

# The Helmholtz Zentrum Dresden-Rossendorf

- Who are we?
- Where are we?
- What do we do?
- What can you do?

**Andreas Wagner**  
Head, Nuclear Physics Division  
Institute of Radiation Physics



# German Research Organizations

(actual costs 2014)

	Budget/ Billion€	Staff in FTE*	Centres/ Institutes
<b>Helmholtz Association</b> Use-inspired basic research with strategic programs	<b>3.95**</b>	<b>33,737</b>	<b>18</b>
<b>Max Planck Society</b> Pure basic research	<b>1.8</b>	<b>13,632</b>	<b>82</b>
<b>Fraunhofer Society</b> Industry-oriented research and development	<b>2.0</b>	<b>17,119</b>	<b>66</b>
<b>Leibniz Association</b> Long-term research topics	<b>1.43</b>	<b>14,229</b>	<b>86</b>

Source: GWK Monitoring Report 2015 Joint Initiative for Innovation and Research

\*Staff in working hours (full-time equivalent)

\*\*excluding project sponsorships, project management agencies and other revenues

# HZDR Research Programs

## ENERGY

- Energy Efficiency, Materials and Resources
- Storage and Linked Infrastructures
- Nuclear Waste Management, Safety and Radiation Research

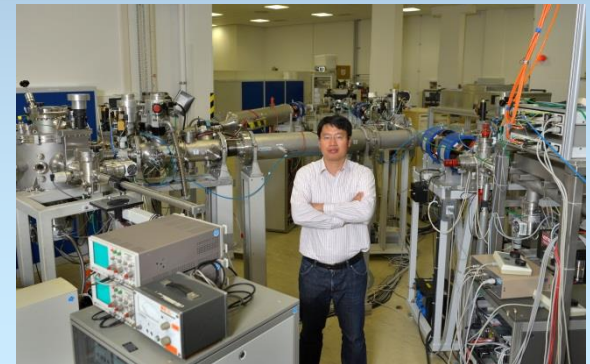
## HEALTH

- Cancer Research

## MATTER

- From Matter to Materials and Life
- Matter and Technologies

Images: 1. At the TOPFLOW Facility | 2. PET/MRI-Full-Body Scan Tomograph | 3. Ion Beam Center



Credits: Weisflog, Bierstedt, Rietschel

# Large Research Infrastructures

## ELBE – Centre for High-Power Radiation Sources

Electron accelerator ELBE, free-electron lasers FELBE, THz source TELBE, high-intensity laser DRACO & PENELOPE: generating electrons, positrons, protons and neutrons as well as X-ray, infrared, terahertz and gamma radiation

## Dresden High Magnetic Field Laboratory (HLD)

Producing Europe's highest pulsed magnetic fields for materials research

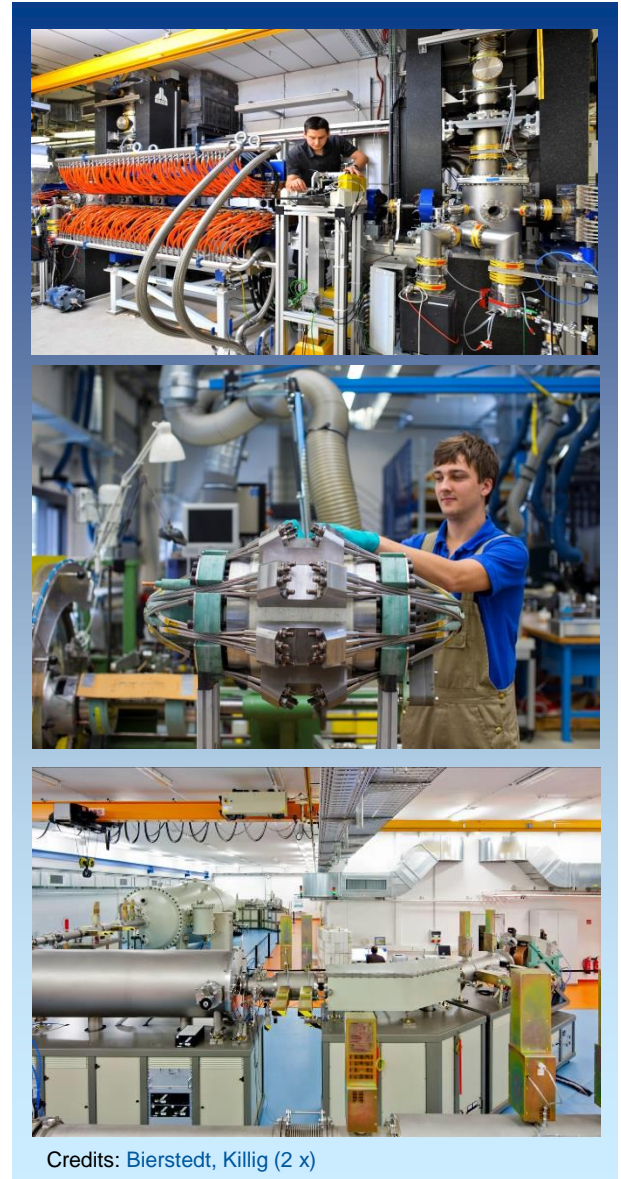
## Ion Beam Centre (IBC)

Nanoscale surface analysis and modification

## HIBEF at the European XFEL

High power lasers and XFEL to probe high density states of matter

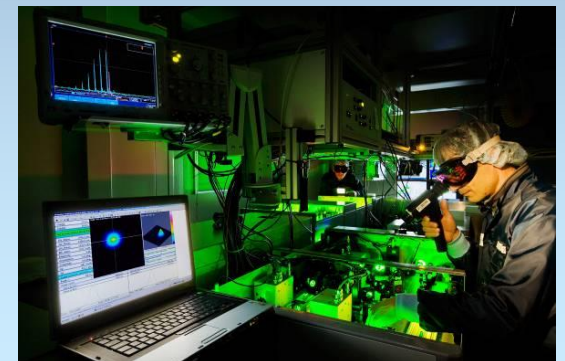
Images: 1. THz Source TELBE | 2. Magnet Coil at the HLD | 3. Accelerator (6 MV) at the Ion Beam Centre





# Institutes of the HZDR

- Institute of Fluid Dynamics
- Institute of Resource Ecology
- Helmholtz Institute Freiberg for Resource Technology
- Institute of Ion Beam Physics and Materials Research
- Dresden High-Magnetic Field Laboratory
- Institute of Radiation Physics
- Institute of Radiopharmaceutical Cancer Research
- Institute of Radiooncology

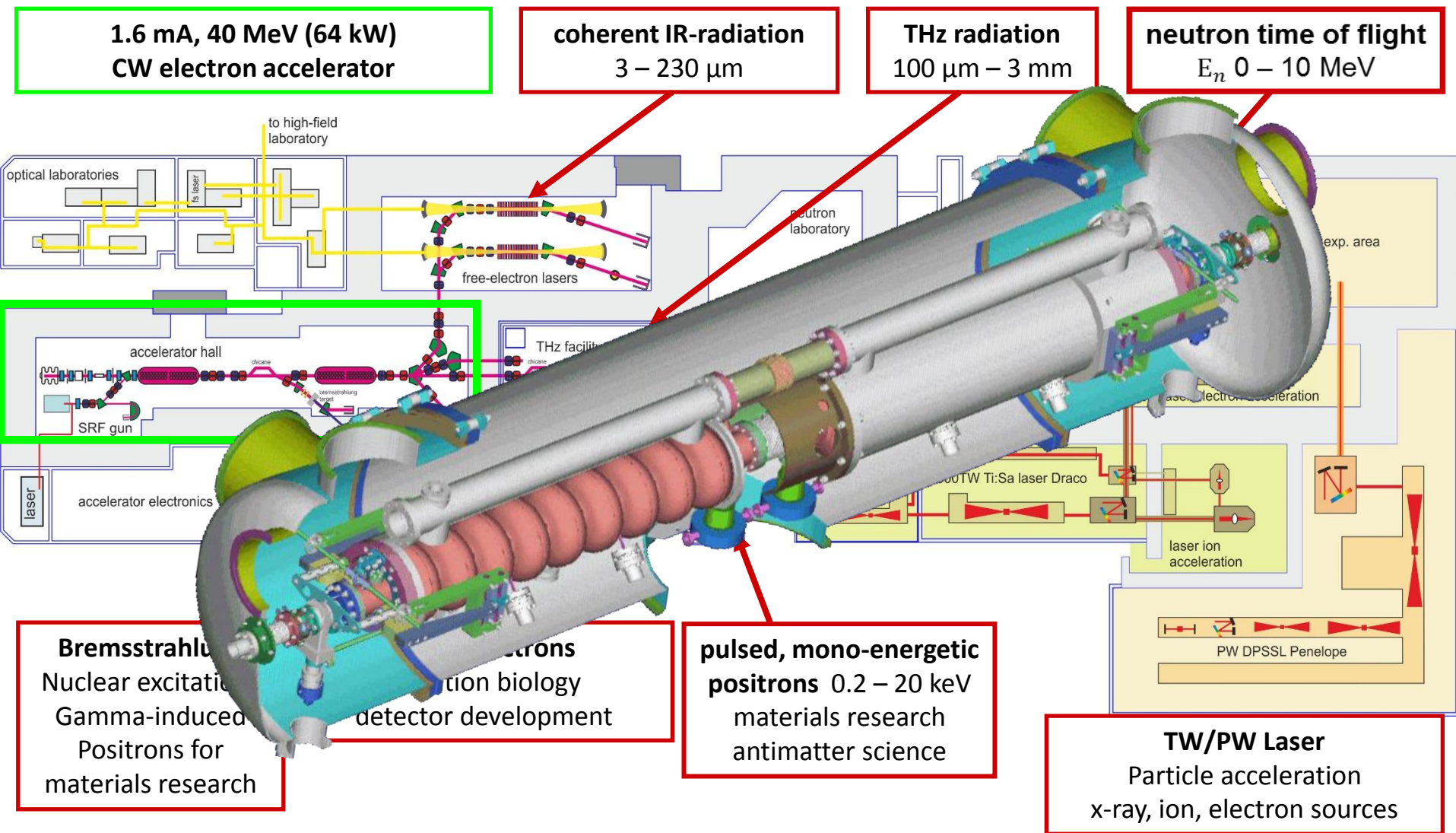


Credits: Morel, KfW/Tölle, Lösel

Images: 1. ROBL at the ESRF in Grenoble | 2. Capacitor Bank at the Dresden High Magnetic Field Laboratory | 3. Particle Acceleration at the DRACO Laser

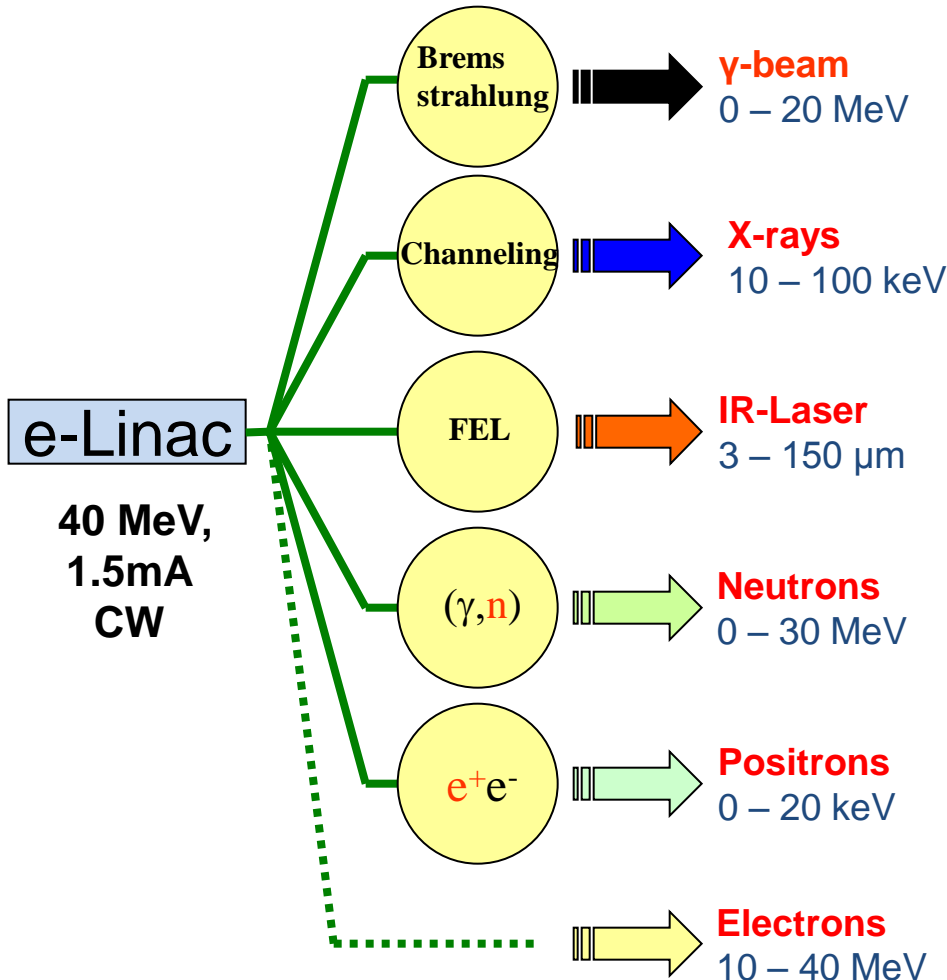
# The ELBE Centre

~ 110 m



# The machine

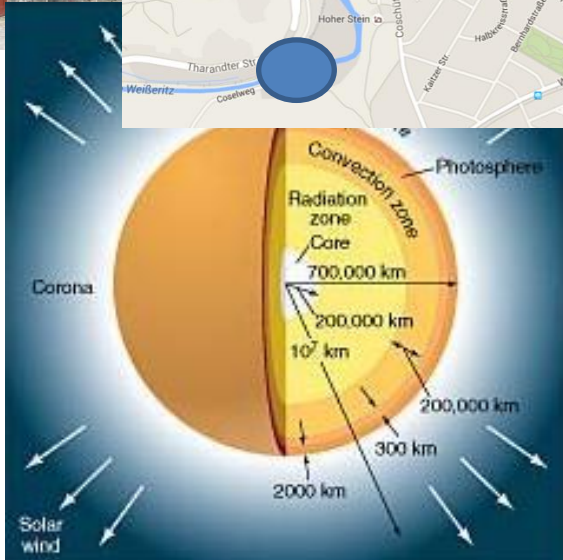
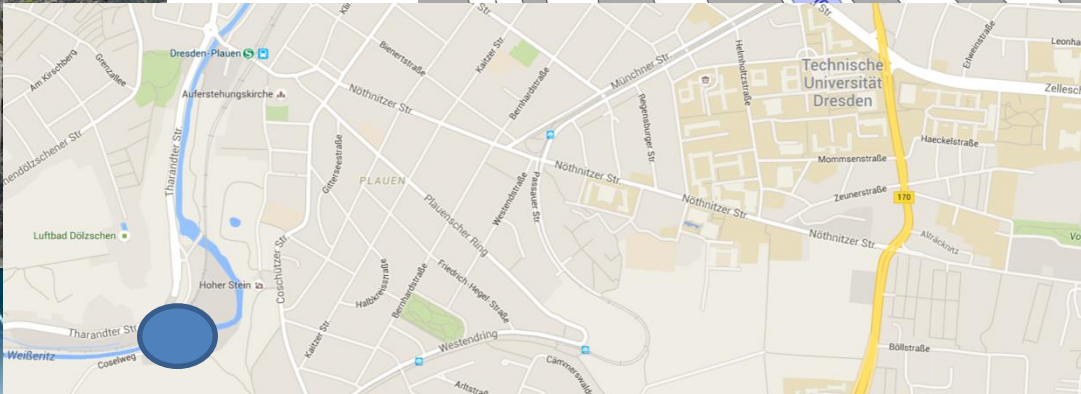
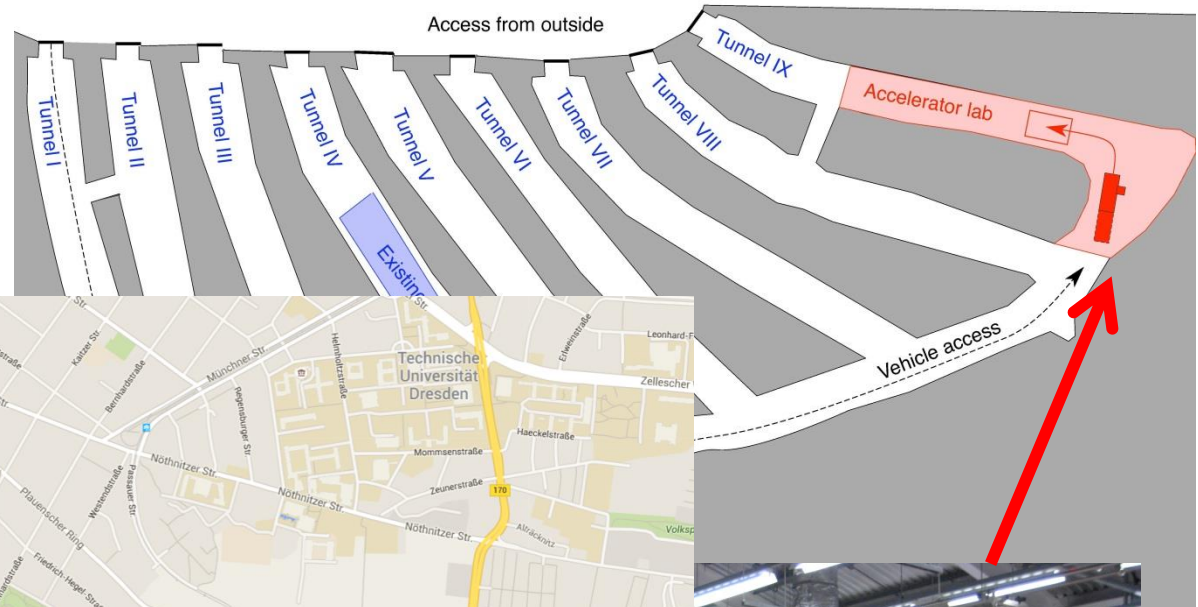
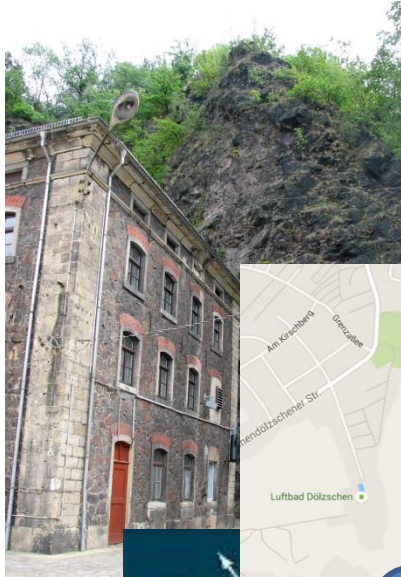
**ELBE: E**lectron **L**inear Accelerator with high **B**rilliance and low **E**mittance



- Nuclear physics – e-m strength in heavy nuclei
- Nuclear astrophysics – synthesis of elements
- Detector characterizations
- Materials research w/ positrons
- Radio-biology
- Materials research
  - Semiconductors, quantum dots, graphene
  - Superradiant THz radiation
- Basic nuclear data for fusion / fission
- Nuclear transmutation
- Dark matter detectors
- Materials research
  - Defect spectroscopy with positron annihilation
- Radiation biology
- Electron-laser interactions
- Detector characterizations



# Low-background experiments at the Felsenkeller

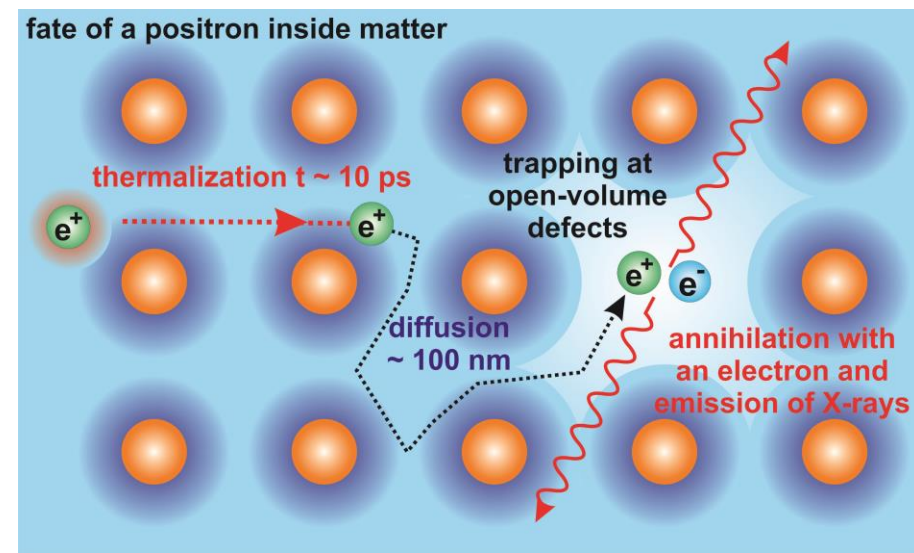


Study solar fusion reactions in a terrestrial laboratory.



# Internships

- Broad range of scientific areas
- State-of-the-art research
- Unique environment of large-scale facilities
- International teams
- Internships (studentische Hilfskraft)  
Scientific work (wissenschaftliches Arbeiten)  
Bachelor thesis  
Master thesis
- PhD thesis



Courtesy: R. Krause-Rehberg / M. Butterling

