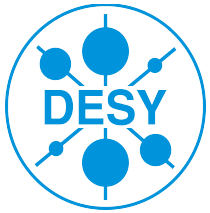
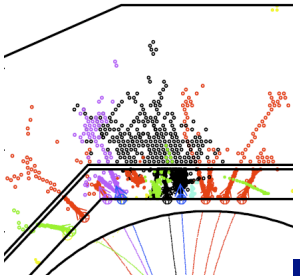
Tungsten HCAL in AIDA - overview and DESY part

Felix Sefkow

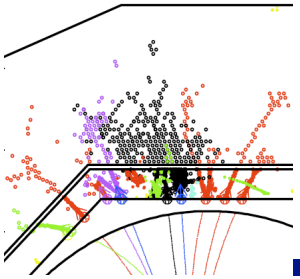


CALICE & EUDET Meeting
DESY, June 5-6, 2010



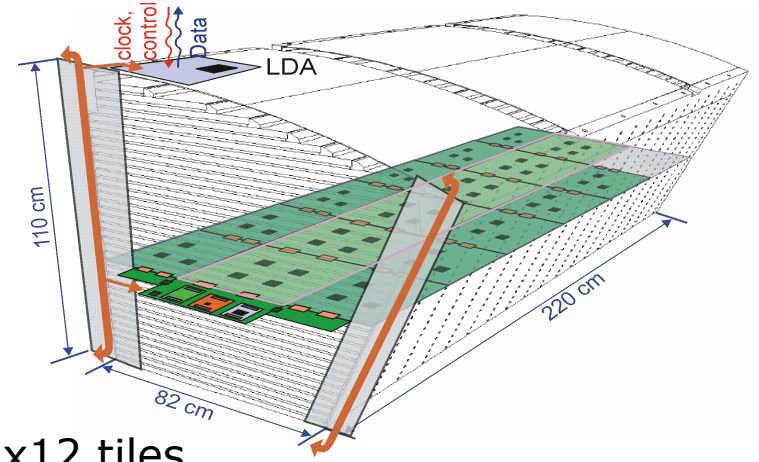
Goals

- Validate shower simulations for tungsten
  - stronger role of neutrons than in iron
  - to be done with scintillator and gaseous devices
- Gain engineering experience with tungsten
- Develop electronics integration solution for a very compact PFLOW HCAL
- Study timing issues
  - physics: signals from delayed de-excitations
  - algorithms: tag neutron signals
  - operation: time stamping for background rejection

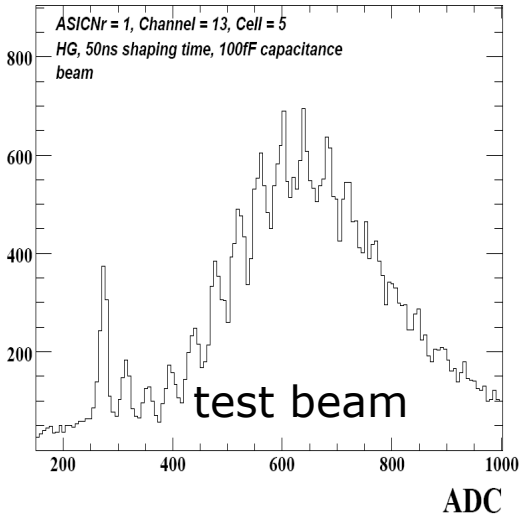


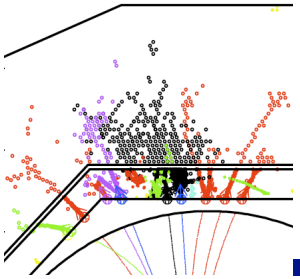
Synergies

- 2nd generation prototype has integrated readout ASICs and LED system - and time measurement
- electronics development is the same, but tighter compactness requirements
- Prototype roadmap:
  - 2010: 1st HBU
  - 2011: full layer (2000 ch)
  - 2012: minical (2000 ch)
  - later: wedge
- Tungsten HCAL
  - 40 layers, 72x72 cm2
  - 23’000 ch



12x12 tiles,
36x36 cm2





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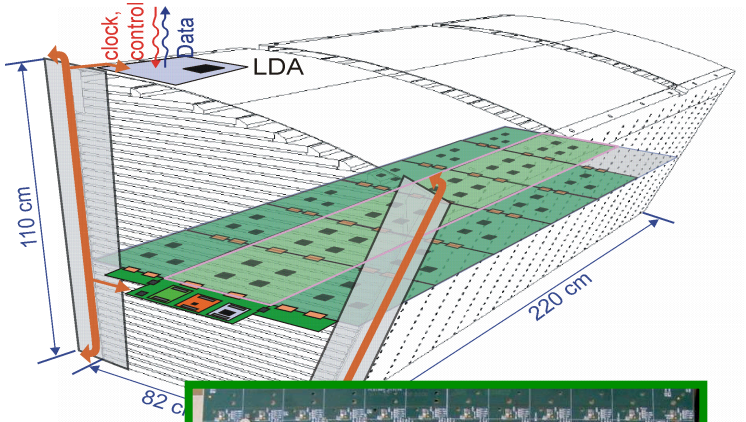

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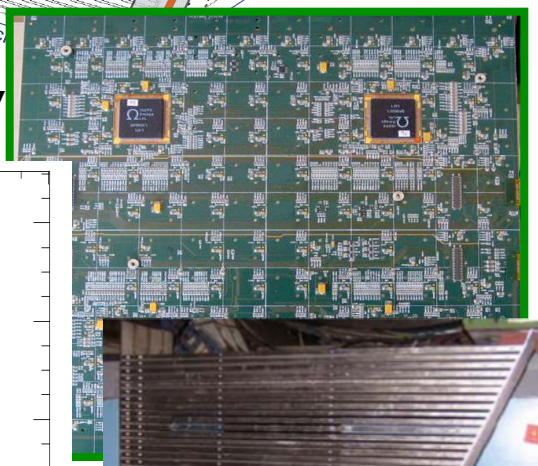
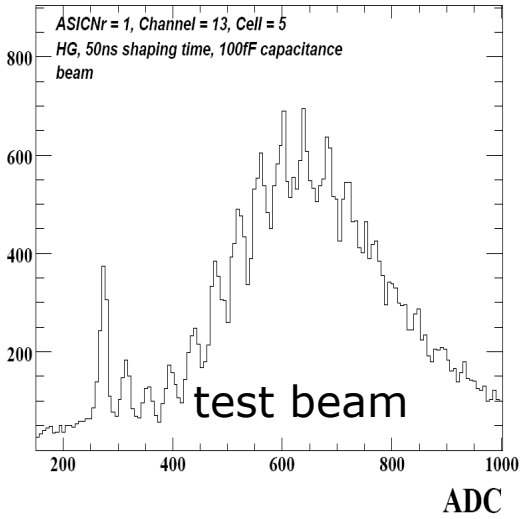
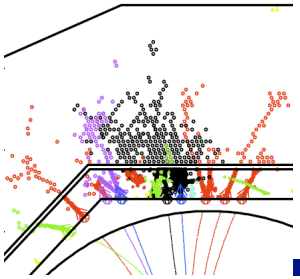




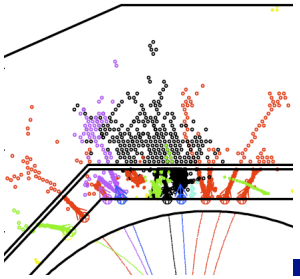


Overview

- At the proposal stage

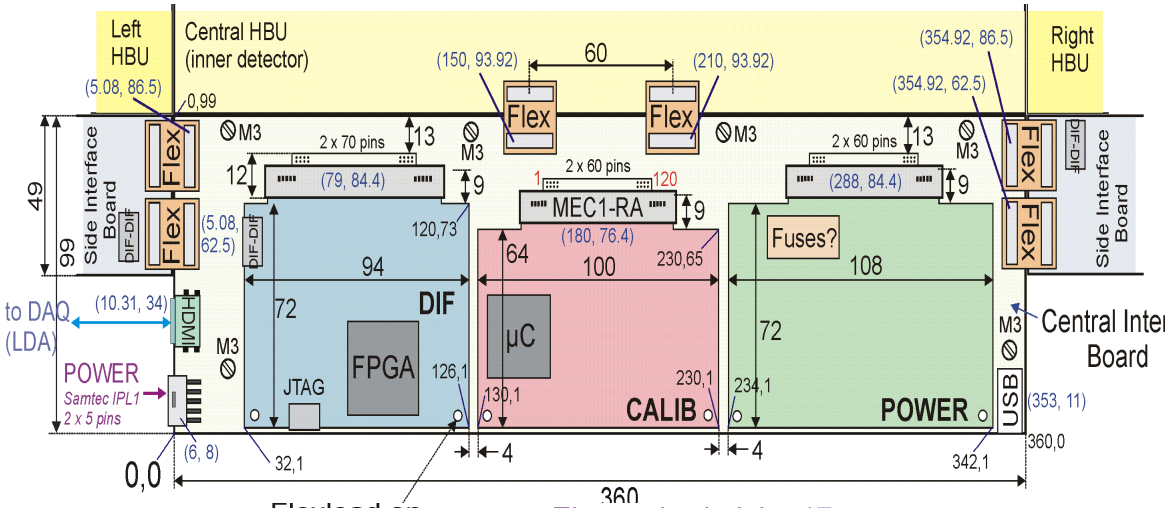
- CERN: tungsten engineering and optical test stand
- MPI-M: tile integration tests and SiPM development
- LAL: 3rd generation ASICs
- Heidelberg: fast timing electronics
- DESY: compact interfaces and integration
- Wuppertal: LED system development and tests
- Prague: adaptive power supplies
- Bergen: adaptive p/s, test stand and simulations

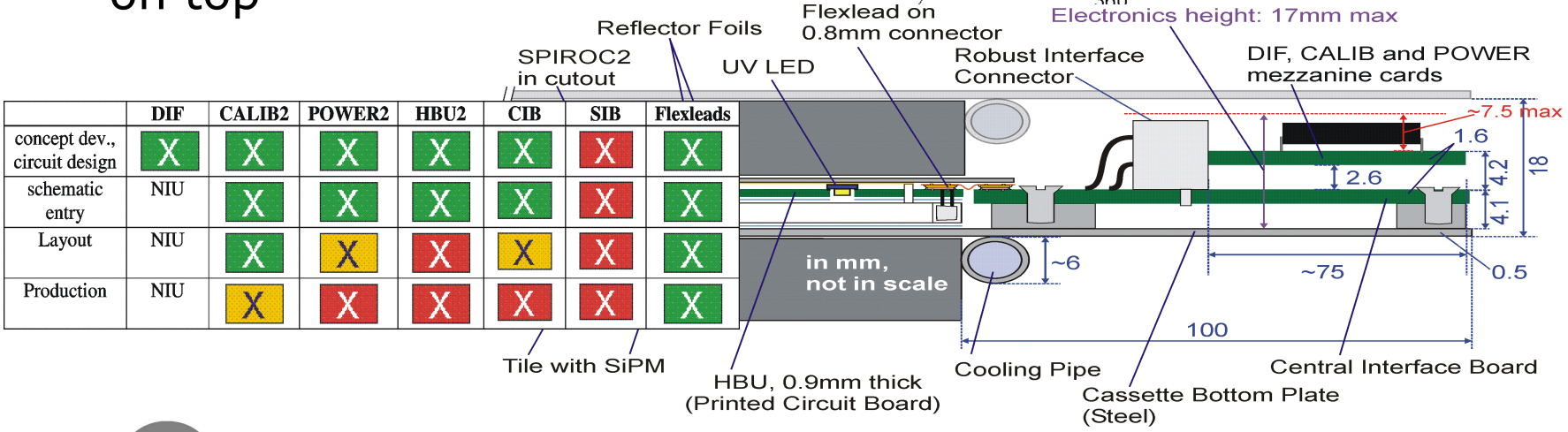
- Briefly review today and update document for internal planning



DESY: interfaces

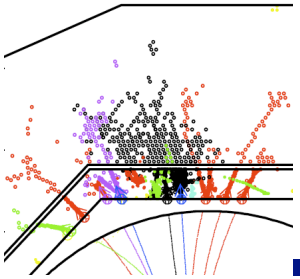
- see talk by Mathias Reinecke
- most components already unerway
- services, cabling and cooling comes on top





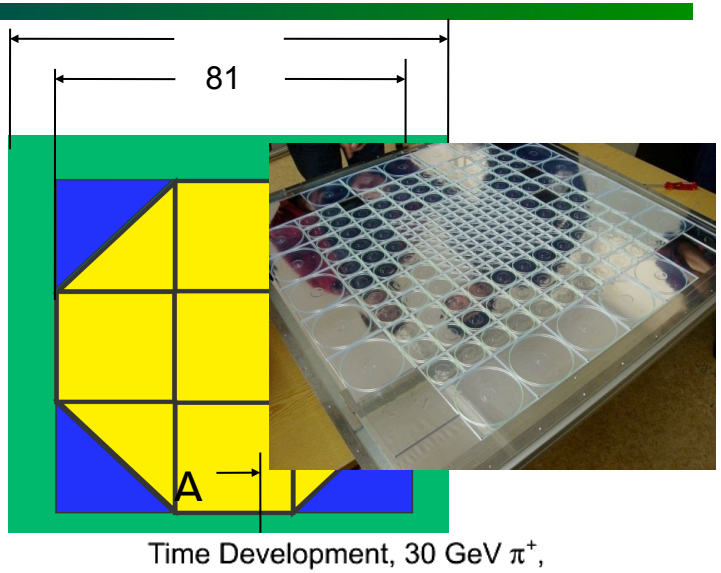
	DIF	CALIB2	POWER2	HBU2	CIB	SIB	Flexleads
concept dev., circuit design	X	X	X	X	X	X	X
schematic entry	NIU	X	X	X	X	X	X
Layout	NIU	X	X	X	X	X	X
Production	NIU	X	X	X	X	X	X

Back-up slides

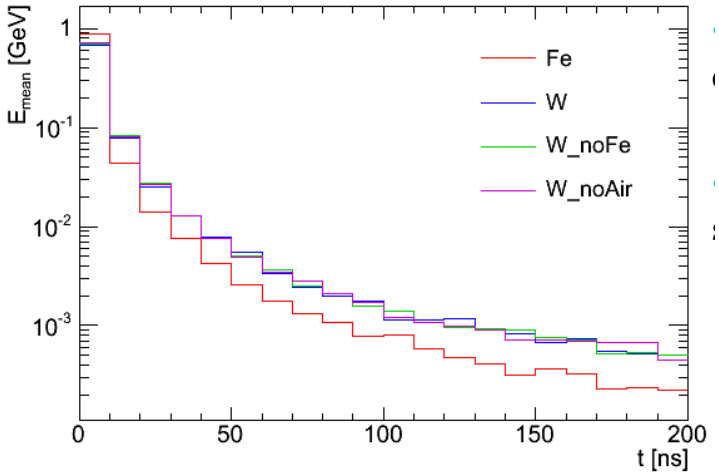


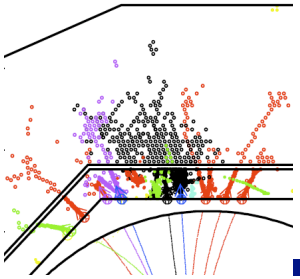
High energy

- Particle flow also a promising option for CLIC energies
- Leakage expected to limit PFLOW performance
  - need 1 λ ECAL + 7 λ HCAL
- Tungsten absorber cost-competitive with larger coil - and less risky
- Test beam validation with scintillator and gas detectors
- More neutrons:
  - different model systematics
  - timing measurements



Time Development, 30 GeV π^+,





Tungsten beam test plans

- start at CERN PS: Sep 2010 muons, Nov 2010 hadrons
- 30 layers initially, more 2011
- scintillator layers modified (finer pitch), re-commissioned
- begin with static set-up, integrate into movable stage later
- move to SPS ~ end 2011
- integrate few layers of gaseous detectors parasitically, full test later
- future: test with scintillator and 2nd generation time-resolving electronics
  - neutron timing, time stamping