Karlsruhe Institute of Technology

Welcome to GridKa School 2019

Achim Streit

Steinbuch Centre for Computing

Karlsruhe Institute of Technology

KIT – The Research University in the Helmholtz Association

Presidential Committee

KIT Facts & Figures

5 Campuses – **200** ha area

21 Spinoffs and startups

366 Professors and executive scientists

396 Trainees

300 Buildings with a usable area of **495,000** m²

25,100 Students

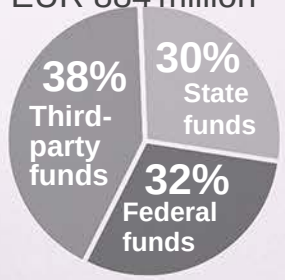
3,200 Doctoral students

63 Patent applications

9,277 Employees

1,074 International scientists

KIT budget
(preliminary)
EUR 884 million



Status: May 2019

KIT Research Profiles

Karlsruhe Institute of Technology

Five Discipline-focused **Divisions**

Division I	Division II	Division III	Division IV	Division V
Biology, Chemistry, and Process Engineering	Informatics, Economics, and Society	Mechanical and Electrical Engineering	Natural and Built Environment	Physics and Mathematics

Seven Interdisciplinary **KIT Centers**

Energy

Mobility Systems

Materials

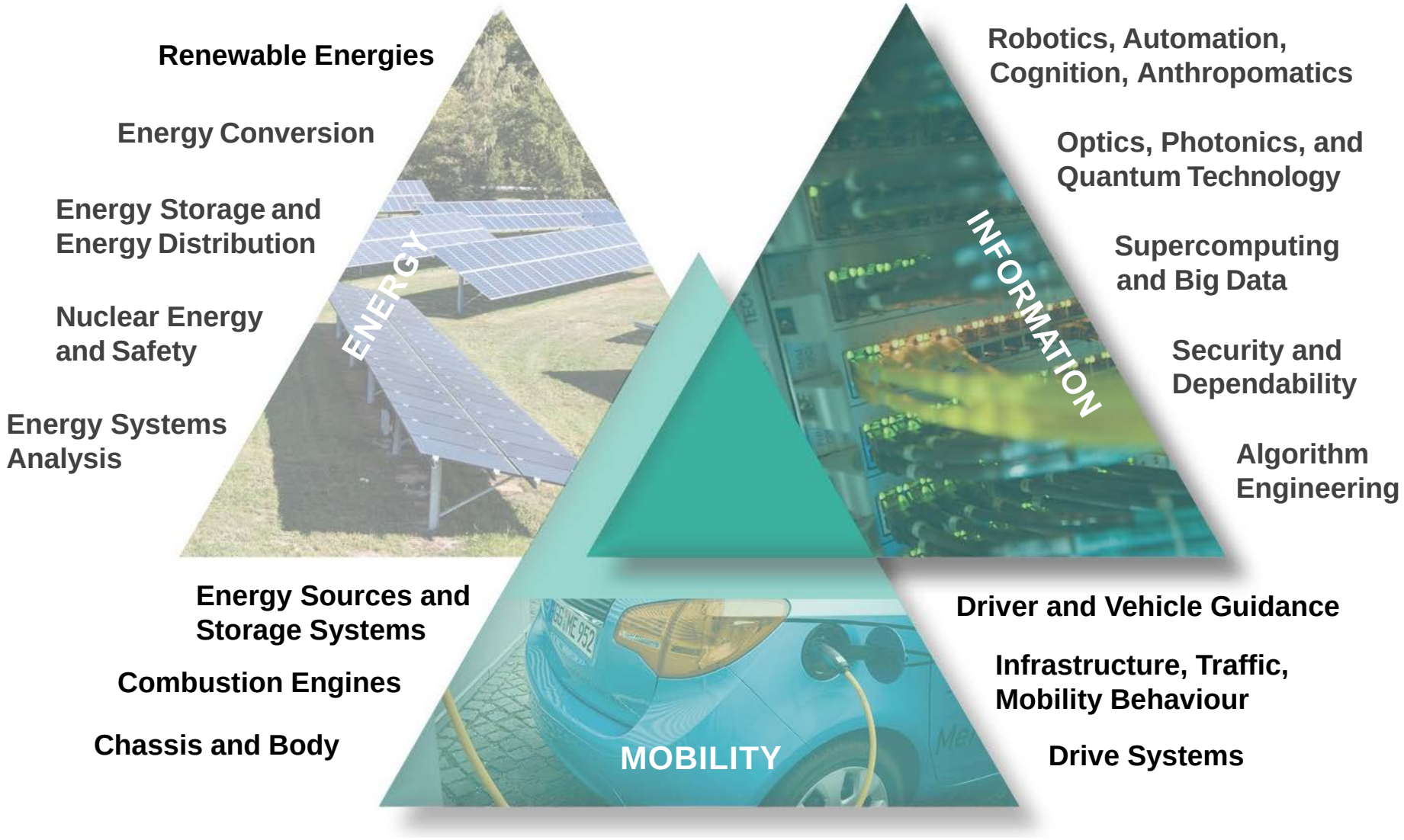
Humans and Technology

Climate and Environment

Elementary Particle and Astro-particle Physics

Information Systems Technologies

Topics Sharpening the Profile of KIT

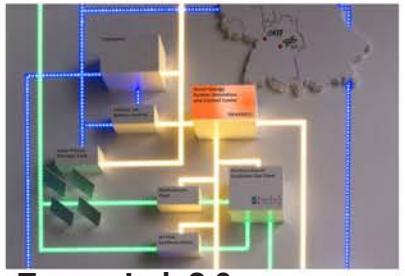


Big Research Infrastructures at KIT

Acoustic Four-wheel Roller Dynamometer

KARA Synchrotron Radiation Facility

Biomass to Liquid (bioliq®)



EnergyLab 2.0

European Zebrafish Resource Center

High-perfomance Computer for Research

Grid Computing Centre Karlsruhe (GridKa)

Karlsruhe Nano Micro Facility (KNMF)

Karlsruhe Tritium Neutrino Experiment

Theodor Rehbock River Engineering Laboratory

Vehicle Efficiency Laboratory

AIDA Cloud Chamber

Showcases of Research:
KIT Centers Interconnect Disciplines

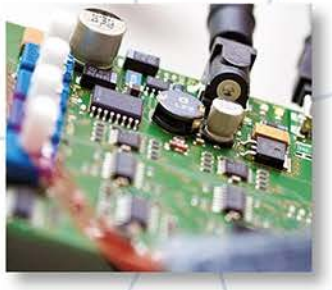
Information · Systems· Technologies

Energy

Elementary and
Astroparticle Physics

Mobility Systems

Materials in Technical
and Life Sciences



Climate and
Environment

Humans and Technology

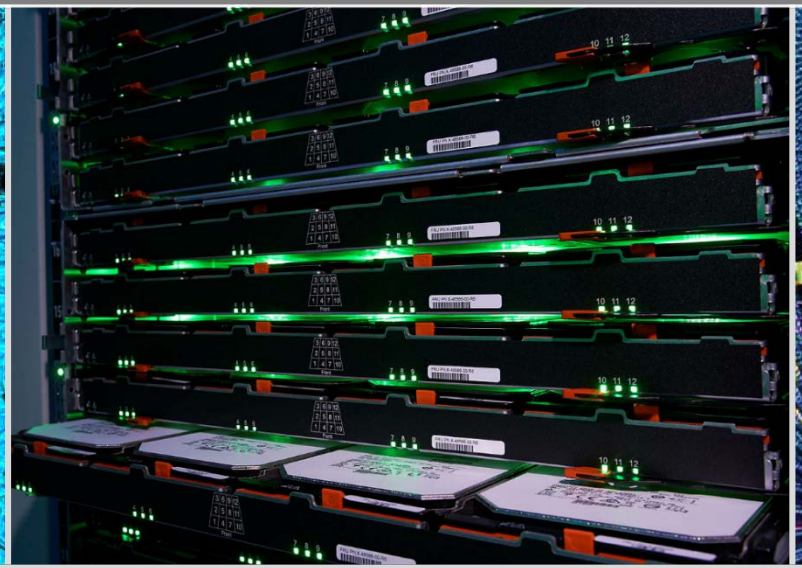
Mathematics in Sciences, Engineering, and Economics

Karlsruhe Institute of Technology

Steinbuch Centre for Computing (SCC)

Achim Streit

Steinbuch Centre for Computing



Steinbuch Centre for Computing

Who are we?

Central scientific unit in KIT

Which demands do we satisfy?

- Computational Science and Engineering (CSE)
- Data-Intensive Science
- For users in KIT, Baden-Württemberg, Germany and worldwide

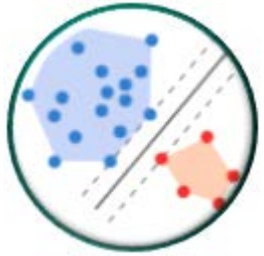
What do we do?

- R&D in scientific computing and data analytics, management of large-scale scientific data, data-intensive computing and secure IT-federations
- Provision of basic IT services
- Development and provision of IT application systems, management of application software
- Operation of large scale research facilities for data-intensive computing

SCC IT-Services

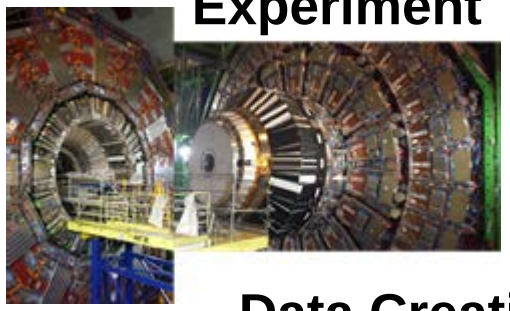
- **Campus-wide IT-services** for > 25.000 students and > 10.000 employees
- **Networks:** 1700 switches/router, 1900 WLAN APs
- **Server virtualisation:** 1000 virtual servers
- **HW server:** ca. 400 servers in 80 racks
- **Backup/archive:** 3000 Clients, 6 Libraries, 30.000 Slots
- **E-Mail:** 45.000 mail boxes, 450.000 incoming mails/d, 200.000 outgoing mails/d
- **Databases:** ca. 1250 MS-SQL/Oracle DB
- **Web:** 600.000 web pages, 800 virt. web servers
- **Computer rooms:** 400 PCs, 250 courses
- **Portal for students/e-learning:** 8.000 users/d, 26.000 users/a, 8.300 active courses

Enabling Data-Intensive Computing



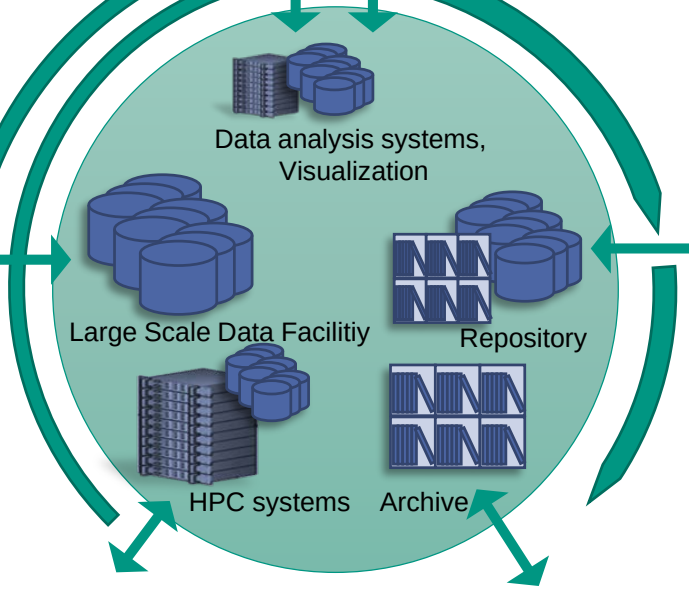
Data Analysis

Visualization



Experiment

Data Creation



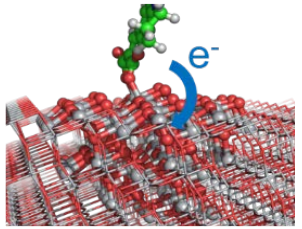
Publications

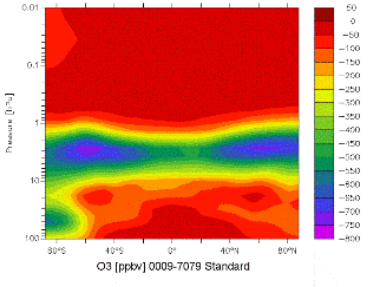
Simulation

Archive

Supercomputing

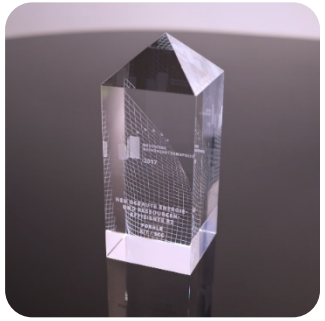
- Operation of **HPC systems**
  - **ForHLR:** Tier-2 system in Germany,
    34.000 cores with > 1,4 PetaFlop/s peak,
    peer-review access for users in Germany
  - **bwUniCluster:** Tier-3 system in the state BaWü,
    HPC capacity system with 18.300 cores,
    shareholder ownership with all 9 state universities
- **Joint R&D** with scientific communities & KIT institutes
  - Application optimisation, scaling, model enhancements
  - Simulation Labs in HGF Programme SBD
- **HYIGs** MBS + FiNE
- **Innovation drivers** for SMEs
- **Architect** for HPC environment in BaWü





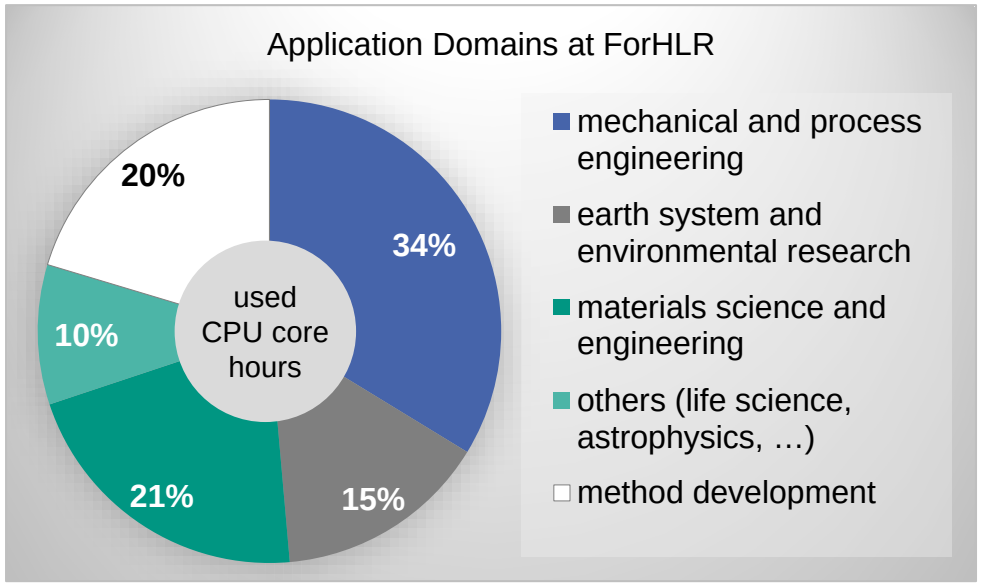
ForHLR: Forschungshochleistungsrechner Karlsruhe

- Third-party funded mid-range national (Tier-2) supercomputer
- 34,800 compute cores
- 1.4 PetaFlop/s peak
- Peer-review access
- Self-designed cooling concept



1st prize German Data Center Award 2017

Newly built energy and resource efficient data centers



Big Data

- Operation of **GridKa**
  - German Tier-1 in WLCG
    for an international community
- Operation of the **Large-Scale Data Facility**
  - Multi-disciplinary data centre for climate research, systems biology, energy research, etc. in BaWü
- **Joint R&D** with scientific communities
  - Generic data management research
  - Data Life Cycle Labs in Helmholtz Programme SBD
- **Innovation driver** for SMEs
- **Active role** in large projects & initiatives

SCC Projects Landscape – Issuing the European federated data infrastructure

Governance
Policies
Skills/Training

Data / Security
Policies
Architecture

Services
Software
Integration

IT services
infrastructure
and Support

inception | development | piloting | production

GridKa

- **German Tier-1 High Energy Physics and Astroparticle Data & Analysis Centre**
  - Supports all four LHC experiments
  - Belle II, Pierre-Auger, several small communities
- **Close interaction** with user communities through experiment representatives
- **Joint R&D** with computer science towards HL-LHC
- **Resources**
  - Computing: ~ 29k physical cores
  - Disk: 37 PB (netto, used), Tape: 54 PB (used)
  - 100 Gbit/s connectivity to LHCOPN, LHCONE
- Among the largest and best performing T1s
- Annual international **GridKa School**
  - > 1800 participants since 2003