Karlsruhe Tritium Neutrino Experiment) with a number of high-technology components.
- Scientific objective: Measuring the mass of neutrinos which are elementary particles of fundamental interest to particle physics and cosmology (s. Nobel Prize for Physics 2015 for research on neutrinos).
- Significantly improved experimental sensitivity.
- Technical commissioning in October 2016, first measurements with tritium planned for mid-2017.
- Total measurement duration: Five calendar years.
- Spectrometer: The largest ultra-high-vacuum tank worldwide.
- Ideal international and interdisciplinary high-technology environment for young students at KIT and worldwide to enhance their skills and knowledge.
- Start of Measurements in 2019.

River Engineering Laboratory

- The “Theodor Rehbock River Engineering Laboratory“ (TRL) in Karlsruhe was founded in 1901.
- Establishment of hydraulic engineering experiments in Karlsruhe and transfer from here to all over the world.
- Permanently installed laboratory channels on an area of 2500 m² for fundamental research and areas for the setup of temporary test models for contract research.
- Pump system with overhead tanks and a pumping capacity of up to 820 l/s.
- Automatic and computer-controlled measurement and control systems for the models.
- Main activities: Analysis and simulation of flow processes in flowing waters, planning and operation strategies of hydraulic engineering systems and concepts.

Vehicle Efficiency Laboratory

Advantages over conventional roller dynamometers:

- Direct flanging of load units to the wheel hubs of the vehicle: Changing properties of tires do not affect measurement results.
- Steerability of front wheels: Steering system is included in the energy balance of the vehicles studied.

Primary research objectives:

- Integrated and precise evaluation of the energy consumption of vehicles with conventional or alternative drives under conditions of straight and curve driving.
- Development and optimization of energy management systems for entire vehicles or individual components.
- Development of future test methods for evaluating energy efficiency of vehicles with alternative drives.

Properties:

- Drives, brakes, steering can be represented.
- Simulation of tires with clearly defined characteristics.
- Simulation of road properties, route, traffic situation in real time; real or virtual driver.
- Large spectrum of vehicles can be tested (from small vehicles to small trucks).
- Innovative wheel recording (unique).

AIDA

- Opened in 1997 as atmosphere simulation chamber for aerosol processes in the environment and climate system.
- 1999 – 2002: Extension to aerosol and cloud chamber.
- Special features:
 - Simulation of atmospheric conditions from the ground up to altitudes of 50 km (troposphere and stratosphere).
 - Exact and very homogeneous temperature control down to -90°C .
 - Controlled generation of droplet and ice clouds by adiabatic expansion control; extensive instrumentation for trace gases, aerosols, and clouds.
 - Widely known on the international level: “Gold standard” for ice nucleation research.
 - Used by a number of national and international research groups in cooperative measurement campaigns with up to 20 external participants.
 - Planned in the next years: Extension to “World Calibration Center for Cloud Physics”.
- Major research objectives:
 - Ice nucleation in tropospheric clouds and its impact on precipitation formation.
 - Climate-relevant optical properties of aerosols and ice particles in cirrus clouds.
 - Chemical aerosol processes and their influence on air quality, clouds, and climate.

Transparencies 47-48: KIT in the Helmholtz Association

Transparency 47

Research Field Energy

- KIT participates in four Helmholtz Programmes.
- KIT competencies: Complete energy chain from (renewable) energy to conversion to distribution to integration into society.
- Additional part of the portfolio: Nuclear safety and fusion research.

Research Field Earth and Environment

- KIT is involved in the Helmholtz Programme „Changing Earth“. The objective is to better understand the role of the atmosphere in the climate system.
- Extensive knowledge and experience of KIT experts in atmosphere research, remote sensing, and biosphere-atmosphere-hydrosphere exchange processes as well as in environmental risks and water research.

Research Field Matter

- KIT participates in three Helmholtz Programmes.
- Concentration on elementary particle physics, including the tier-1 center GridKa, astroparticle physics with neutrino physics, and search for dark matter as well as on investigation of cosmic rays, KARA synchrotron radiation source, and development of detector and accelerator technologies.

Research Field Information

- KIT participates in three Helmholtz Programmes.
- KIT competencies in biotechnology and nanotechnology, micro- and nanoelectronics, optics and photonics, microsystems technology and materials technology as well as in information technology.

Transparencies 49-58: Umbrella Strategy KIT 2025

Transparency 50: Mission – It is identical with the wording of the KIT 2025 Umbrella Strategy.

Transparencies 51-58: KIT 2025

The KIT 2025 Umbrella Strategy maps out the path of KIT for the years to come. KIT wants to fully exploit its synergy potential. In the next years, the tasks of national large-scale research and of a state university will be brought further together step by step. This set of transparencies contains one transparency per area of action, with the major “goals” being indicated.