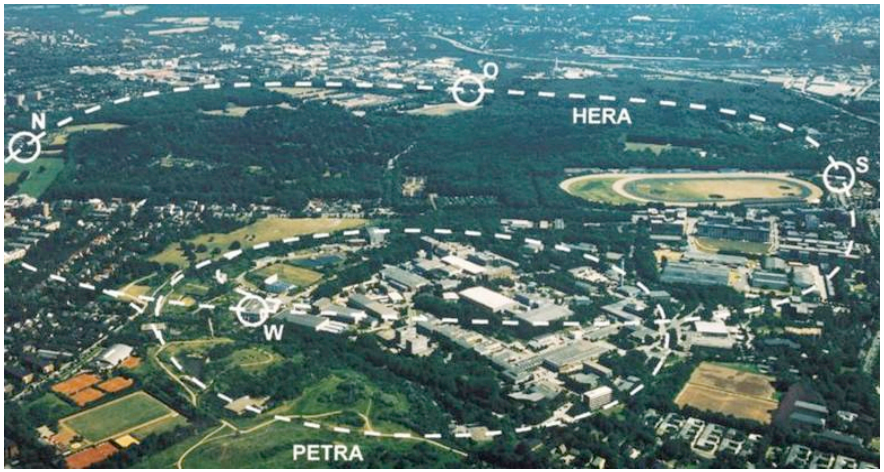
DESY.

Status and Perspectives of Photon Science



Albrecht Wagner
Chair of the DESY Directorate

Deutsches Elektronen-Synchrotron DESY

DESY is one of the worldwide leading accelerator centres exploring the structure of matter

DESY is Member of the HELMHOLTZ GEMEINSCHAFT

Mission: Development, construction, operation and scientific exploitation of accelerators

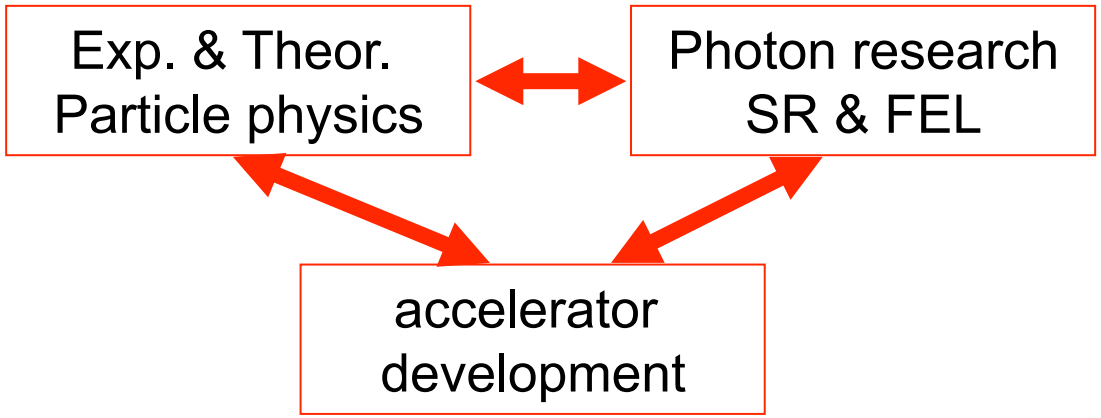
Provide access and services for national and international users

Internationally used, nationally funded Research Institute

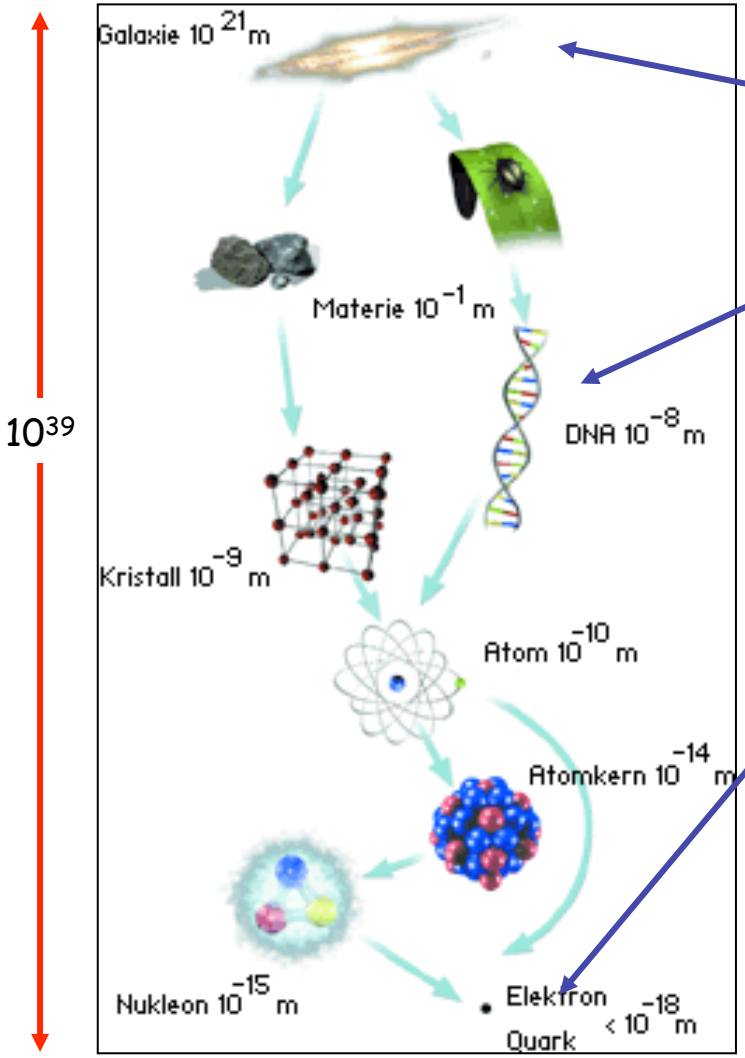
Base-Budget:	170 MEuro (2007)
Staff:	~ 1600 FTE in Hamburg and Zeuthen
Users:	3000 (1500 from abroad) from 45 nations
	920 in particle physics, 2100 in photon science

The three Key Competences of DESY

- DESY has a long successful history in three areas of basic science and high technology :
  - Particle physics (one of 5 major laboratories world wide),
  - Research with X-rays (synchrotron radiation, FEL) and
  - Accelerator development.
- These topics stimulate each other and constitute the basis for the future of the laboratory.



Focus of the Research



- Cosmology with particles from the universe (neutrinos)
- Investigation of the structure of matter and materials, from crystals to atoms
- Analysis of fundamental building blocks and forces of the universe and its development
- Theoretical research
- Core Tasks: Development, construction and operation of large research facilities

Accelerator Development

Areas of Competence

- Accelerator technology development (SCRF, electron sources, SC magnets)
- Operation of colliders (e+e-, ep)
- Operation of synchrotron light sources
- Development and operation of Linac driven Light sources (FLASH, XFEL)
- International Linear Collider development

Strategy:

- Further strengthening of know-how in accelerators, driven by science needs:

Exploiting the synergy between projects and technologies

Strategy for Research with Photons

Areas of Competence:

> SR sources, FELs, beam lines, instrumentation, photon science

Facilities:

> Synchrotron light sources: DORIS, PETRA III

> Linac driven light sources: VUV-FEL – FLASH,
Participation in European XFEL

Strategy:

> Make leading edge research possible in physics, chemistry, material science, biology etc. through unique light sources:

FLASH, PETRA and the XFEL are or will be unique facilities on a world scale

XFEL – how it began …

- 2001 – **TESLA Proposal** and Science Council Eval.
- Oct. 2002 – **X-ray FEL** with 20 GeV superconducting accelerator (TESLA-technology)
- Feb. 2003 - **Approval** by Federal Government as European project
- Nine countries signed **MoU for the Preparatory Phase** of the XFEL in January 2005

- July 2006 – **Technical Design Report**
- July 2006: **Plan Approval Process** completed

XFEL GmbH

Construction started in January 2009

DESYs Role in the XFEL

- **Central Element of DESY Strategy**: Participation in all phases of the XFEL (construction, operation, science und development)
- DESY **leads the international accelerator consortium** for the construction of the SC accelerator and its infrastructure, delivering the majority of components and technical systems as in-kind contributions
  - Up to 300 FTEs from DESY will work on the XFEL
- DESY is ready to **operate** the **accelerator system** on behalf of the XFEL GmbH
- DESY will **develop** the XFEL further, together with the XFEL GmbH
- A Centre for FEL science has been established together with MPG und Uni HH to become a **main user** of the XFEL

Particle Physics

Areas of Competence:

- 50 years of experience in accelerators, detectors, experimental and theoretical physics, data collection and analysis, computing

Strategy:

- Continue to play a leading roles in particle physics (LHC and ILC science and technology), thus remaining a leading and attractive particle physics lab
- Focus on Physics at the energy frontier (Terascale)

Summary

Particle- and Astropart.-physics	Accelerators Develop./Operation	Research with Photons

The scientific focus of the research at DESY is the understanding of the structure of matter at different length and time scales

In its three areas of key competence DESY is a world leading institution

Science driven technology developments have led to a major new research possibilities for photon science and particle physics, such as FLASH, XFEL and ILC