DESY

Zeuthen Site

Hamburg Site

Detector development at DESY

Ties Behnke

Karlsruhe Portfolio kickoff

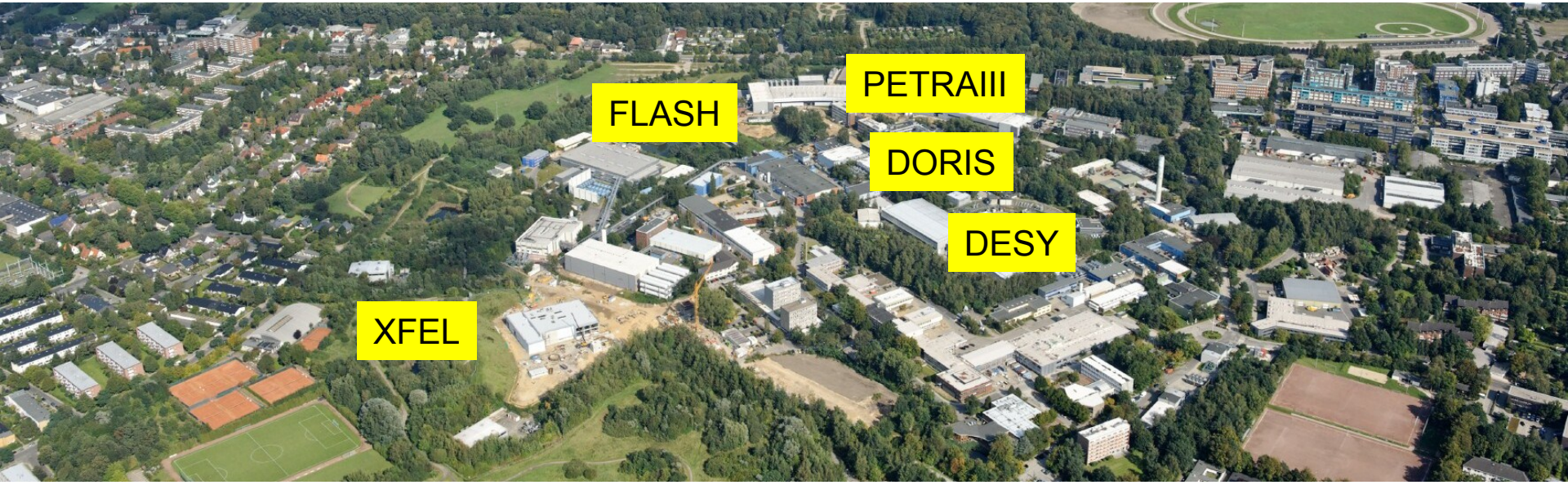
HELMHOLTZ ASSOCIATION

DESY

The DESY Program

DESY operates a number of major facilities on site:

Sources for photons (PETRAIII, Flash, XFEL in the future)



DESY participates in major facilities worldwide:

LHC
KEK-B
LCLS Stanford
Future developments (Linear Collider, …)

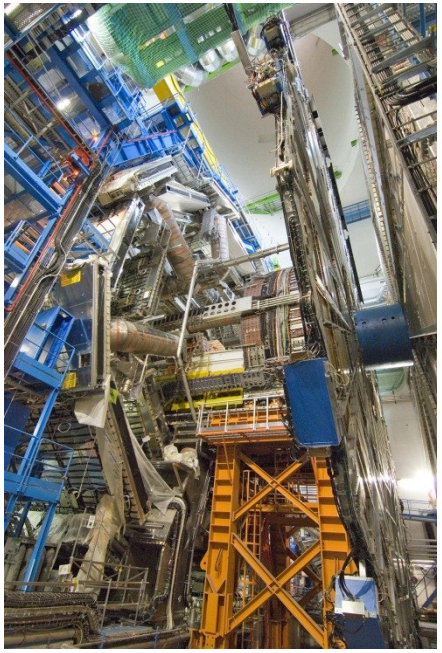
Detector Developments at DESY

Detectors for photon sources

- PetraIII
- FLASH
- XFEL

Particle physics detectors

- LHC
- KEK-B
- Future projects (ILC, others)
- Technological collaborations (CALICE, LCTPC, …)



Common technical infrastructure:

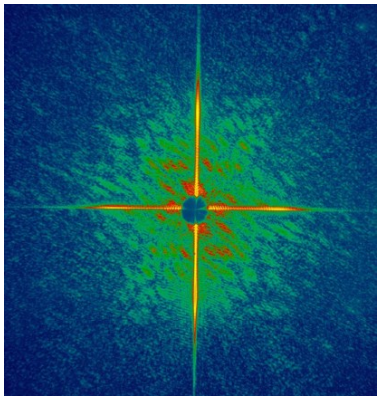
- Electronics development including ASICS etc
- Mechanical and other engineering support

Major Challenges ahead

XFEL:

Detectors at the cutting edge of technologie:

- fast imaging, large number of pixels, excellent spatial resolution
- Detector systems grow significantly compared to conventional synchroton sources

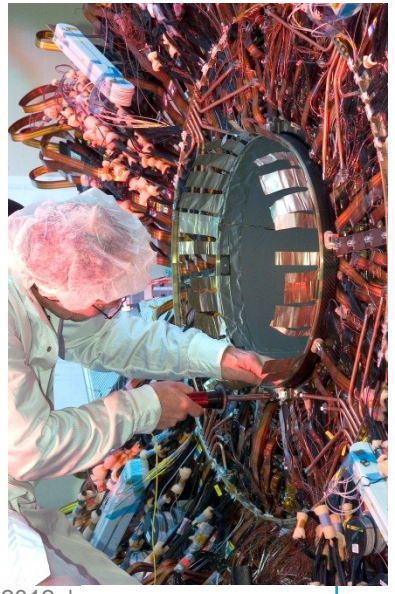


Diffraction pattern

LHC:

Upgrade of the existing ATLAS and CMS systems

- Large systems, complex, radiation hard
- Challenging electrical and mechanical environment



Atlas endcap

LC

High resolution systems for future large detectors

- Thin, fast excellent resolution Silicon systems
- Next generation calorimeter systems with excellent granularity

DESY know how and Portfolio Strategy

Traditionally DESY concentrates on

- Large scale systems
- Detector integration
- Detector operation

In house know how

- Frontend
- Readout
- System aspects
- System integration

We are weak on

- Sensor development

Detector Portfolio:

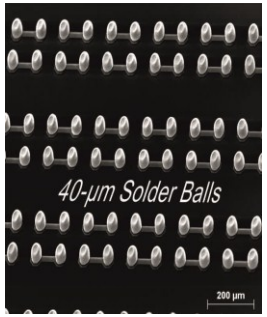
Part of a strategy to

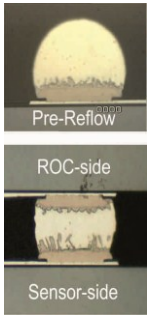
- Develop a coherent and basic detector R&D program
- Increase access to know-how on sensor development
  - as part of a network within the Helmholtz association
  - and together with our university and other partners

DESY in the Portfolio

Silicon technology

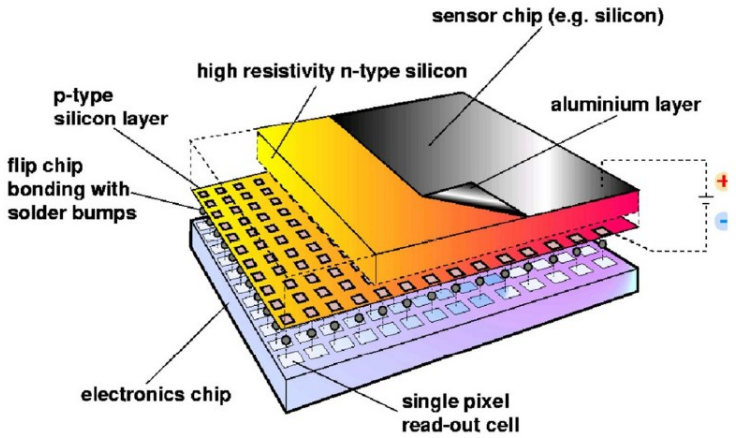
In particular vertical integration/ interconnect



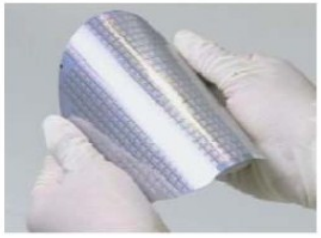


Bump bonding technology at DESY

Helmholtz cube as a test system for “3D” developments



Novel materials for (in particular) solid state detectors



Wafer thinned to 50 microns (leti)

Novel sensor developments (e.g. SiPM developments) and novel and compact detectors