

# Activities of the Group of DPNC Geneva

D. Haas

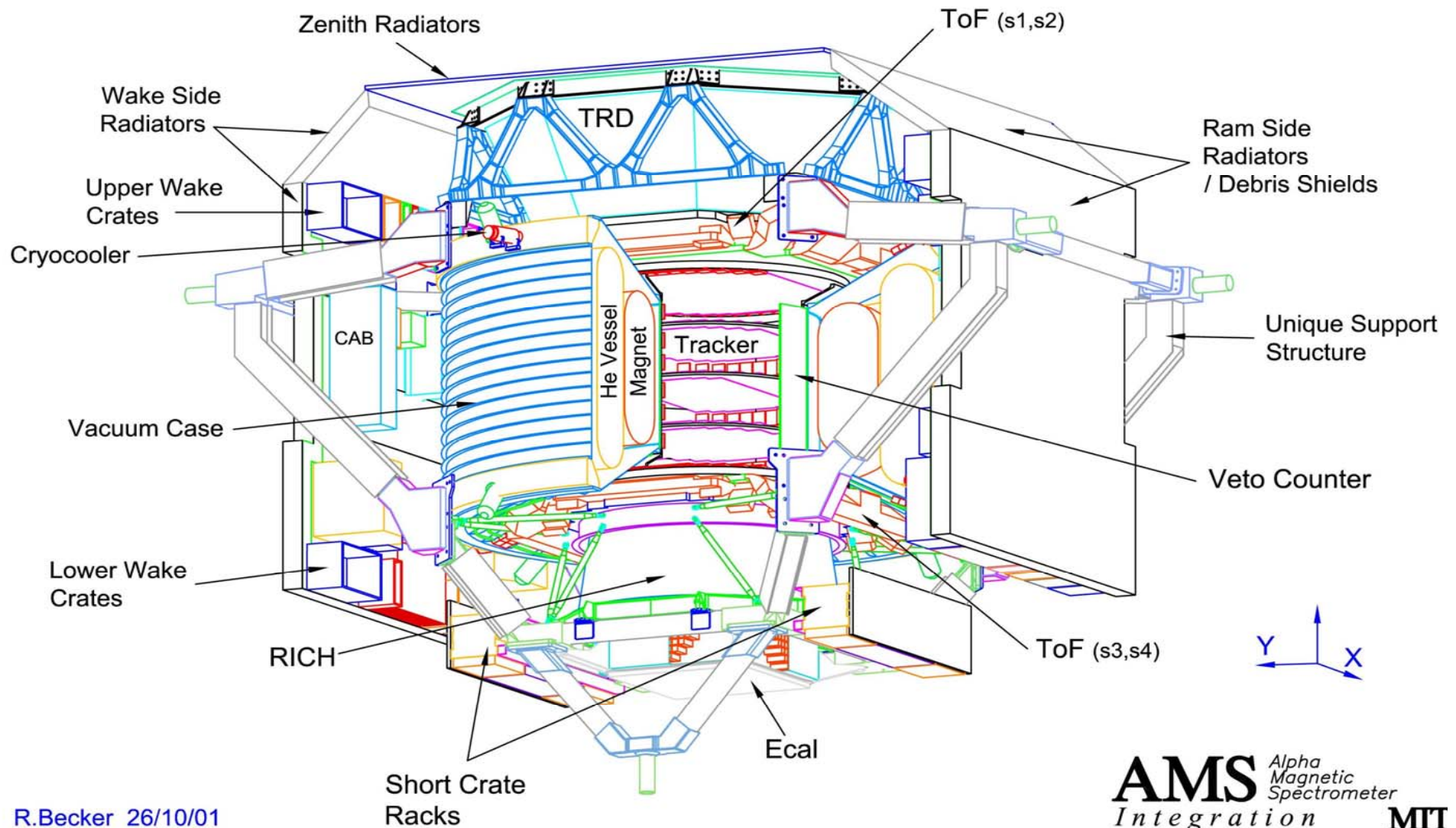
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## Outline

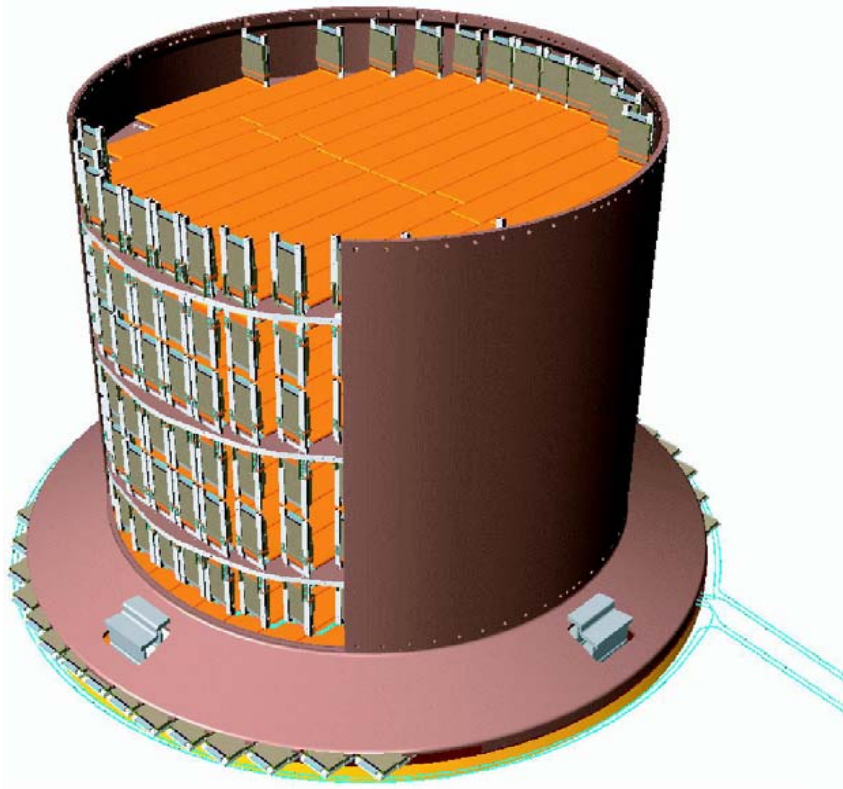
- AMS Activities
  - Silicon Tracker
  - Electronics
- GSEM Activities
- Summary



# The AMS02 Experiment



# Silicon Tracker - Overview...



## 2264 Sensors

- Doublesided Silicon  $\sim 6.4\text{m}^2$  total
- 1024 channels each
- Combined into Ladders of 7-15 sensors, around 200k channels

## 8 layers on support planes

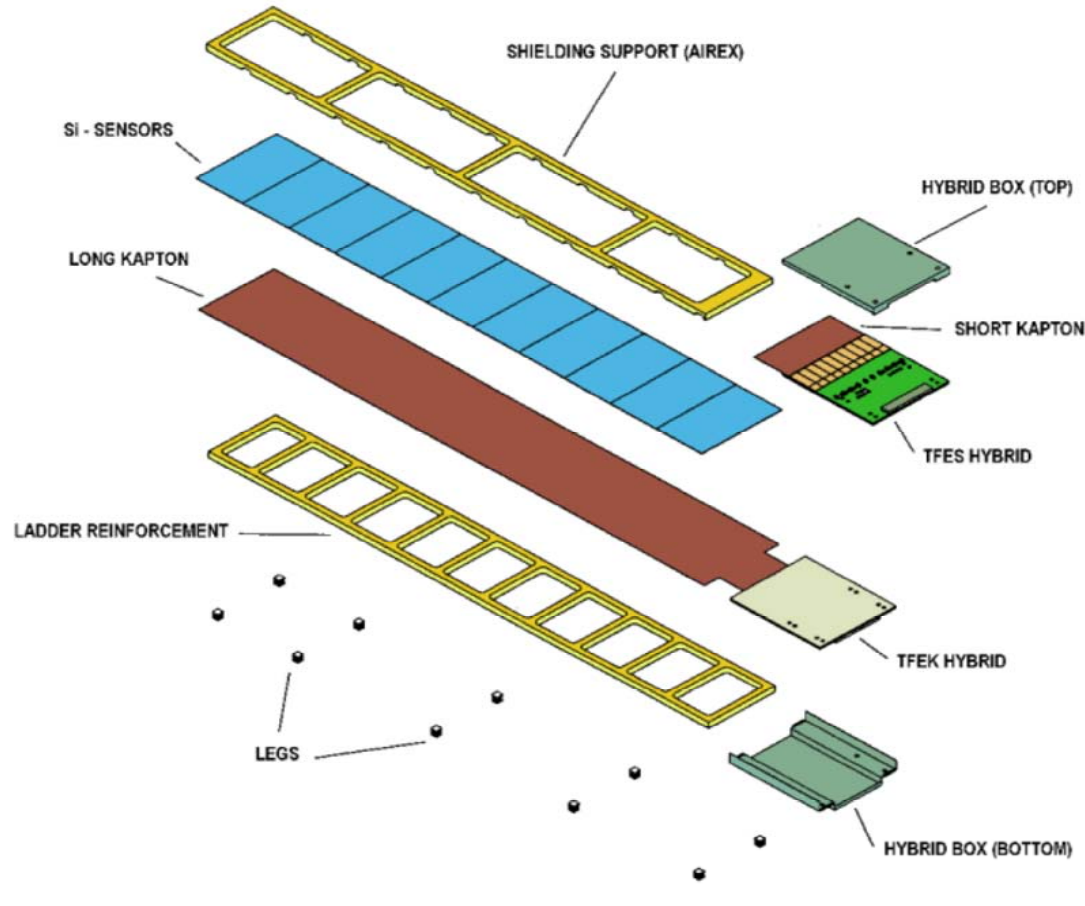
- 2 external planes - 1 layer each
- 3 internal planes - 2 layers each

## Goals:

- Track charged particles
- Measure rigidities  $p/Z$  up to  $\alpha(10\text{TV})$   
with  $\sigma(p)/p \sim 1.5\%$
- Identify elements via  $dE/dx$



# Silicon Tracker - Ladders...

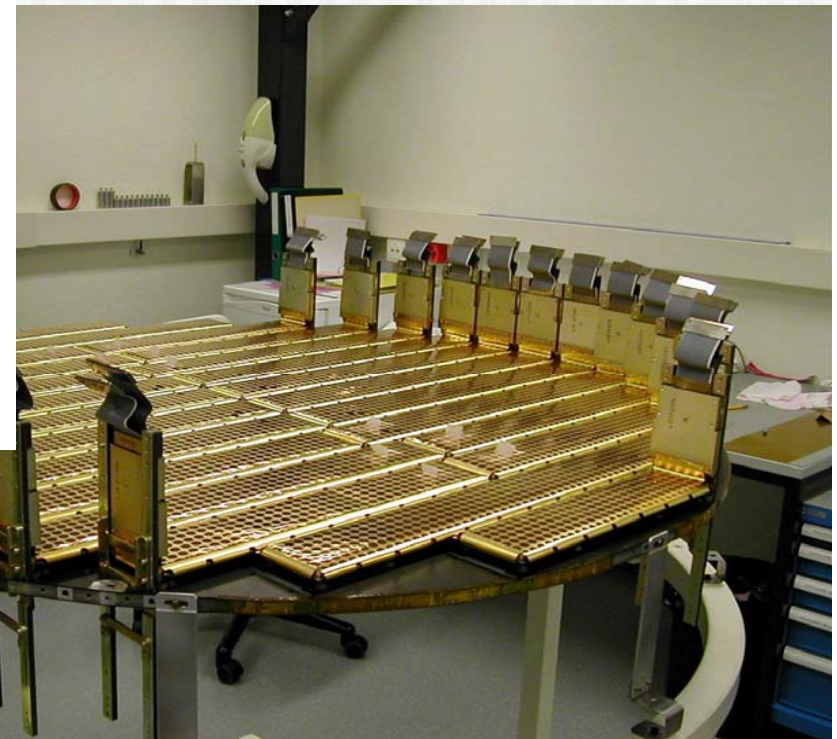


Two-sided silicon is used:

- K-side (n) has 384 channels
- S-side (p) has 640 channels

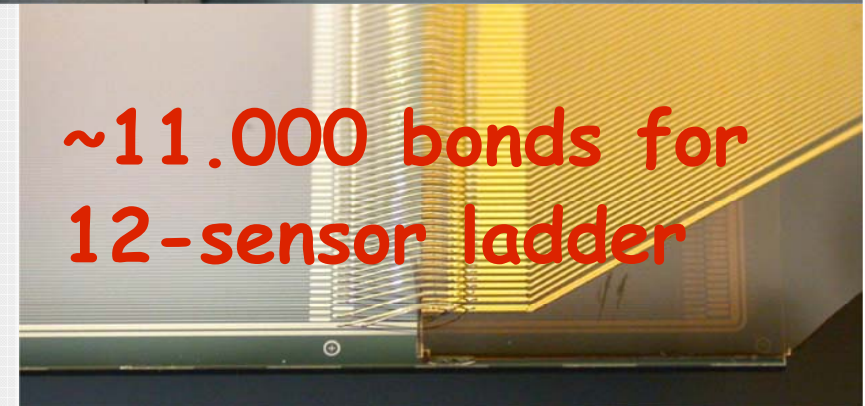
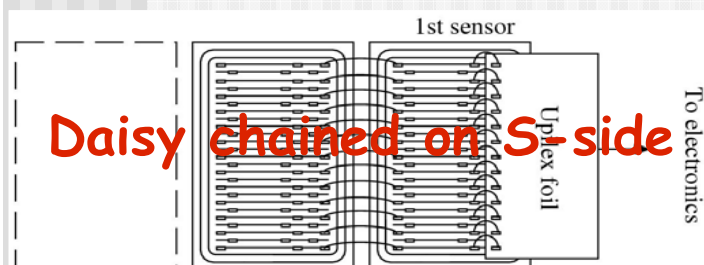
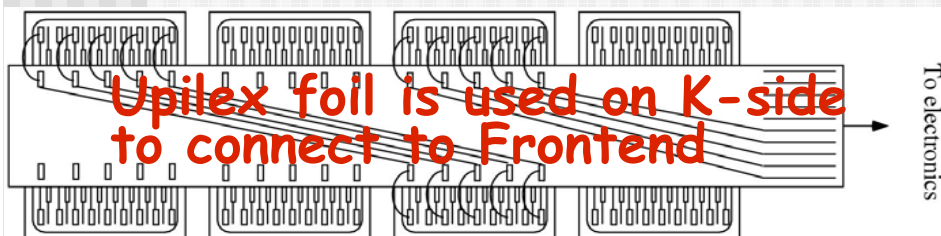
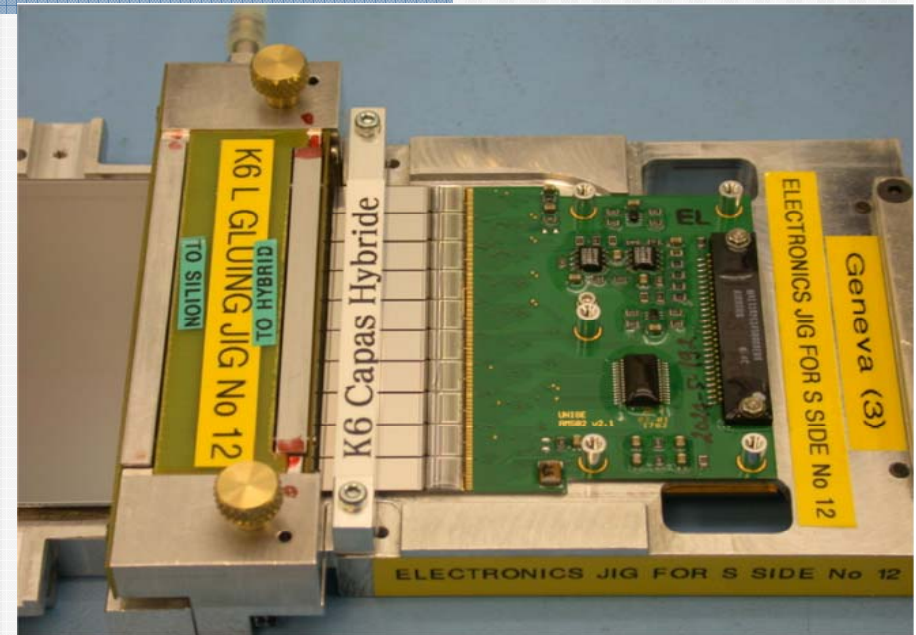
Ladder is reinforced

Channels bonded to Frontend



# Silicon Tracker - Frontend...

- Frontend produced by IDEas, Norway
- AC coupling with PreAmp via Capacitors
- 64 channel PreAmp/Shaper
- Multiplexed analog readout



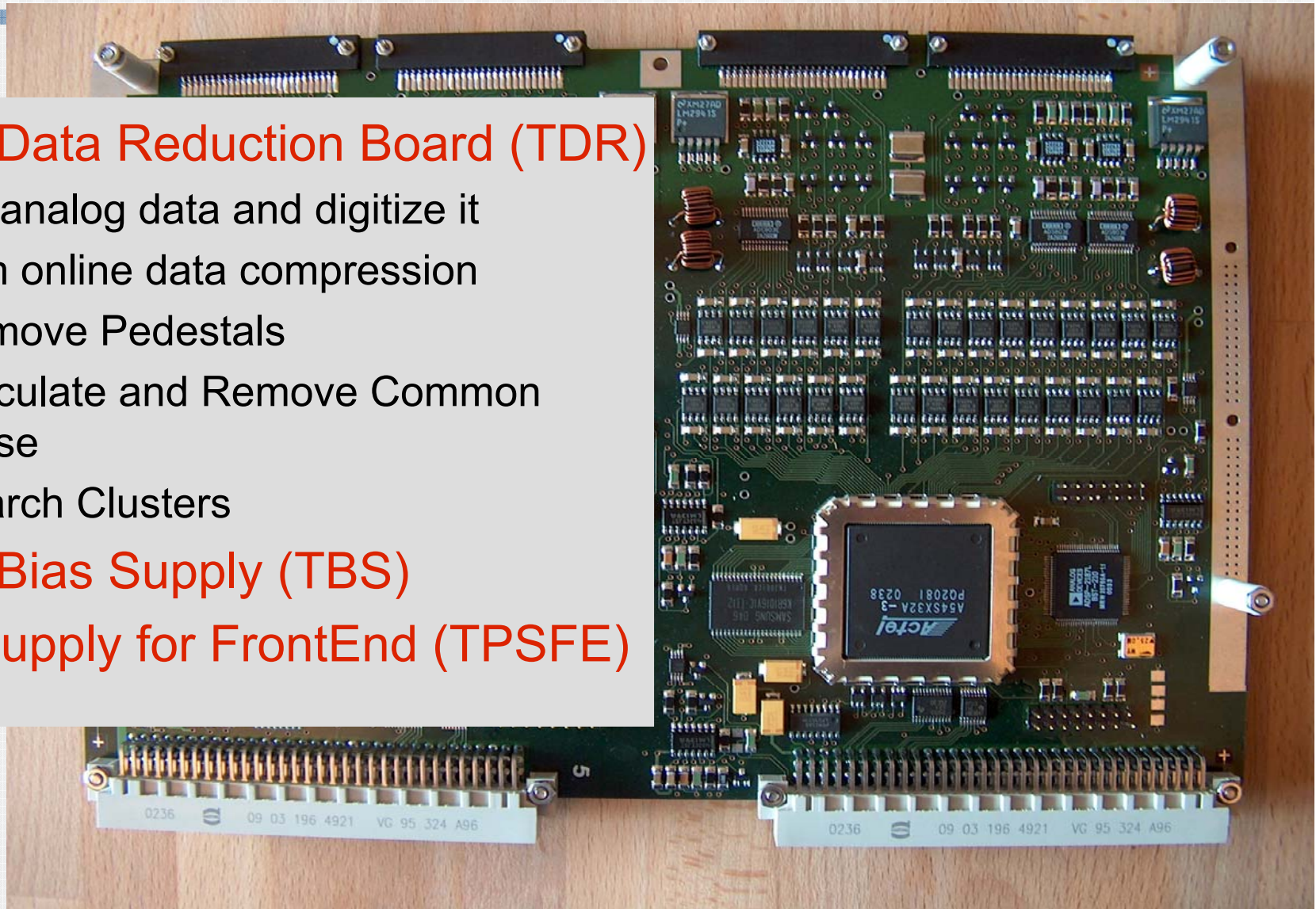
# Silicon Tracker - Electronics...

## Tracker Data Reduction Board (TDR)

- Collect analog data and digitize it
- Perform online data compression
  - Remove Pedestals
  - Calculate and Remove Common Noise
  - Search Clusters

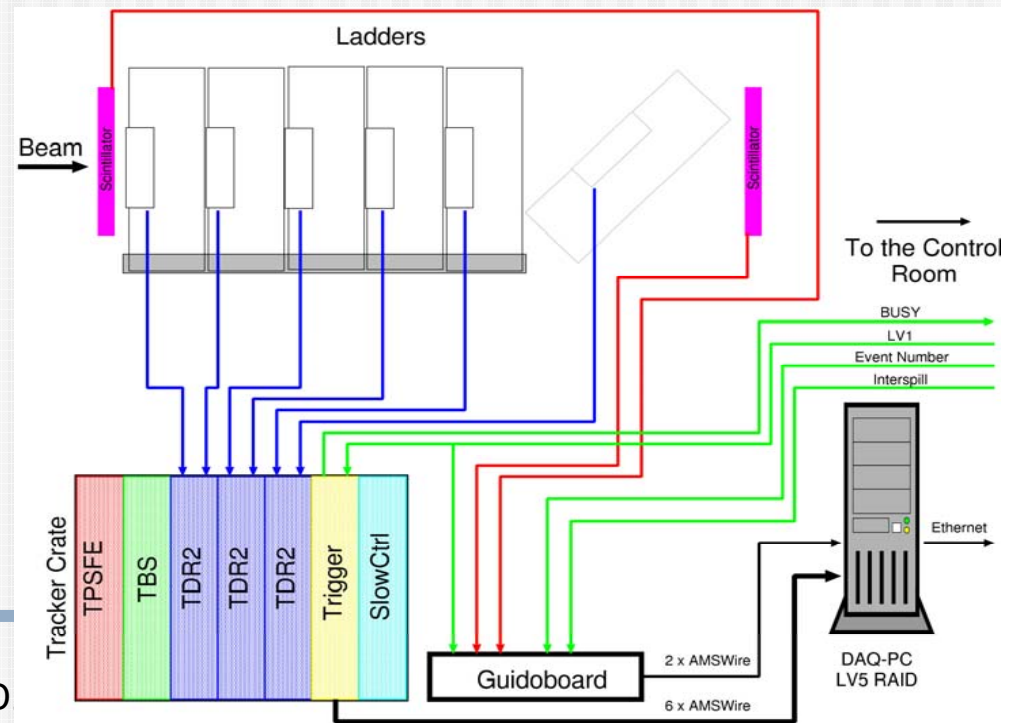
## Tracker Bias Supply (TBS)

## Power Supply for FrontEnd (TPSFE)

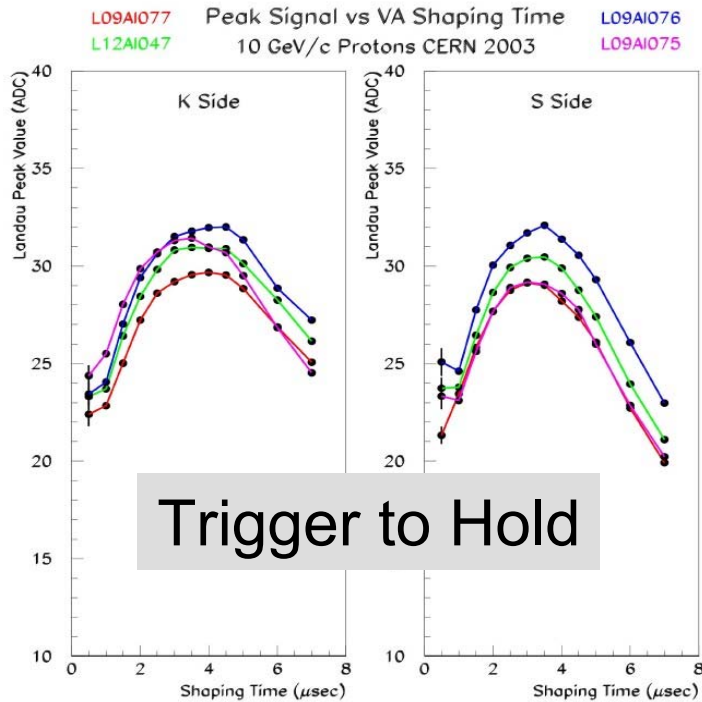


# Silicon Tracker - Qualification...

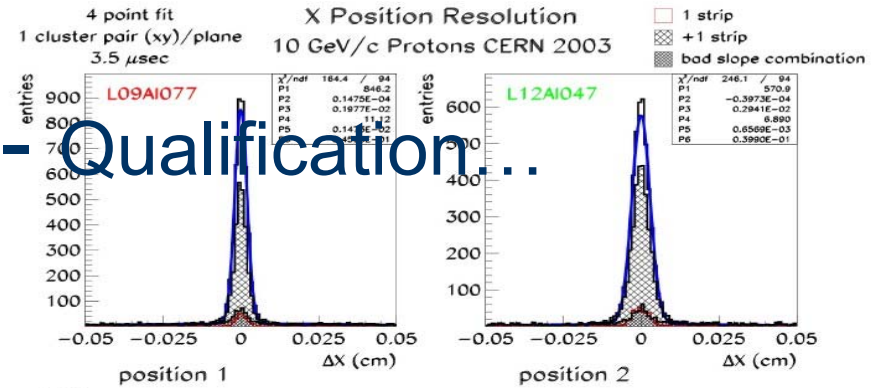
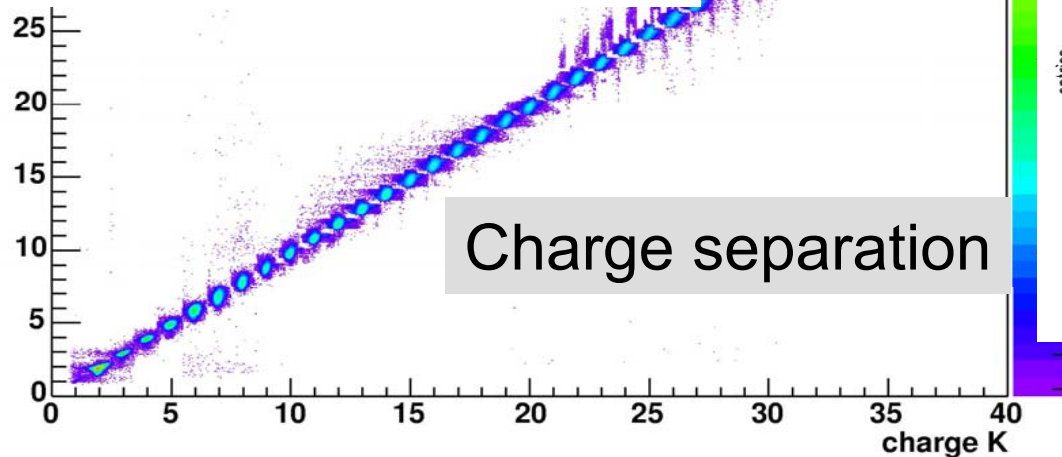
- Testbeams:
  - CERN SPS 10/2002 (p, ions)
  - CERN PS 6/2003 (p)
  - CERN SPS 10/2003 ('final' TDR2 boards)
  - GSI 11/2003 (dedicated ions)
  - CERN PS 9/2004 (full electronics)
  - CERN SPS 2006 upcoming



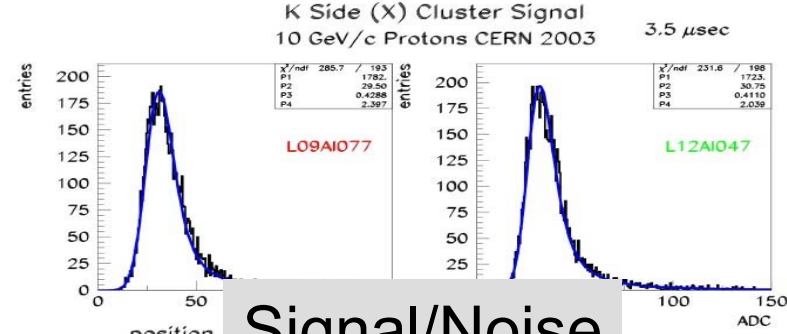
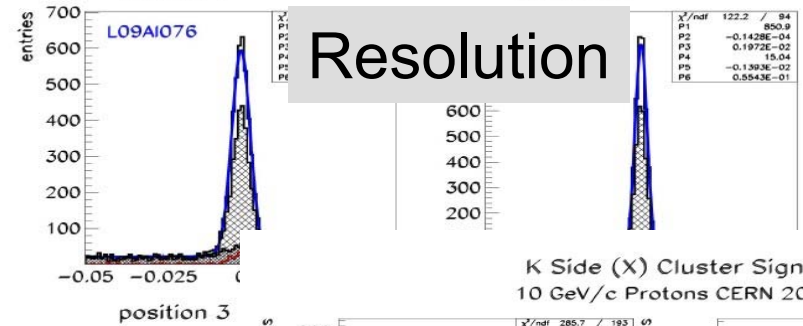
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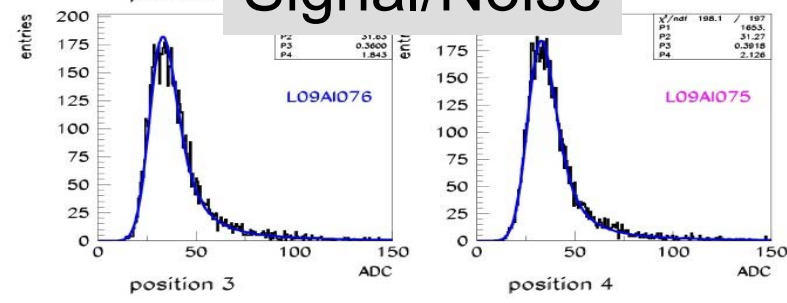
Trigger to Hold



Resolution



Signal/Noise

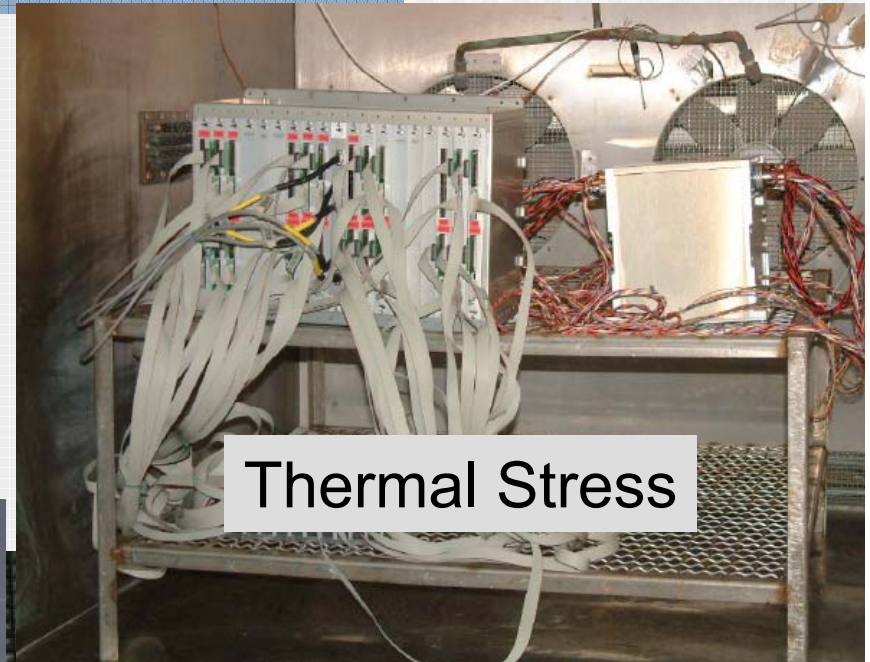




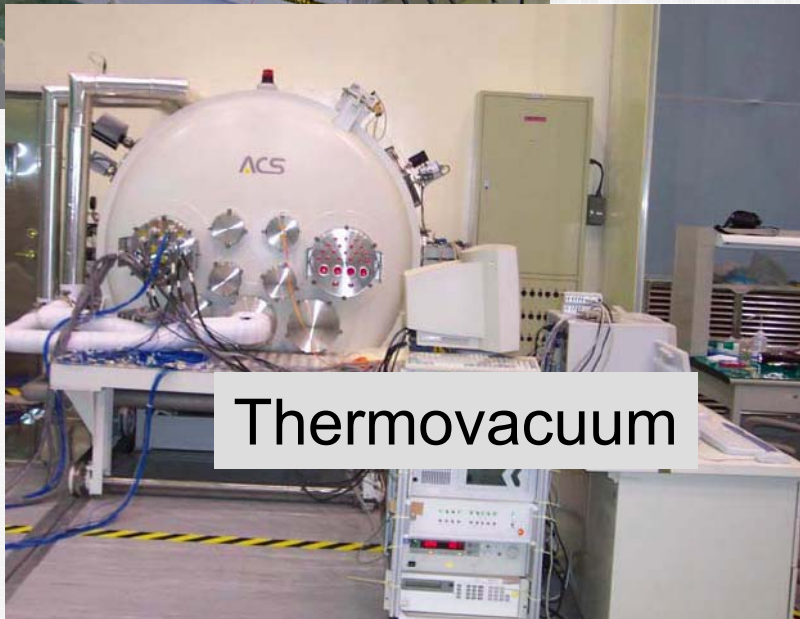
# Electronics - QA/Space Qualification...



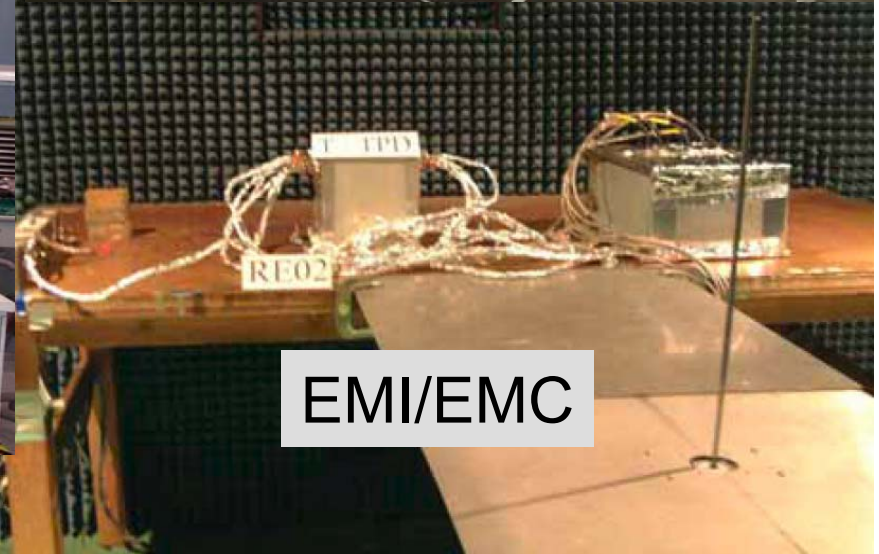
Vibration



Thermal Stress



Thermovacuum

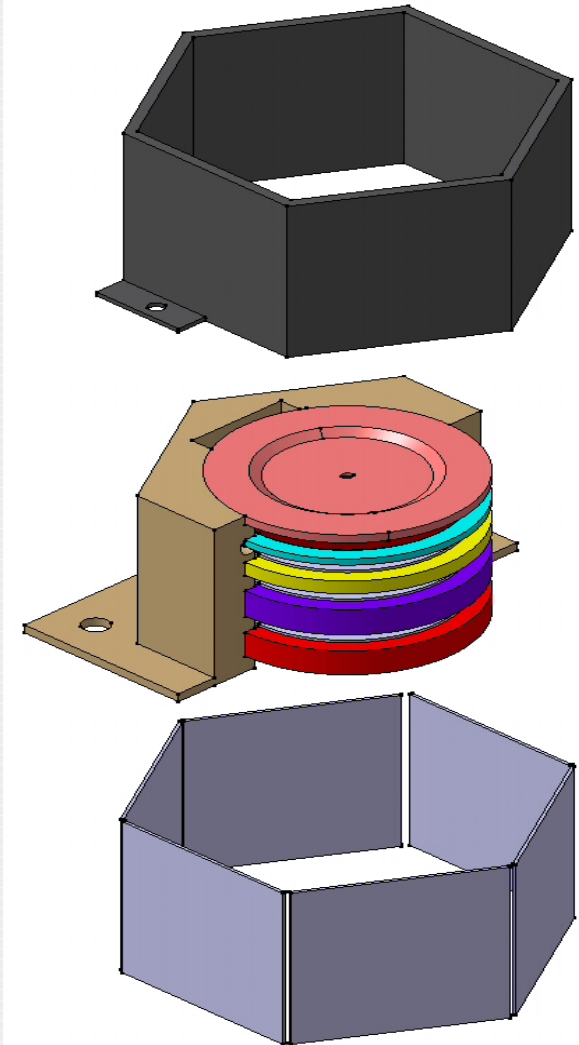


EMI/EMC

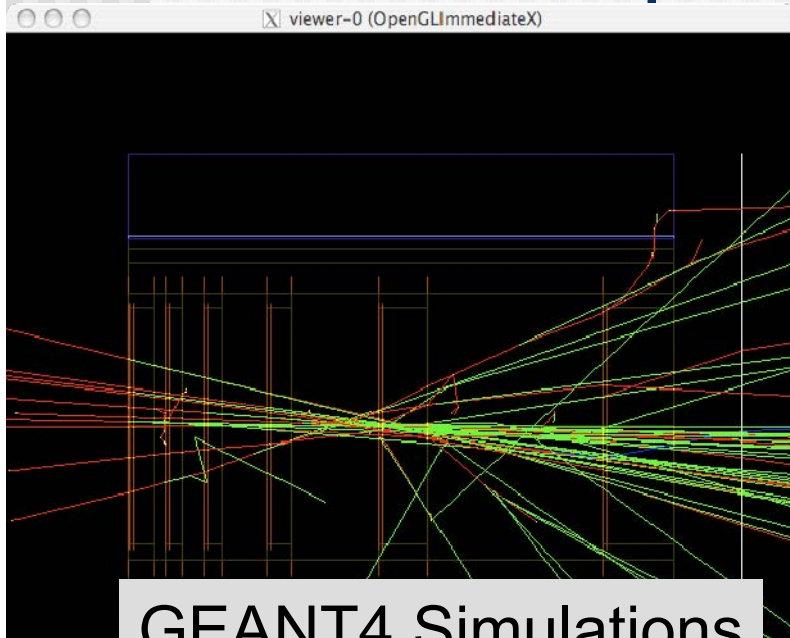


# General Space Environment Monitor

- Range Telescope with:
  - Measured quantities:
    - Range
    - $dE/dx$  in all layers
  - Stack of silicon PIN diodes and absorber layers
  - Size determined by rate about 2 cm diameter
  - Full digital readout
  - Active veto outside
  - Passive shield around Veto

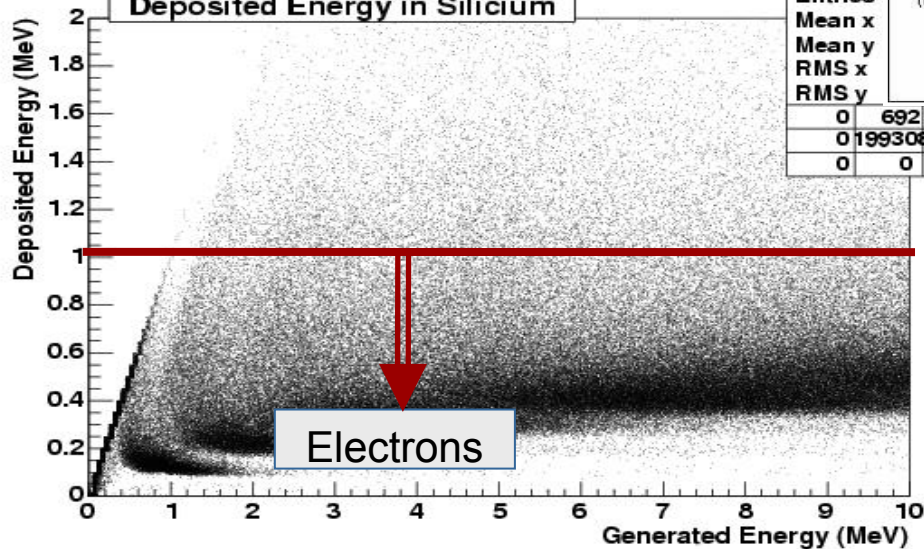


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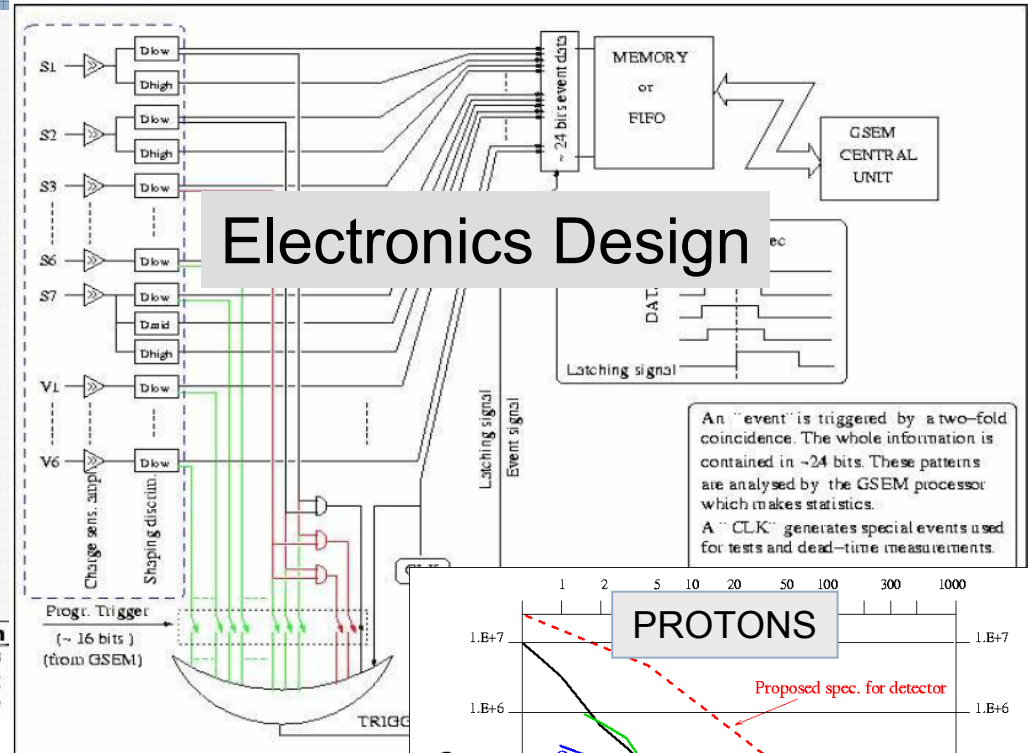


GEANT4 Simulations

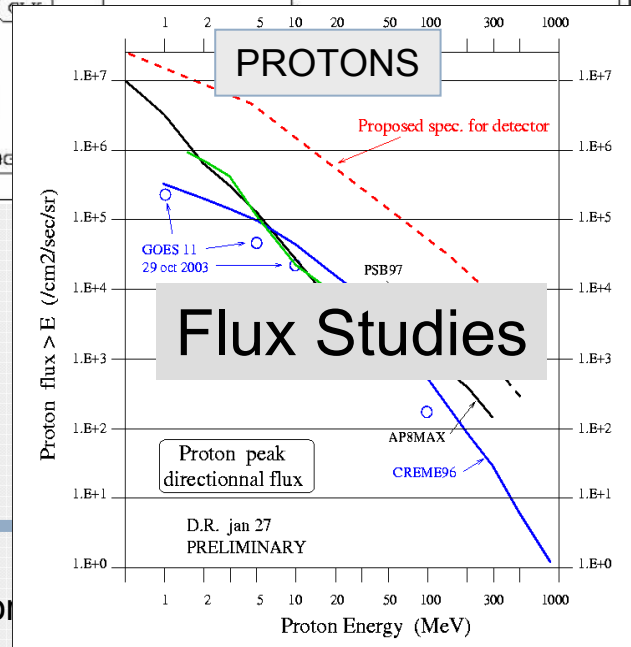
Deposited Energy in Silicium



| h2DEn | Entries | Mean x | Mean y | RMS x | RMS y |
|-------|---------|--------|--------|-------|-------|
| 0     | 692     | 0      | 0      | 0     | 0     |
| 0     | 199308  | 0      | 0      | 0     | 0     |
| 0     | 0       | 0      | 0      | 0     | 0     |



JRA-1 Brainston



# To Summarize:

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- Geneva group has experience with:
  - Silicon detectors:
    - Design, assembly, testing
  - Frontend and readout electronics
    - Design and construction of prototypes
    - Prototype-Readout of Mimoso Chip (not mentioned before)
    - Verification and quality assurance
    - Space qualification following NASA/ESA standards (lots of paperworks, strict rules!)
- Looking forward to contribute to a LC testbench (See Martin's talk tomorrow)

