CALICE AHCAL in H2

- Beam time: 8 - 22 July 2015
- Setup & Goals
- Layout and Supplies
- Beam Parameters

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H2/H4 beam users meeting, 15 April 2015

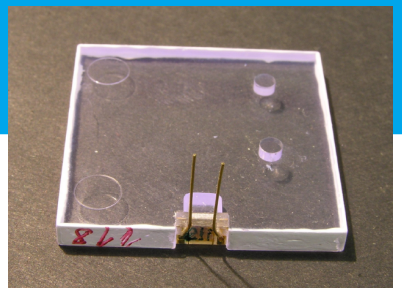
HELMHOLTZ ASSOCIATION

CALICE Calorimeter for ILC

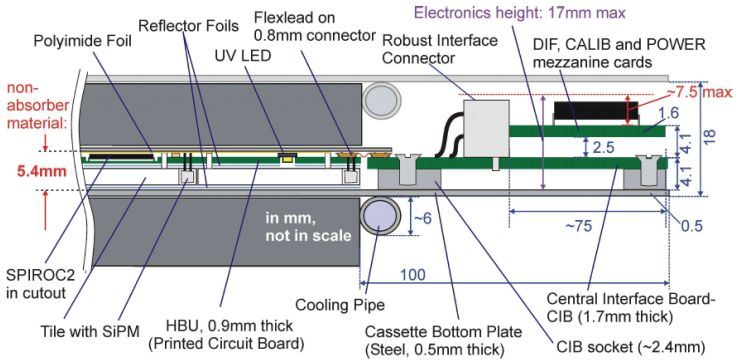
Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

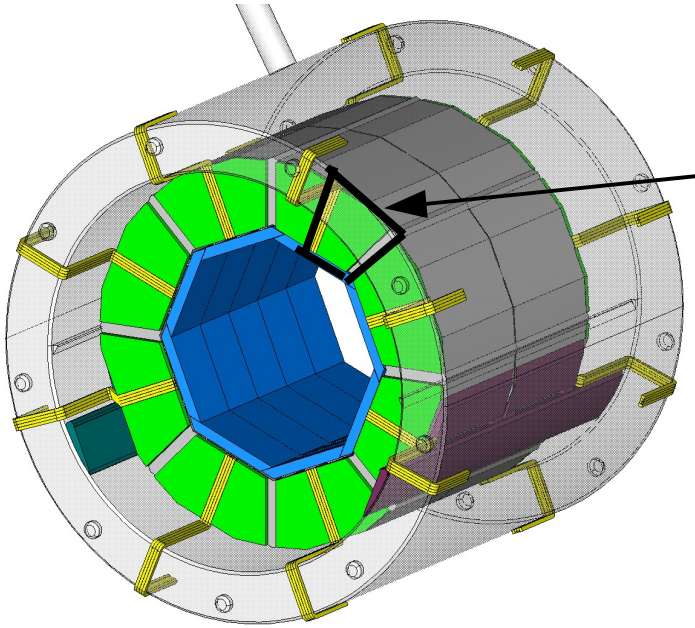
DESY

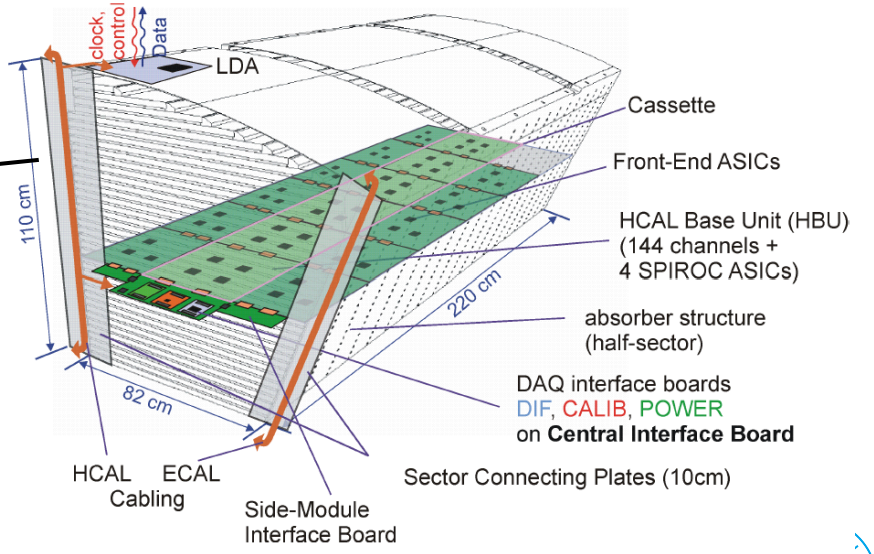
CALICE AHCAL Technological Prototype



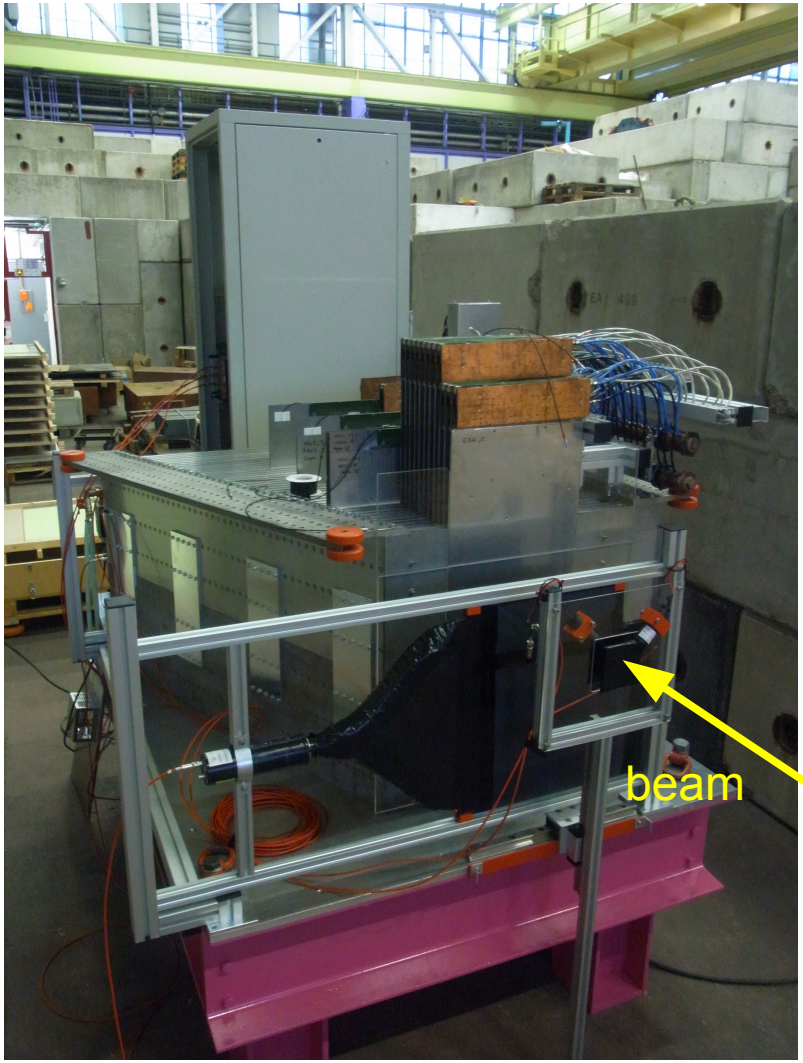
- high granularity hadron calorimeter (3*3 cm² tiles)
- scalability to large detector
- compact layout
- embedded readout electronics
- data concentration
  - 8 mio readout channels
  - 1 cable going out of the detector per ~100 000 channels







Current setup of AHCAL technological prototype



- steel absorber structure
  - as planned for ILC detector barrel
- active layer configuration
  - 11 small layers (18*18 or 36*36 cm^2): shower start finder
  - 4 big layers (72*72 cm^2): shower profile, correlation of hit times
- goals
  - measure shower profile and hit time correlations for pions
  - real life practical test
  - data to decide on tile and SiPM (variety of different tiles and SiPMs)
- data sets
  - wide muon beam for MIP calibration
  - energy scan electrons & pions

Layout and Supplies

- the complete setup is mounted on a platform (~2*2 m²)
  - can be craned into the testbeam area
  - weight is a few tons
- preparation outside beam area
  - a few days in advance (if possible 7-10 days)
  - need external power (~1kW)
- inside beam area
  - need to adjust to beam height (distance feet to beam height should be ~1m, positioning to ~1cm precision)
  - need external power (~1kW)
  - signals from beam instrumentation (Cerenkov)
  - to beam hut: ethernet connections, signals from counters
  - no magnet, no gases, no cryogenics

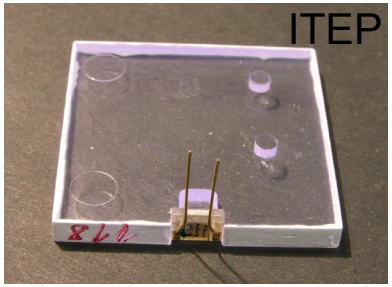
Beam parameters

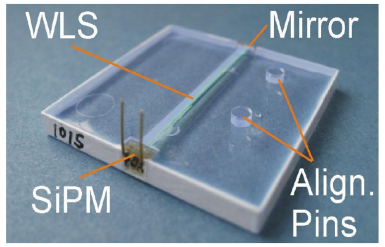
- muons for calibration
  - a few days in the beginning
  - energy and polarity not relevant
  - intensity as high as possible
  - wide beam
- electrons
  - polarity not relevant
  - intensity: >10^3 to 10^4 (as high as possible)
  - energy scan: 8 – 120 GeV, logarithmic binning
  - spot size/divergence: not critical
- pions
  - negative polarity preferred (no proton background)
  - intensity: >10^3 to 10^4 (as high as possible)
  - energy scan: 8 – 120 GeV, logarithmic binning (highest stat. around 60 GeV)
  - spot size/divergence: not critical

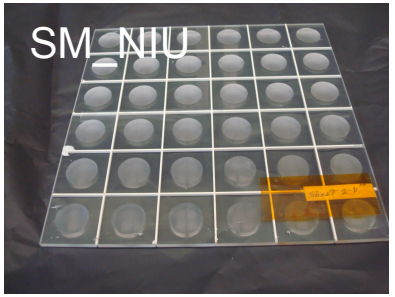
Backup

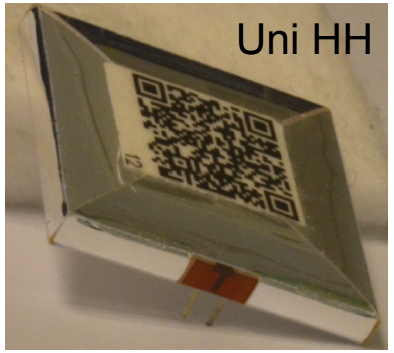
Tiles/Strips and SiPMs

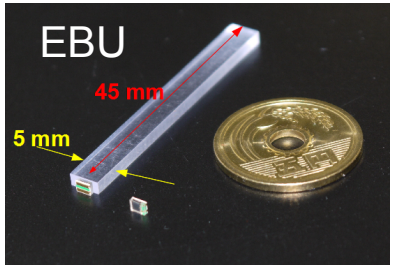
- 1 bottom readout EBU
  Hamamatsu MPPC with 10000 pixels
- 1 longitudinal EBU
  Hamamatsu MPPC with 10000 pixels
- 1 (old) transverse EBU
  Hamamatsu MPPCs with 1600 pixels
- 1 megatile surface mount HBU
  2 types of Hamamatsu MPPCs
- 5 HBUs with old ITEP tiles with WLS
  CPTA SiPMs with 800 pixels
- 2 HBUs with new ITEP tiles
  Ketek SiPMs with 12000 pixels
- 2*4 HBUs with individually wrapped tiles
  Ketek SiPMs with 2300 pixels
- 2*4 HBUs with individually wrapped tiles
  sensl SiPMs with 1300 pixels
- 1 surface mount HBU with individually wrapped tiles (Uni Mainz)











Testbeam goals

- data taking:
  - muons for MIP calibration
  - electrons to check calibration on EM scale
  - hadrons: shower profile, hit time correlations
- “real life” practical test:
  - large system
  - new DAQ
  - channel-wise power supply and power distribution
  - water cooling
  - variety of different tiles and SiPMs
  - full EUDET stack
- step towards a full AHCAL barrel module