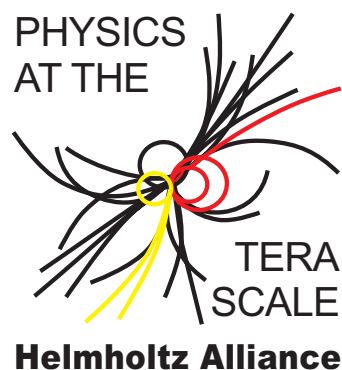


*Meeting with the Scientific Manager of the
Helmholtz Alliance “Physics at the Terascale”
Humboldt-Universität zu Berlin, June 3, 2008*

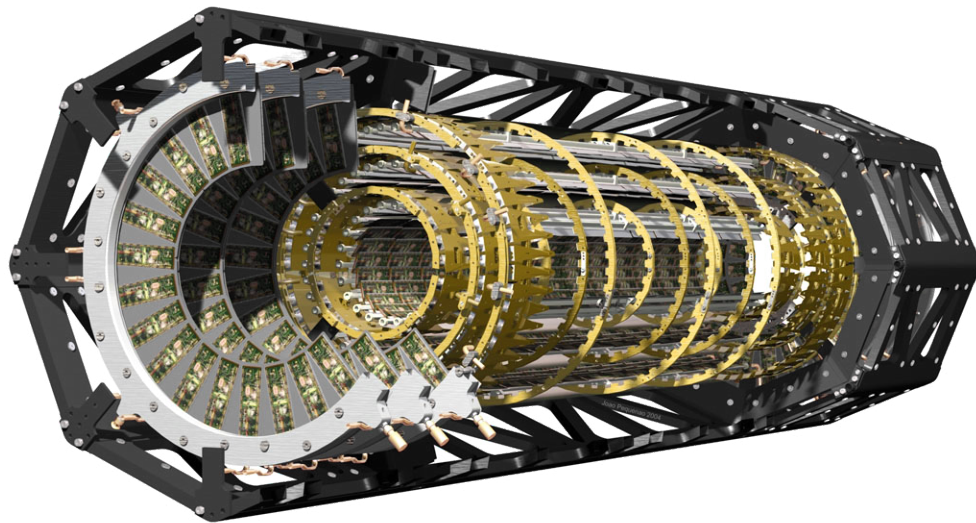
Towards an ATLAS Pixel Upgrade Project



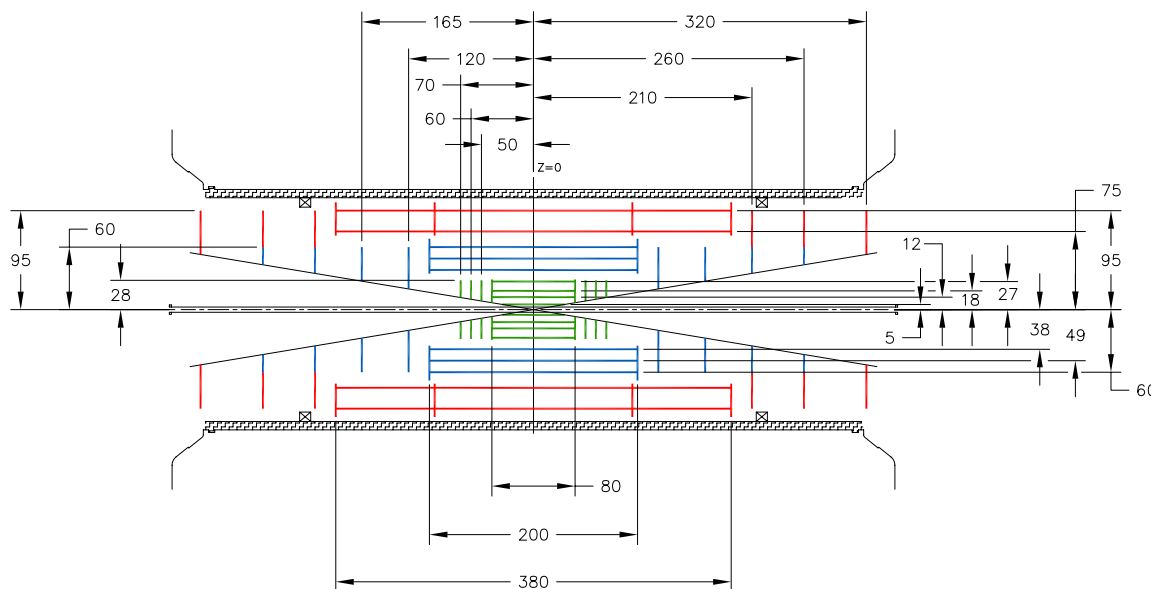
Ulrich Husemann
DESY



ATLAS Silicon Pixel Detector



Strawman Design for ATLAS Inner Detector Upgrade



BROOKHAVEN
NATIONAL LABORATORY

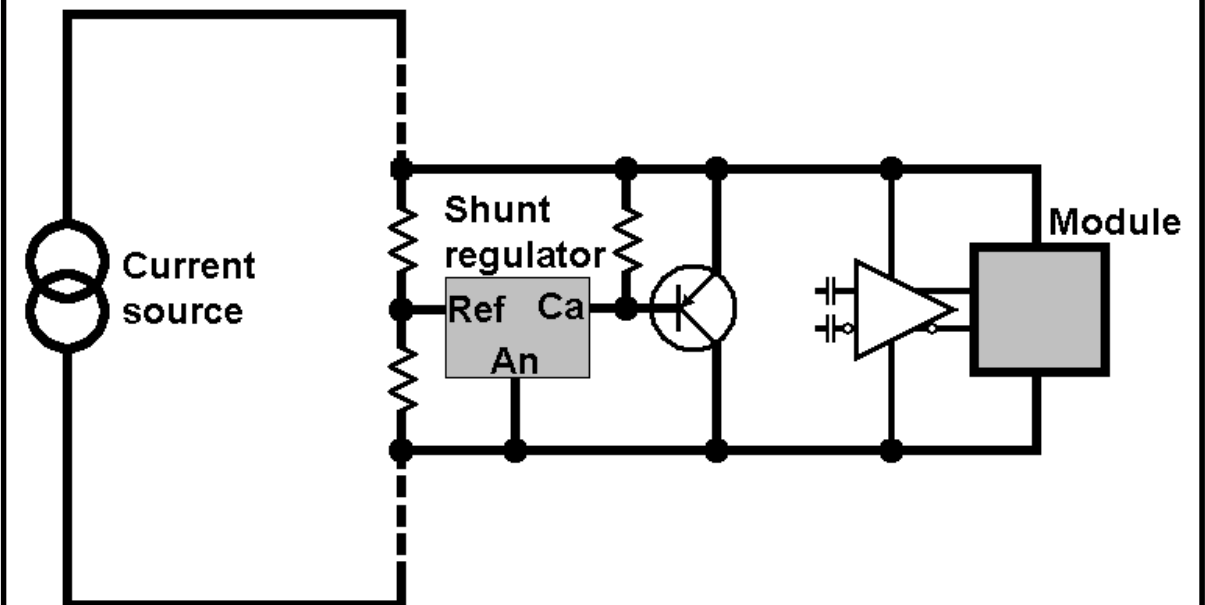
- Several DESY and HU groups interested in hardware projects for ATLAS upgrade
- **Established** groups with previous hardware experience:
 - DESY (Zeuthen site): Peter Kostka, Wolfgang Lange
 - DESY (Hamburg site): Ingrid Gregor
- **New** groups:
 - HU Berlin: Exp. Elementarteilchenphysik II (Heiko Lacker)
 - DESY: Helmholtz Young Investigators Group "Top as Key to LHC Physics" (UH)

- Current focus of DESY/HU activities:
 - Get involved into **ATLAS pixel operations** → learn about current system
 - Identify **concrete** upgrade project
- Many levels of **coordination** required:
 - Inside DESY
 - Within Helmholtz Alliance
 - Within ATLAS pixel community
 - Within joint LHC upgrade efforts
- Currently considering three different upgrade projects:
 - Planar pixels (contact: C. Gößling, Dortmund)
 - Power distribution (contact: M. Weber, RAL)
 - Versatile optical link (contact: C. Issever, Oxford)

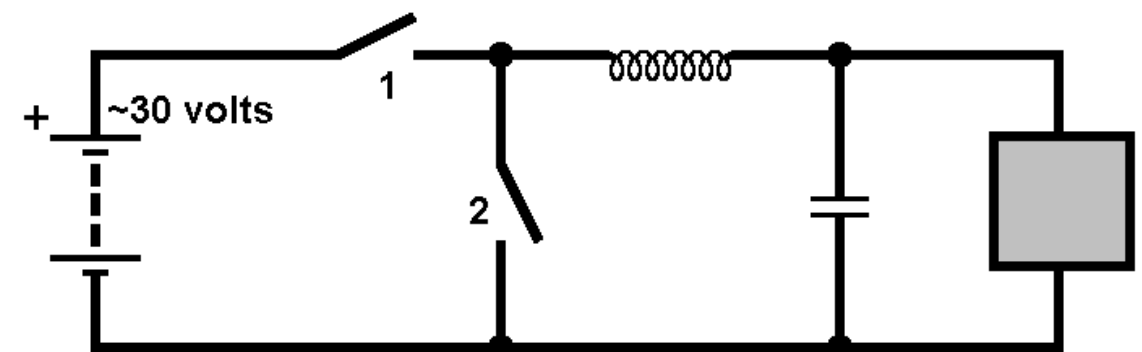
- “Conservative” solution to ATLAS pixel upgrade with largely well proved technologies → planar (i.e. non-“shingled”) sensors
- Small group of institutes proposes R&D into
 - Sensor material
 - System integration
 - Reduction of inactive area: “active edge sensors”
 - Simulation of optimum pixel size
 - Low-threshold front-end electronics
- Starting point at DESY:
 - Test stand for front-end testing and sensor characterization
 - MC simulations
- Specialized project, well embedded into Helmholtz Alliance and ATLAS pixel community

- Want more readout channels and less material → novel power distribution schemes
 - Serial powering: current “recycling”
 - DC-DC coupling: “HV” power lines
- R&D coordinated by joint ATLAS/CMS power working group
- Starting point at DESY: test stand
- “Generic” R&D, some overlap with other Alliance members (Bonn, Wuppertal, Aachen)
- Work package in DEVDET proposal for EU FP7

Serial Powering



DC-DC Buck Converter



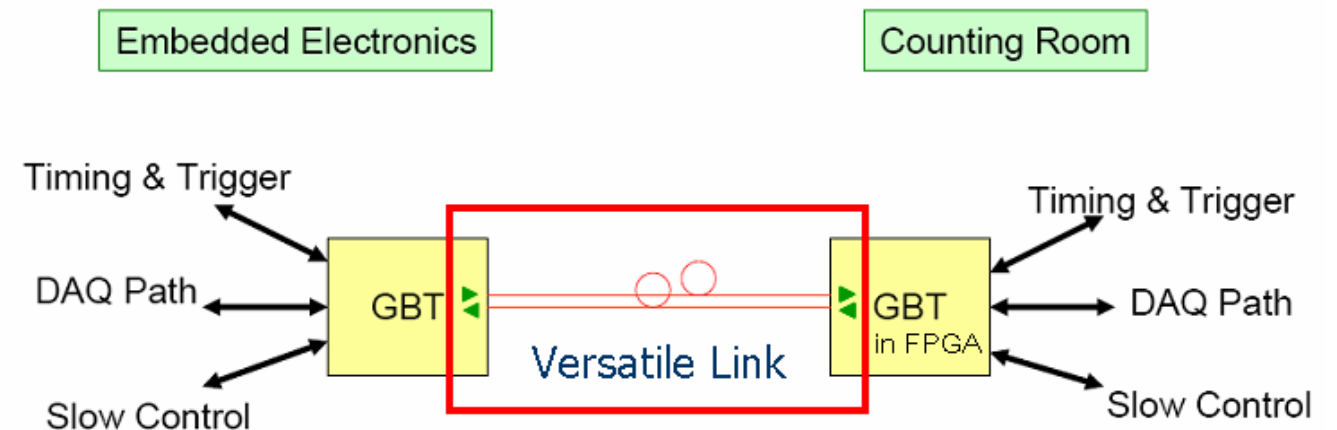
[M. Weber]

- Goal: common technology for all optical data transmission in ATLAS/CMS upgrade

- Requirements:

- Radiation hardness
- Less material → fewer connections → high bandwidth

Point-to-Point Connection with Versatile Link



[F. Vasey et al.]

- Solution: “Versatile Optical Link” (CERN, Oxford)
- Starting point at DESY: test stand
- “Generic” R&D, some overlap with similar activities within Alliance (Dresden, Wuppertal)