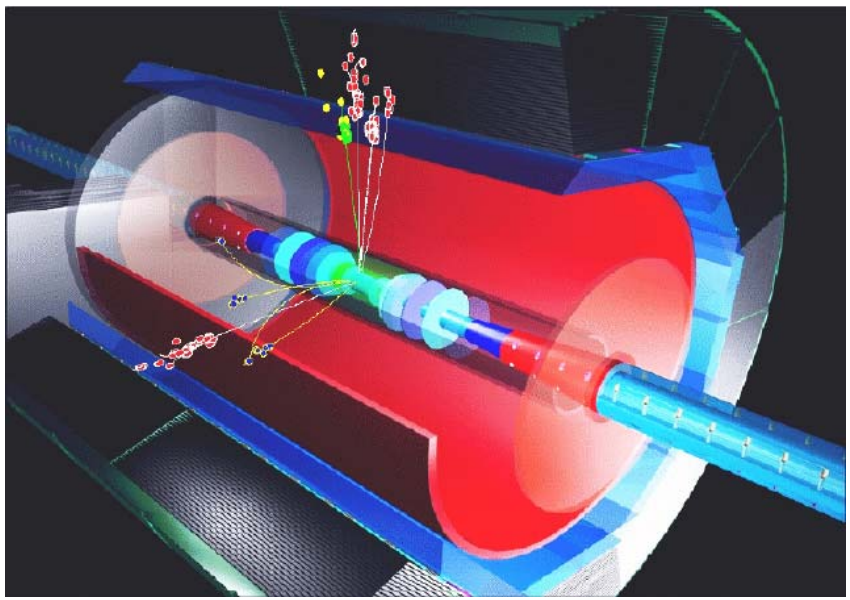
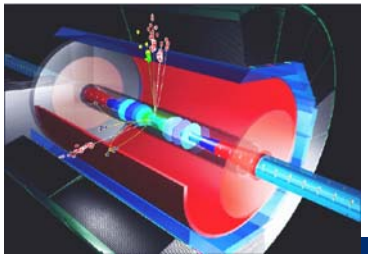
The DESY node in the HGF Alliance Laboratory for Detector Technologies



Felix Sefkow

1st Helmholtz Alliance Detector Workshop

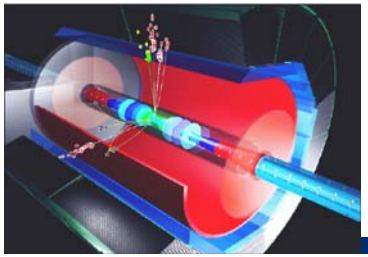
Karlsruhe, 3. April 2008



This talk

PHYSICS AT THE TERA SCALE
Helmholtz-Alliance

- Detector competence and infrastructure at DESY
- Detector projects and co-operations
- Alliance resources at DESY



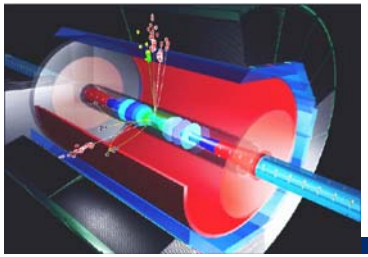
Detectors at DESY

- Competence and infrastructure built up for experiments at DORIS, PETRA, HERA

- Mechanical engineering
- Electronics development
  - analogue, digital; no ASICs
- Detector physicists

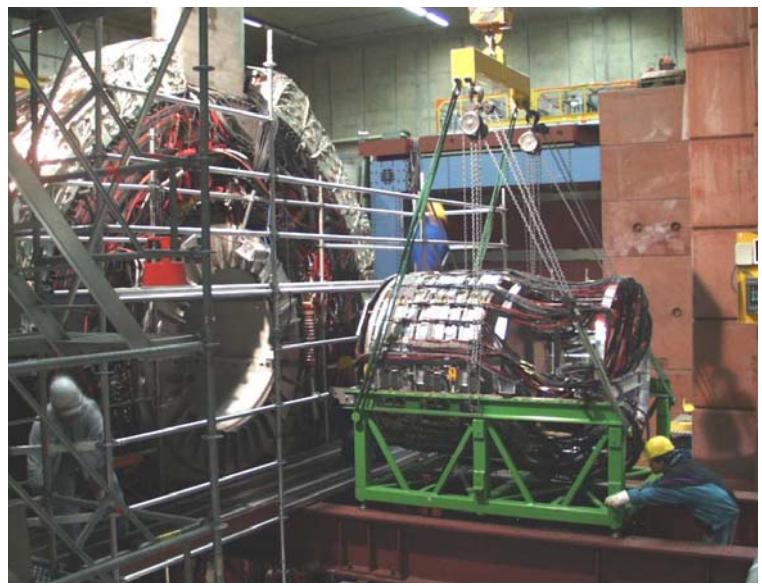
- Workshops
- Assembly and test facilities
- Test beams
- Computing and communication
- Administrative and guest services

- Support contributions from German and foreign institutes to experiments at DESY's accelerators

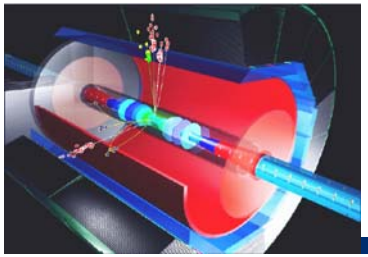


Detector support

- Main focus: integration
- Sub-detector system integration
  - Electronic and mechanical interfaces
  - Assembly and tests
- Testing and commissioning
  - Test beam !
- Overall detector integration
  - Mechanics, installation, tooling
  - Services (power, cooling,…)
  - Readout (DAQ, trigger)
  - Software: reconstruction, alignment,..



- Compared to this, generic R&D on key technologies played a smaller role (although important contributions made, e.g. on Si sensors)
  - Complementary to role of (most) university groups



Detector future

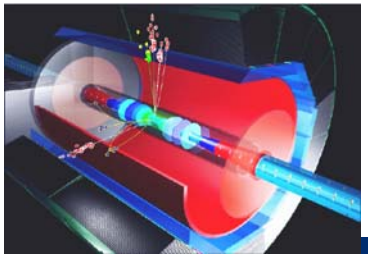
- Transition time: from "domestic" to global accelerators
- Evolve the successful model from the past

- Detector activities central part of DESY's HEP programme
- Strong participation in all main future projects

Synergies with photon science

- Last-minute LHC contributions
- sLHC involvement to emerge

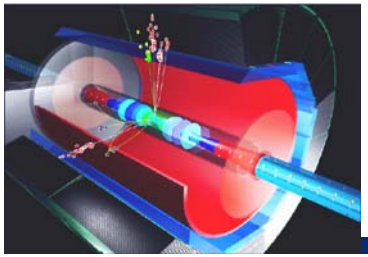
- Leading role in ILC detector concept
- Leading roles in ILC-driven detector R&D collaborations



Detector projects at DESY

- LHC:
  - ATLAS: absolute luminosity ALFA (with Giessen, Humboldt)
  - CMS: Beam condition monitor (with Karlsruhe), CASTOR calorimeter
- sLHC preparation: under discussion
  - Tracking (with German LHC groups)
  - High level triggering (with German LHC groups)
  - Calorimetry?
  - …?
- ILC
  - VTX (with Aachen, Bonn, Hamburg, Karlsruhe, Mannheim, Munich)
  - TPC (with Aachen, Bonn, Freiburg, Hamburg, Mainz, Munich, Karlsruhe, Rostock, Siegen)
  - HCAL (with Hamburg, Heidelberg, Munich, Wuppertal)
  - FCAL (with Dresden)
  - ILD concept: optimization and software, integration engineering

LHC and ILC detectors: Now moving from basic R&D to realistic devices

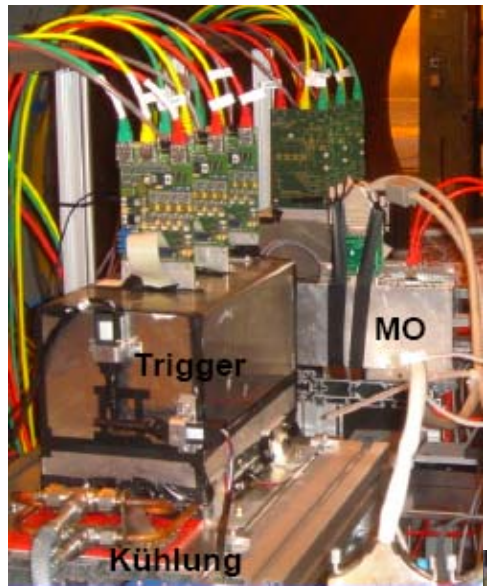


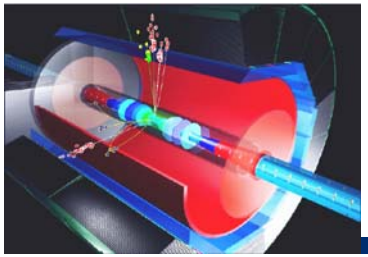
VTX example

- Beam telescope, MAPS sensors
- Different devices under test
  - e.g. DEPFET sensors

- DESY role:
  - Chip characterization
  - Electronics boards
  - Mechanical structure, cooling
  - Test beam support
  - User integration
  - …

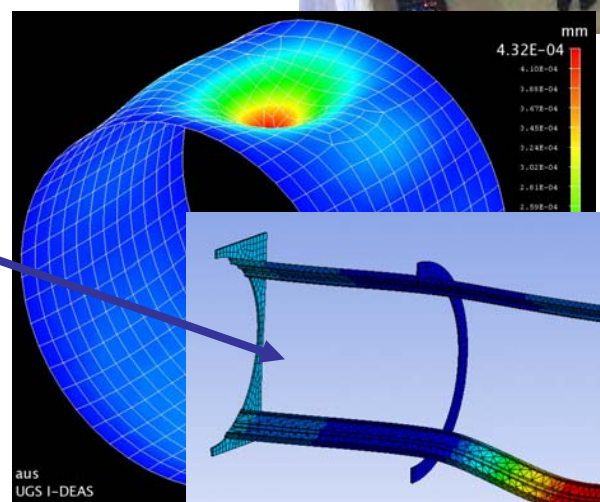
- 6 users in 2008
- Final telescope in 2009

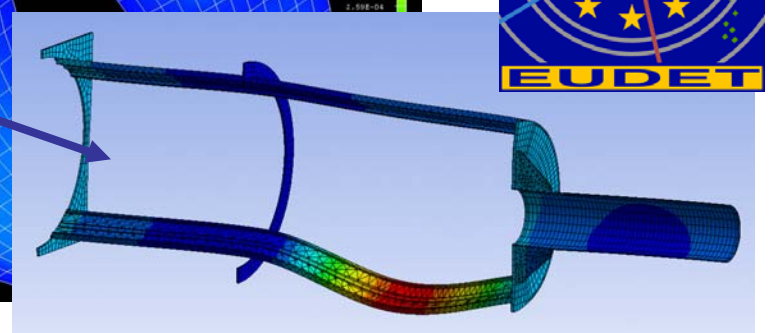


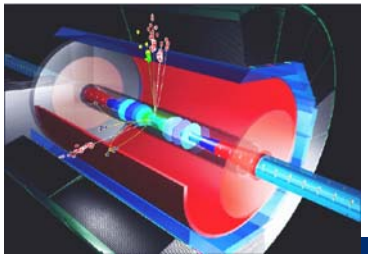


TPC example

- Infrastructure:
  - S.C. Magnets:
    - 5 Tesla, 28 cm ∅, cosmics + sources
    - 1.2 Tesla, 80 cm ∅, test beams
- Large scale TPC prototype
  - Field cage
  - End plate with different micro-pattern read-out structures
- DESY role
  - Field cage
  - Mechanical structure
  - System integration
  - Test beam integration
- Start beam tests in summer

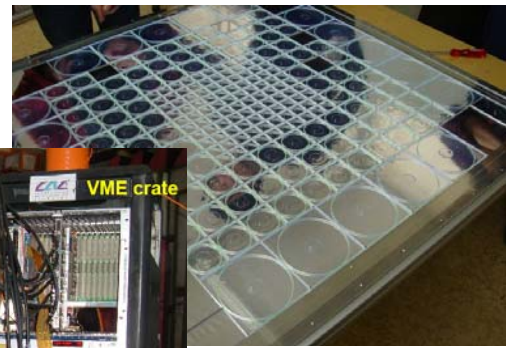


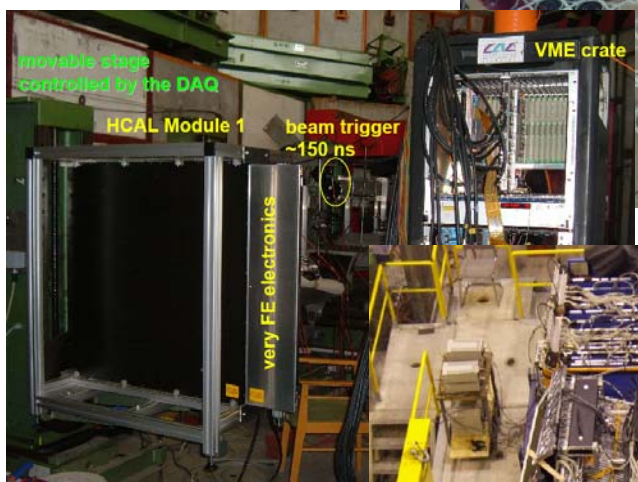


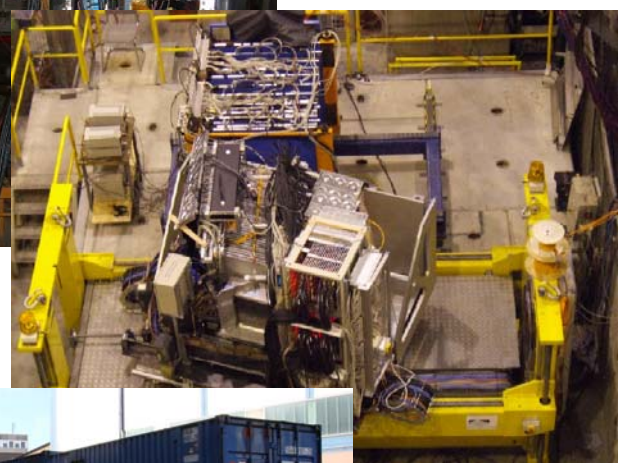


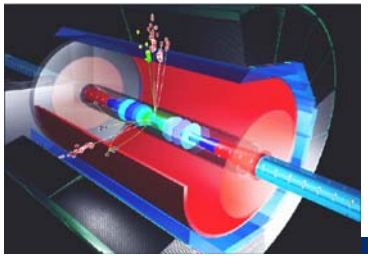
HCAL example

- Cubic-metre prototype for hadron test beams
- 8000 Scintillator tiles with novel SiPMs
- DESY:
  - Mechanical structure, assembly and tests
  - Electronics boards
  - Slow control, system integration
  - Commissioning in DESY beams
  - Movable stage
  - Logistics
- 2nd generation realistic PT underway



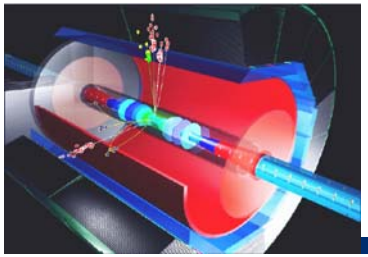






FCAL, ALFA

- Similar project structures

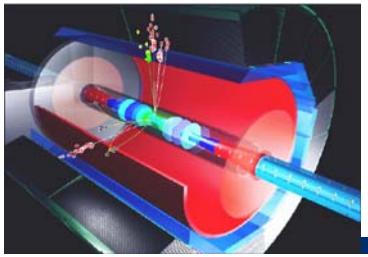


Detector alliance

- Offer: open the DESY infrastructure to Alliance partners

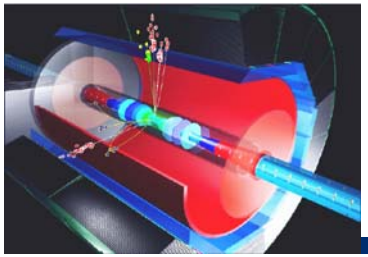
- Not restricted to DESY detector projects
- Service-like activities on shorter time scales possible
    - E.g. FEM calculations for ATLAS pixel detector

- Obviously maximize use of infrastructure and resources (beyond alliance) in projects where DESY participates actively



Alliance resources

- Personnel
  - Dedicated Alliance LDT team of 3-4 people
  - 2 engineer positions already filled
- Access to further scientific and technical expertise and support
  - From DESY's central services
  - From the former HERA groups
  - Through alliance team
  - Through DESY participation
- Funds for infrastructure investments and (later) new projects
  - To be discussed
  - Respond to demands from existing and possible new projects



Conclusion

- DESY has a strong record in supporting detector development and integration in German HEP
- Already successfully evolved to ILC and LHC detector projects
- Large potential for use of existing infrastructure and expertise
- New alliance resources: opportunities for enhanced coherence and stronger impact of German detector activities