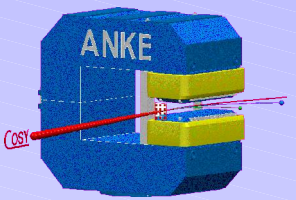
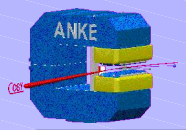
Forschungszentrum Jülich
in der Helmholtz-Gemeinschaft

From 

Preparations for Spin-Filtering Experiments

to Polarized Antiproton EXperiments



Spin Filtering Studies at C

Polarized Antiproton EXperiments

Depolarization Setup November 2007

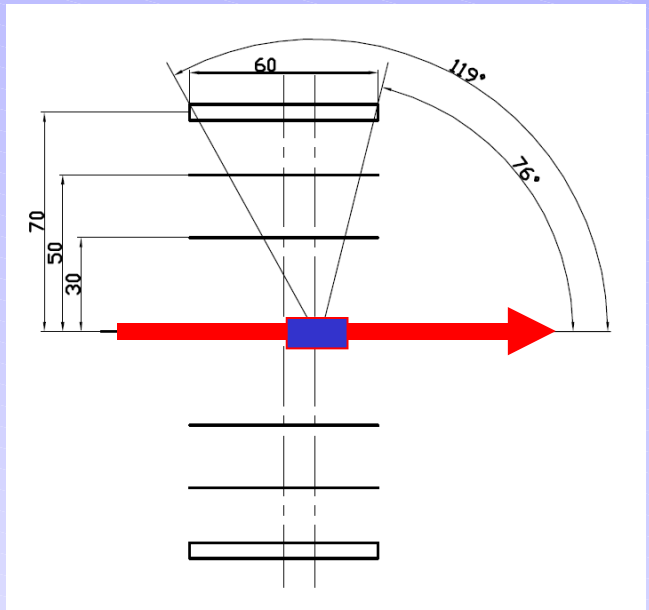
Preparing two Silicon Tracking Telescopes

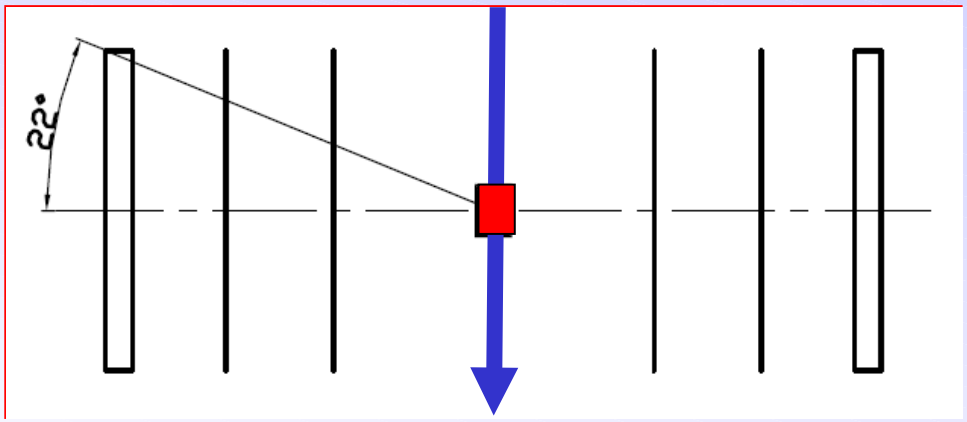
Preparing Laboratory Test Stations

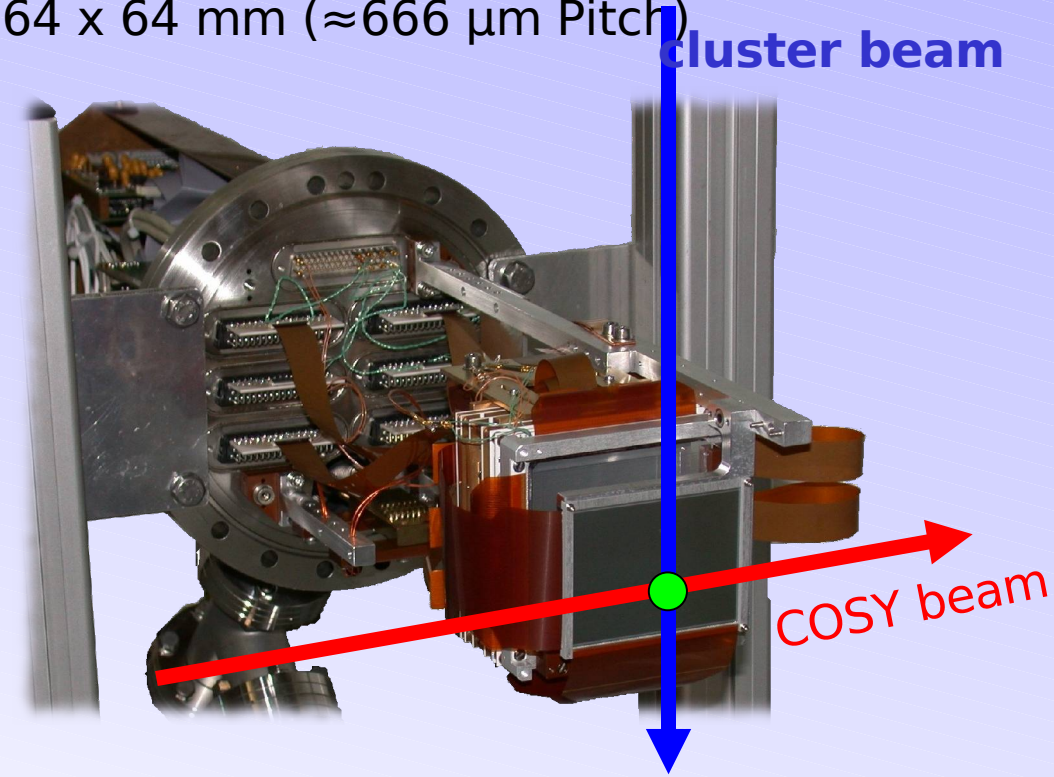
Hermes Recoil Detector goes PAX

Depolarization: ANKE Setup

- 3 silicon detector layers
  - 69 µm silicon
  - 300µm silicon
    128 x 151 segments
    51 x 66 mm (≈400 µm pitch)
  - >5 mm Si(Li)
    96 x 96 strip
    64 x 64 mm (≈666 µm Pitch)

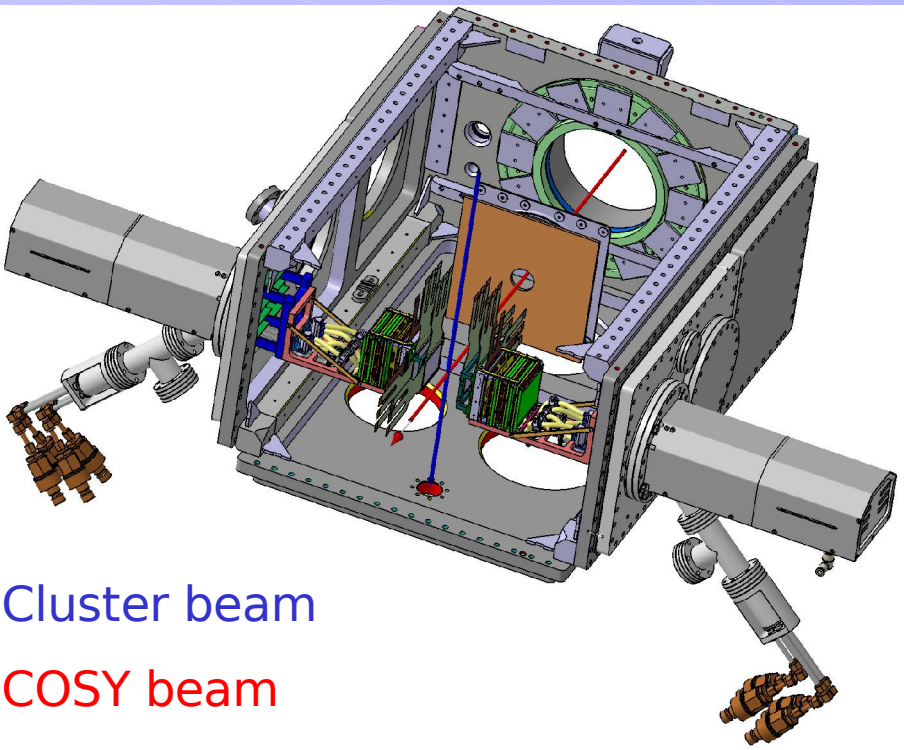






Depolarization: ANKE Setup

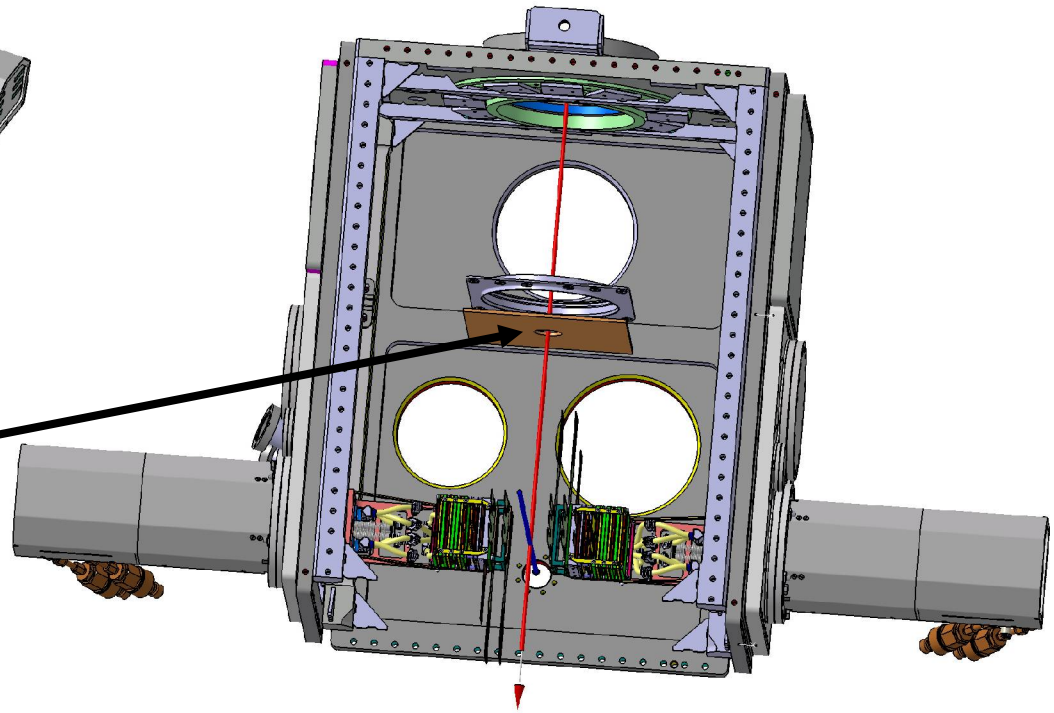
ANKE Target Chamber



Cluster beam

COSY beam

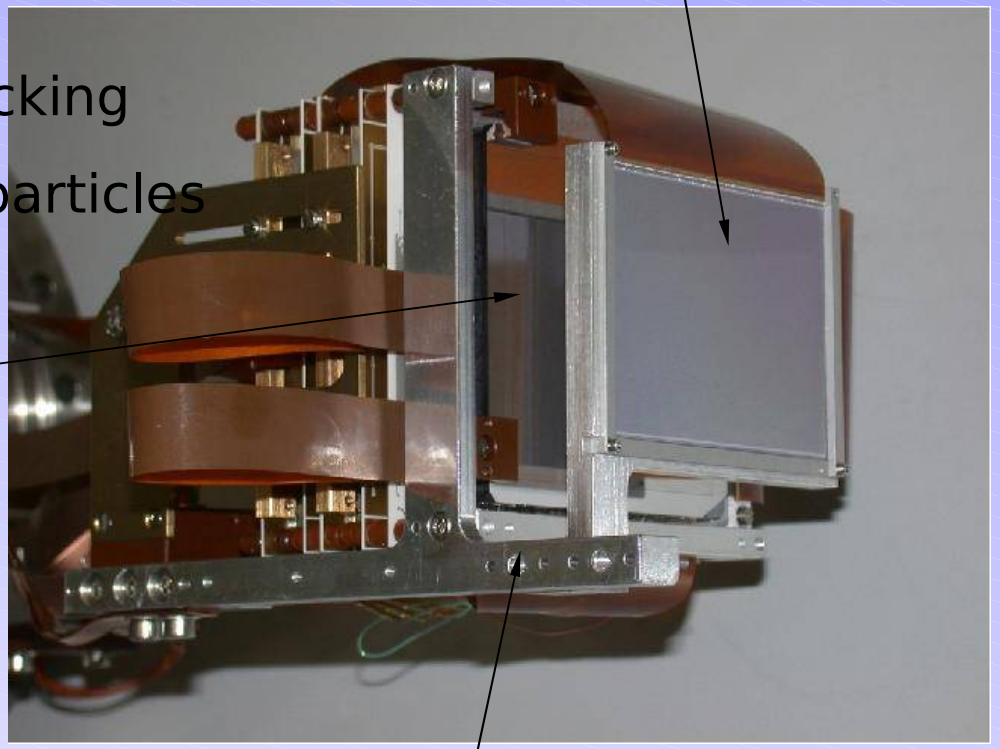
Injection Protection Shield

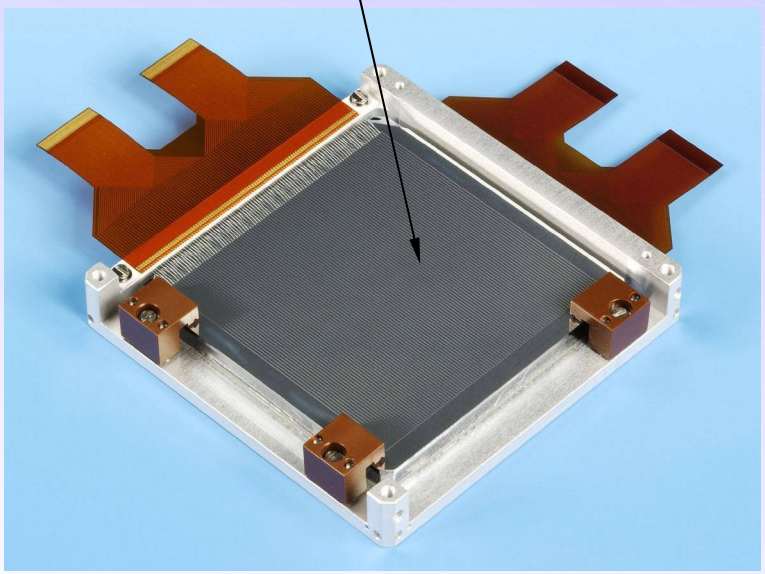


Preparing two STTs

Two range telescopes with 3 layers of x,y silicon detectors provide

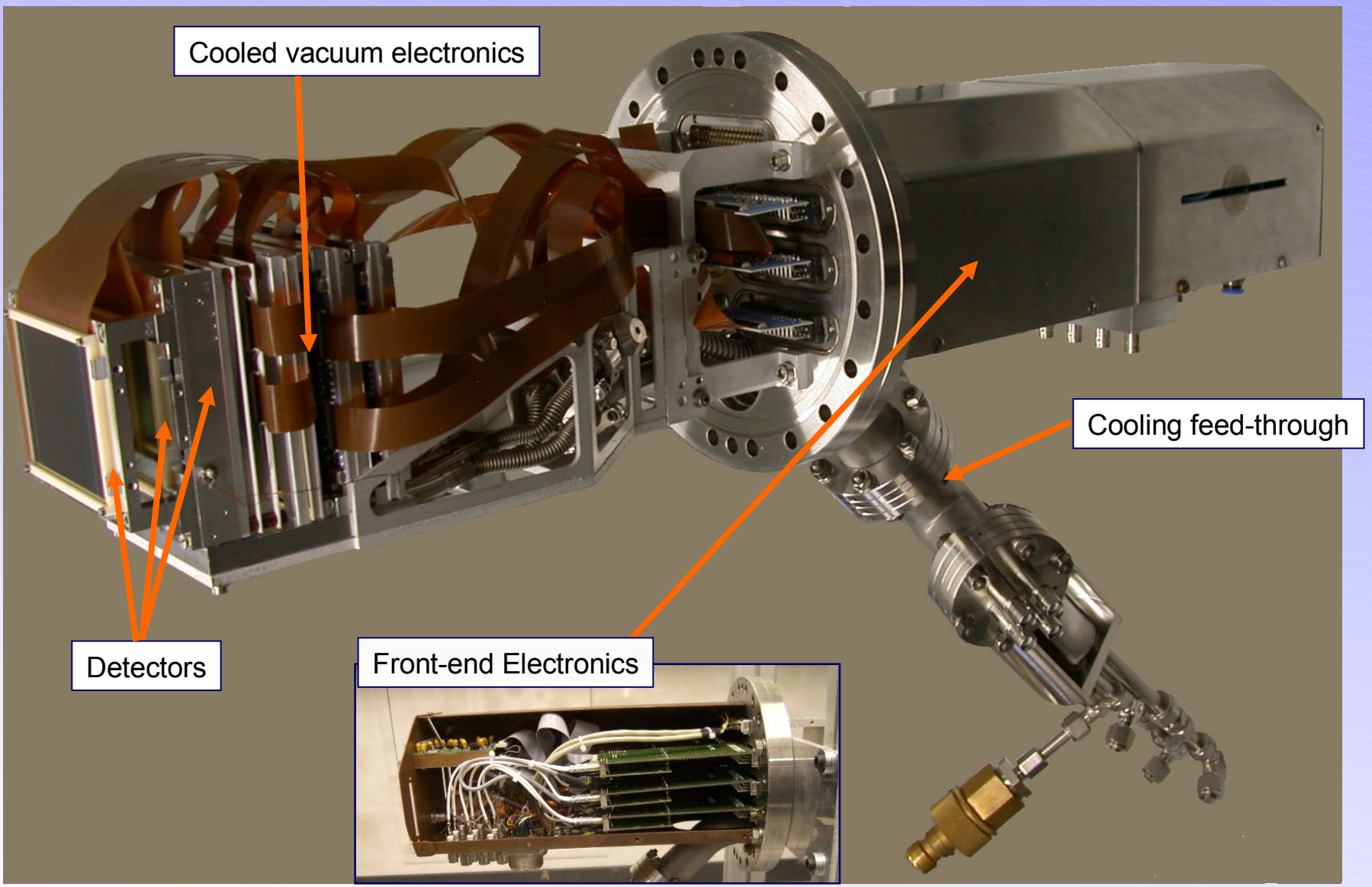
2. ΔE/E particle identification and tracking
3. Energy determination of stopped particles
4. Self-triggering
5. Time-resolution





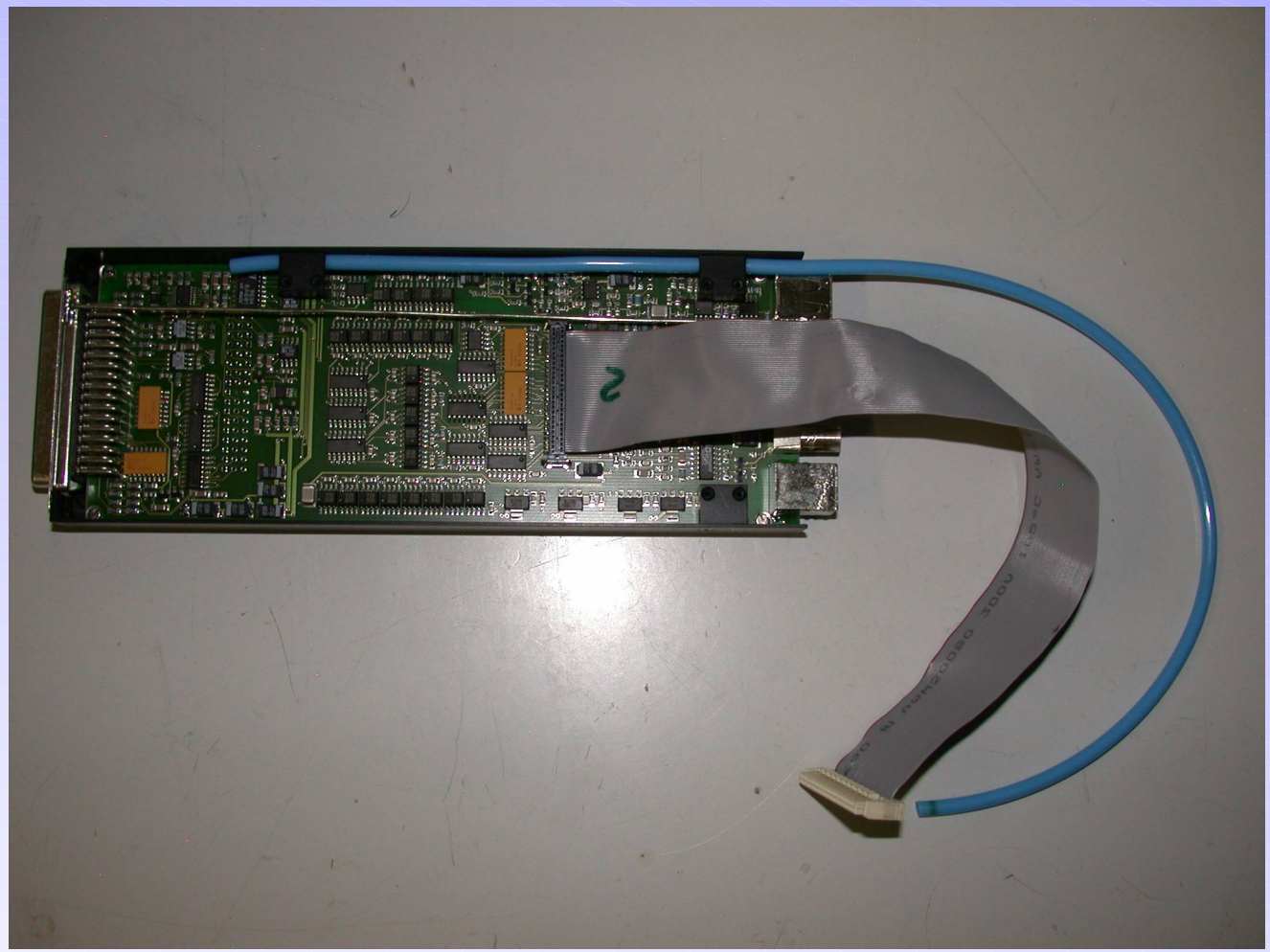
Depolarization: Preparing Two STTs

Two telescopes for November 2007



Depolarization: Front-end Electronic

Prepare, check and calibrate ~ 24 Front-end Cards



→ Sergey Merzlyakov: Detector Test Station

Depolarization: Detectors

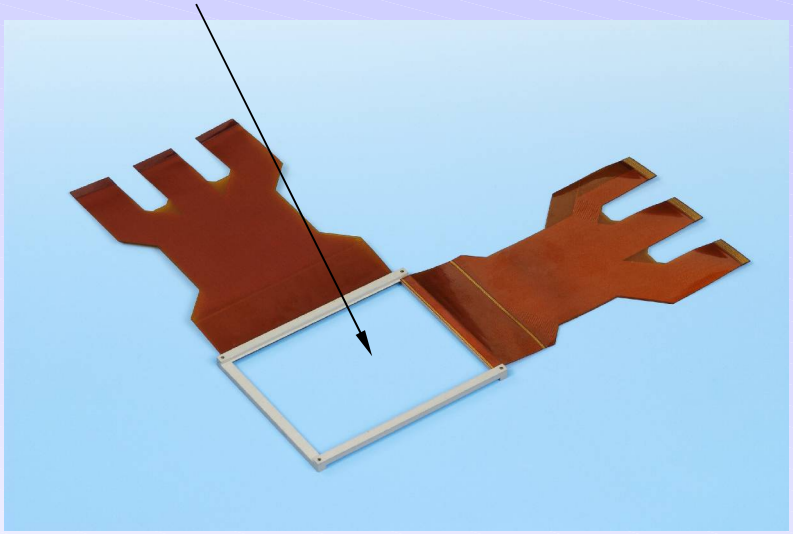
$$69\mu m,\ \Delta E < 2.5MeV,\ 66\cdot 52mm^2,\ \sim 0.4mm\ pitch$$

$$300\mu m,\ \Delta E < 6.2MeV,\ 66\cdot 52mm^2,\ \sim 0.4mm\ pitch$$

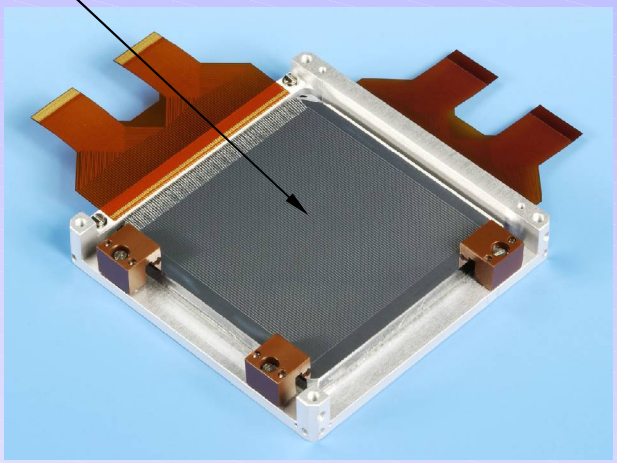
$$500\mu m,\ \Delta E < 8.2MeV,\ 66\cdot 52mm^2,\ \sim 0.4mm\ pitch$$

$$5500\mu m,\ \Delta E < 40MeV,\ 64\cdot 64mm^2,\ \sim 0.7mm\ pitch$$

69/300/500 µm Si-detector,
Micron Semiconductur, England



5100–20000µm thick Si(Li) detectors,
IKP Semiconductor Laboratory

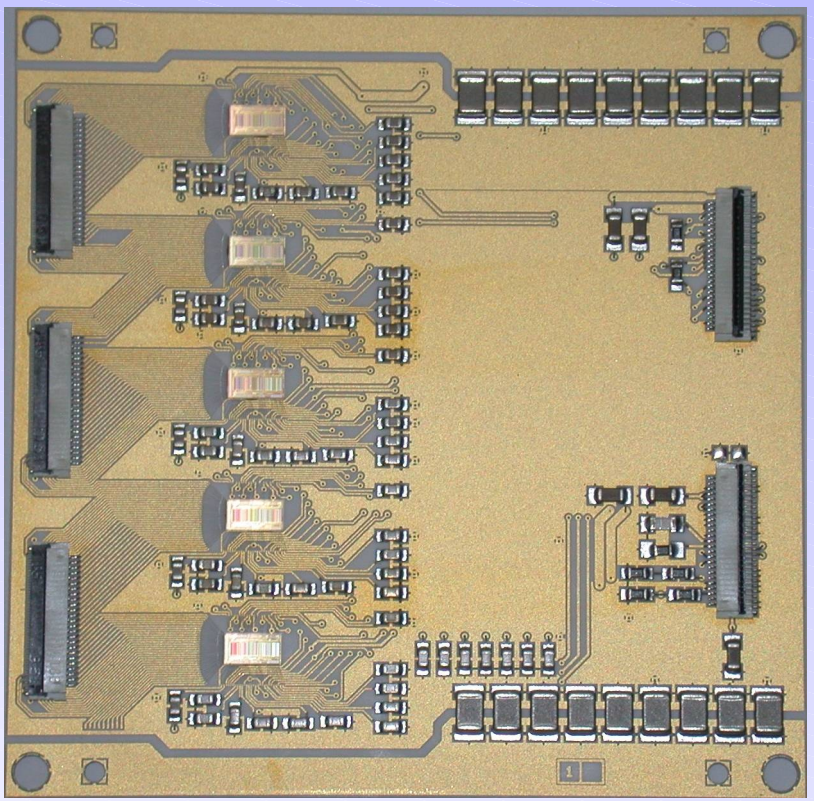


→ Sergey Merzlyakov: Detector Test Station

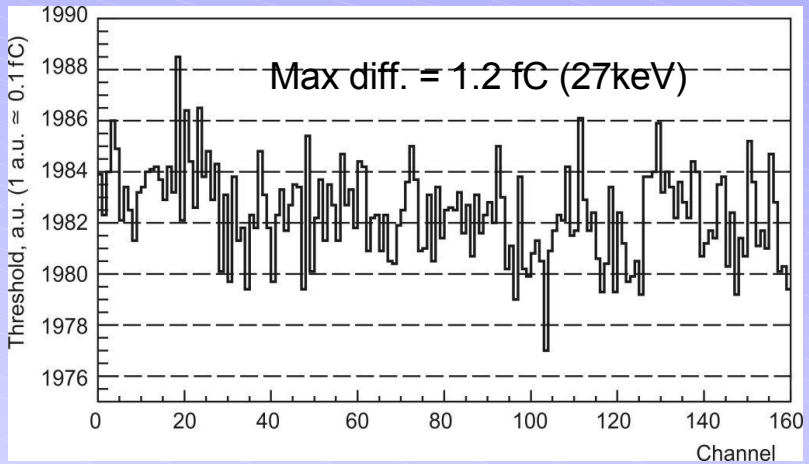
Bond Station

Prepare, check and calibrate ~ 20 VA32TA2 boards

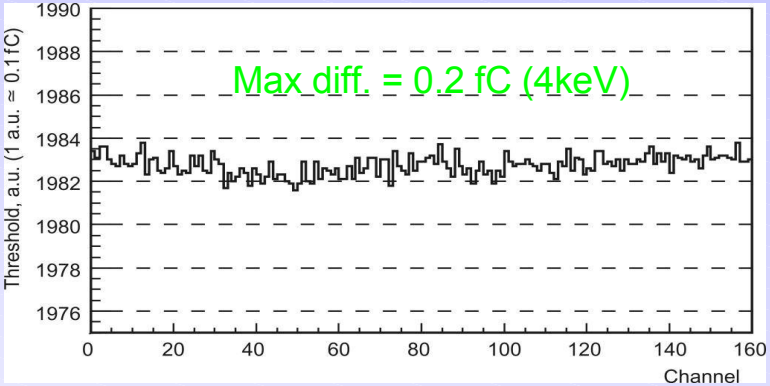
Check and threshold tuning of 12 VA32TA2 ceramic boards



Before threshold DAC-tuning…

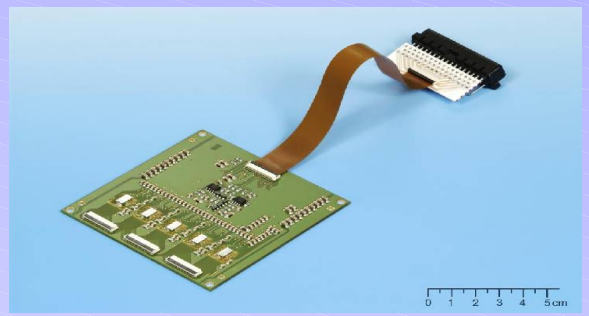


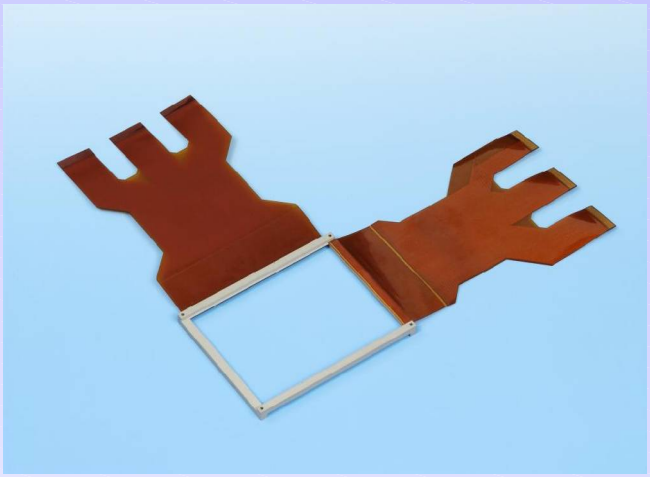
After threshold DAC-tuning…



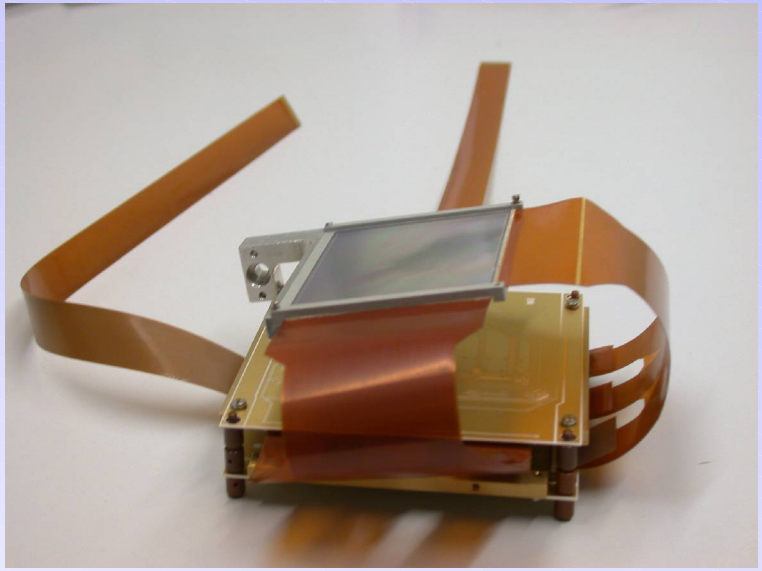
→ Sergey Merzlyakov: VME Test Station

Depolarization: Detector Setup



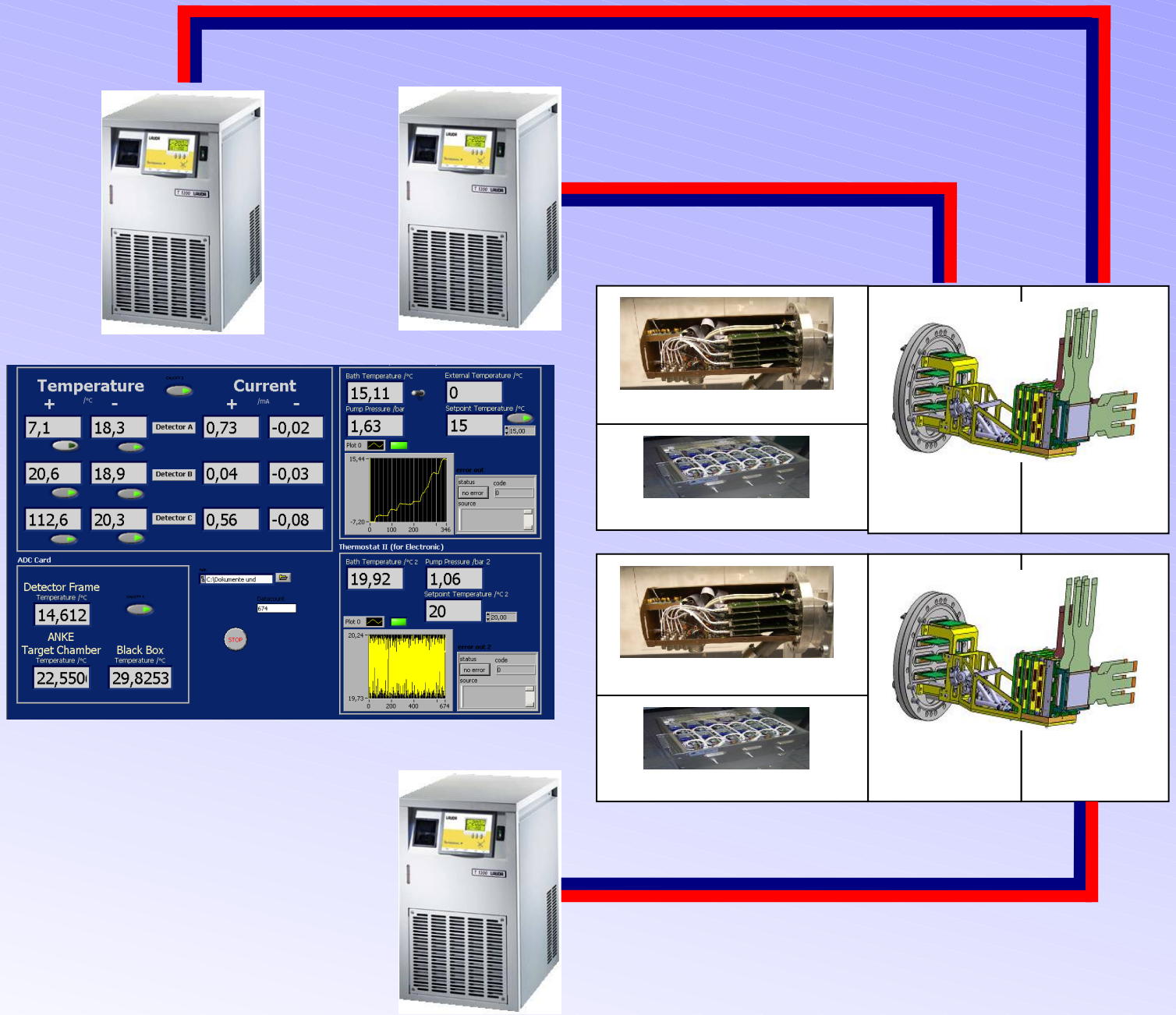


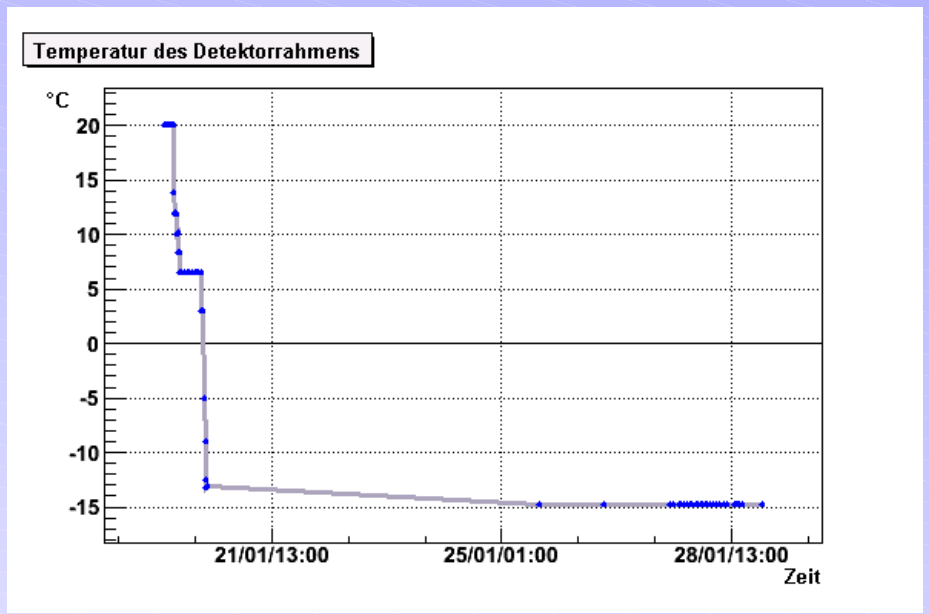
- 160 channels preamplifiers
- Dynamic range: 1-100 MIPs
- self-triggering
- 5(10) MHz read-out

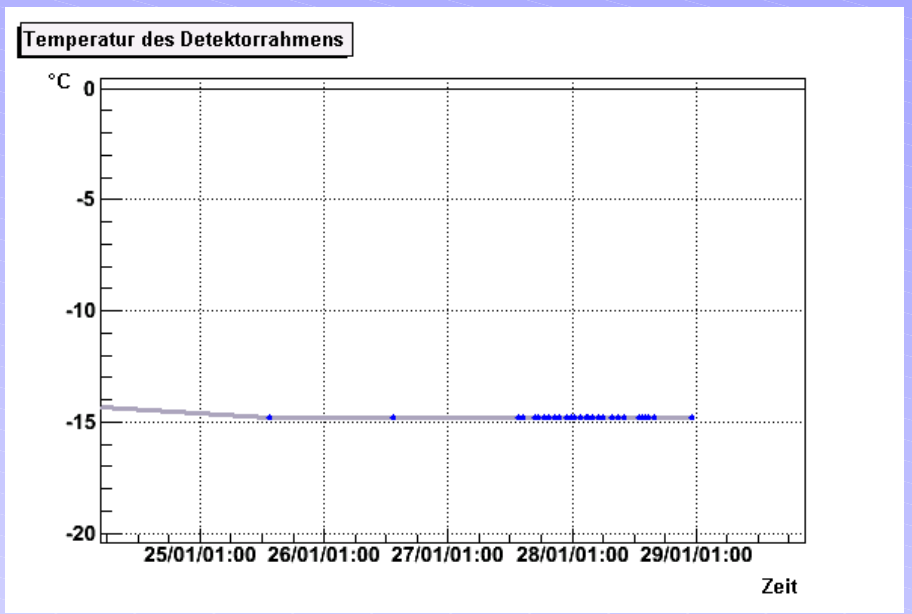


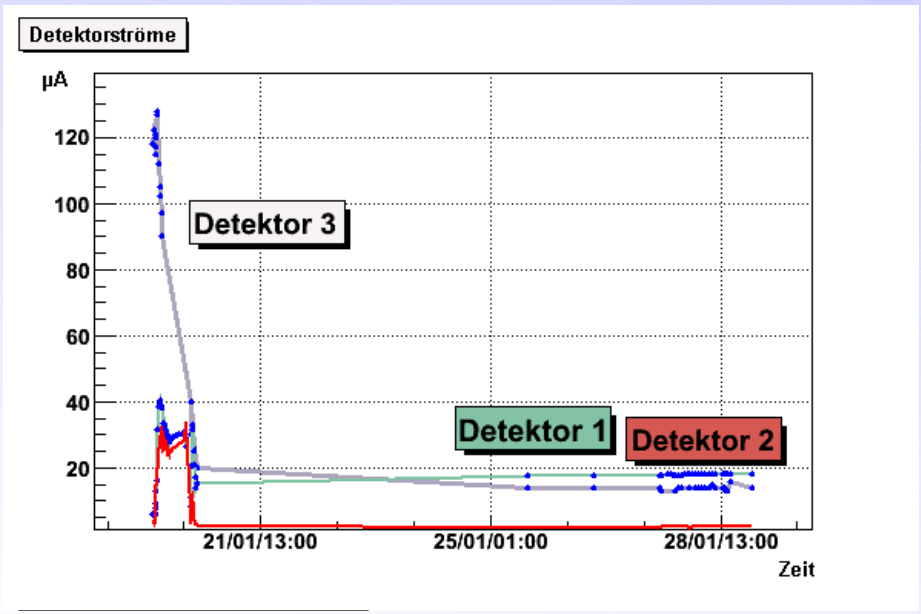
→ Sergey Merzlyakov: VME Test Station

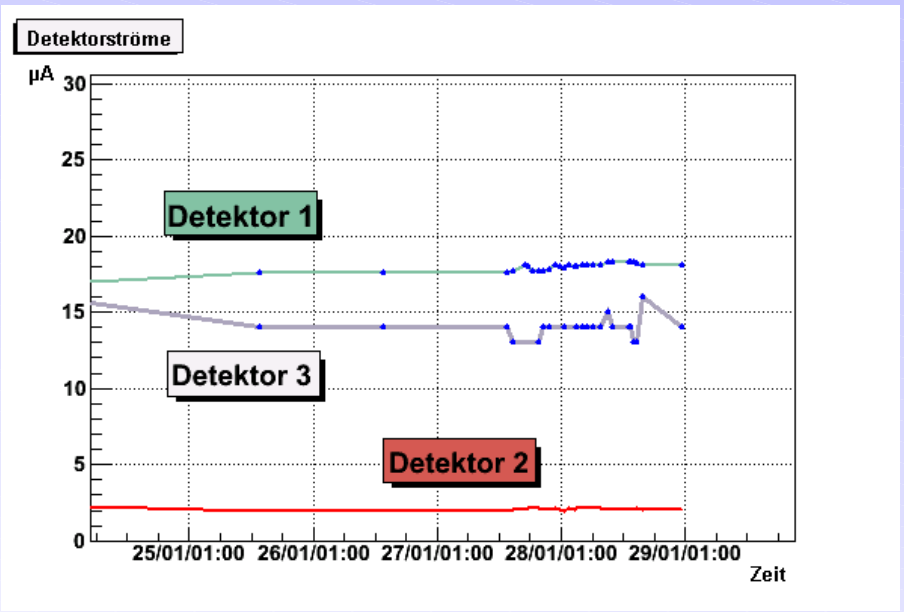
Depolarization: Cooling




Temperatur des Detektorrahmens
°C
20
15
10
5
0
-5
-10
-15
21/01/13:00
25/01/01:00
28/01/13:00
Zeit

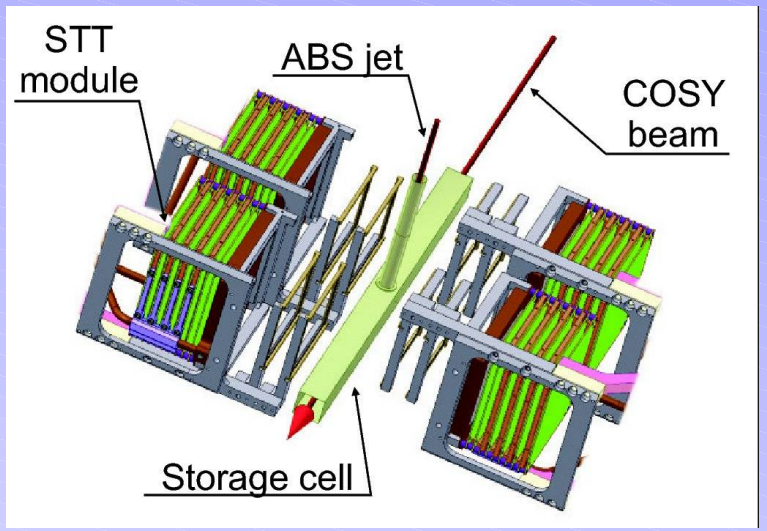

Temperatur des Detektorrahmens
°C
0
-5
-10
-15
-20
25/01/01:00
26/01/01:00
27/01/01:00
28/01/01:00
29/01/01:00
Zeit

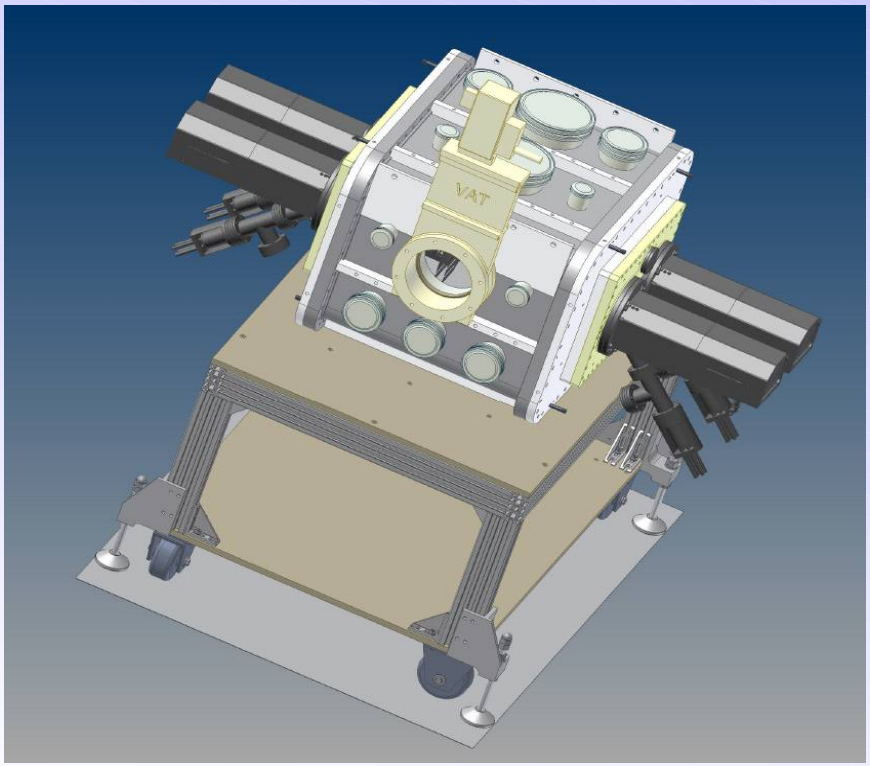

Detektorströme
µA
120
100
80
60
40
20
Detektor 3
Detektor 1
Detektor 2
21/01/13:00
25/01/01:00
28/01/13:00
Zeit

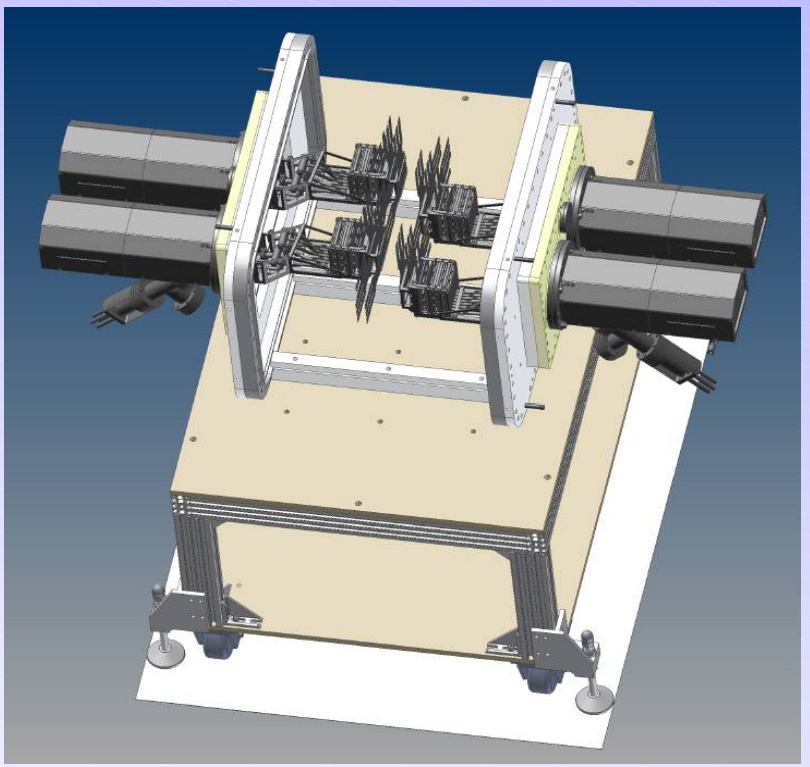

Detektorströme
µA
30
25
20
15
10
5
0
Detektor 1
Detektor 3
Detektor 2
25/01/01:00
26/01/01:00
27/01/01:00
28/01/01:00
29/01/01:00
Zeit

Preparing Laboratory Test Stations

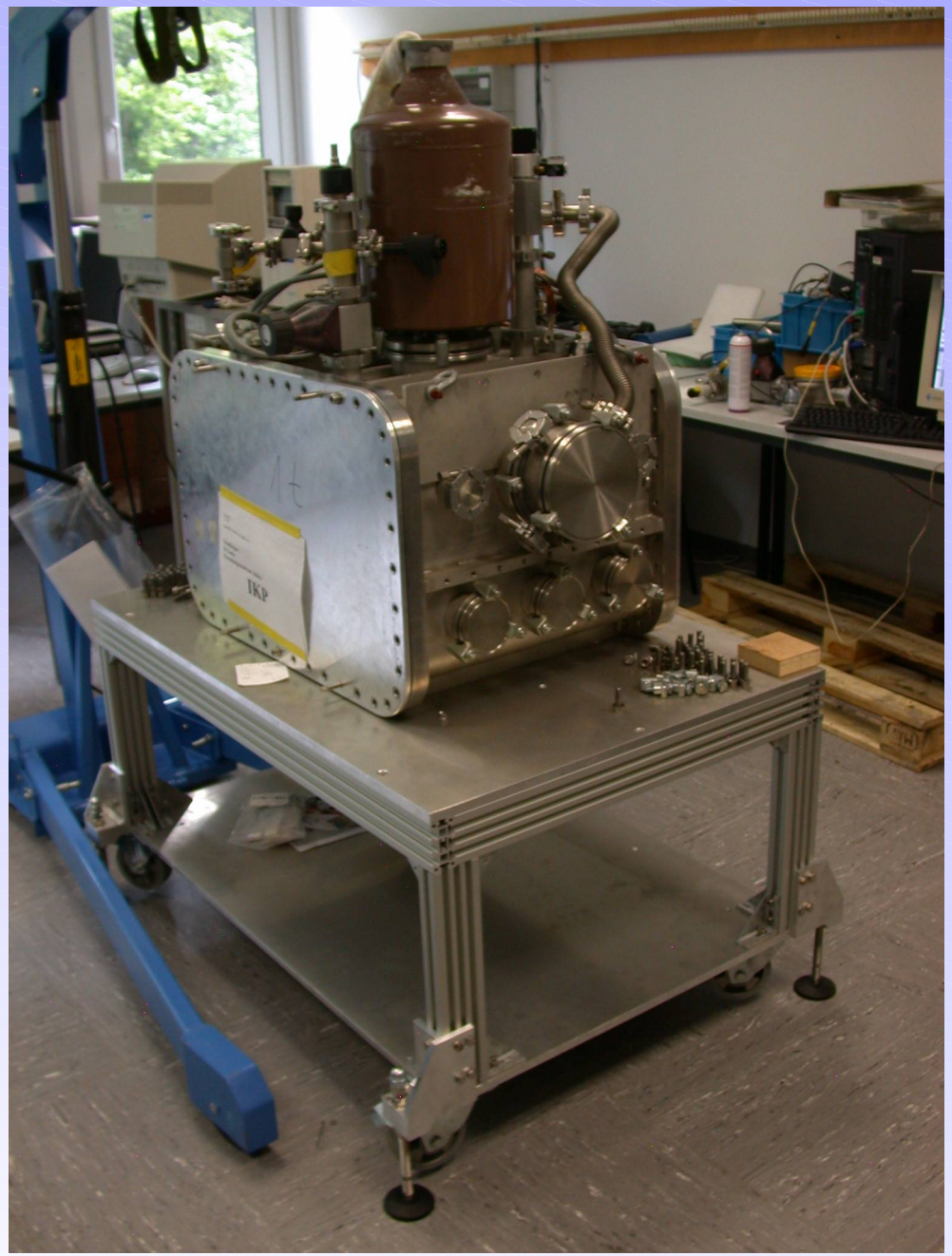
Detector Test Stations



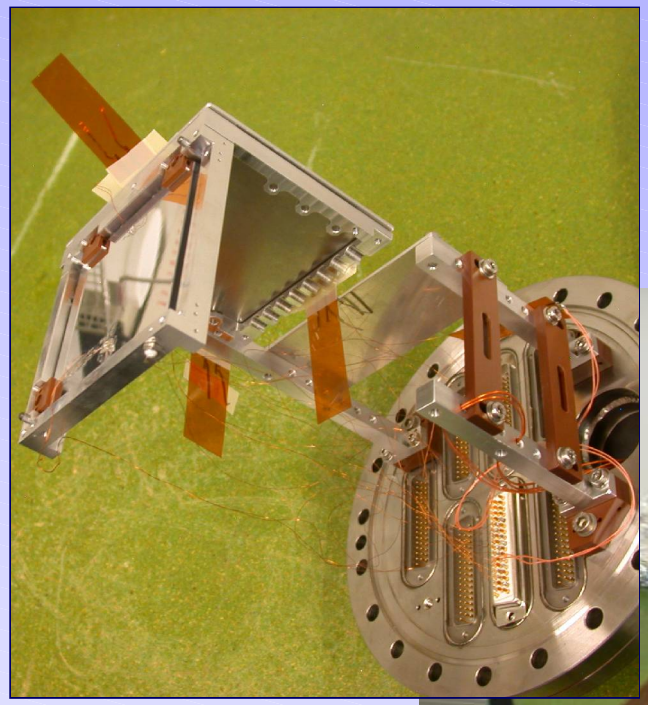




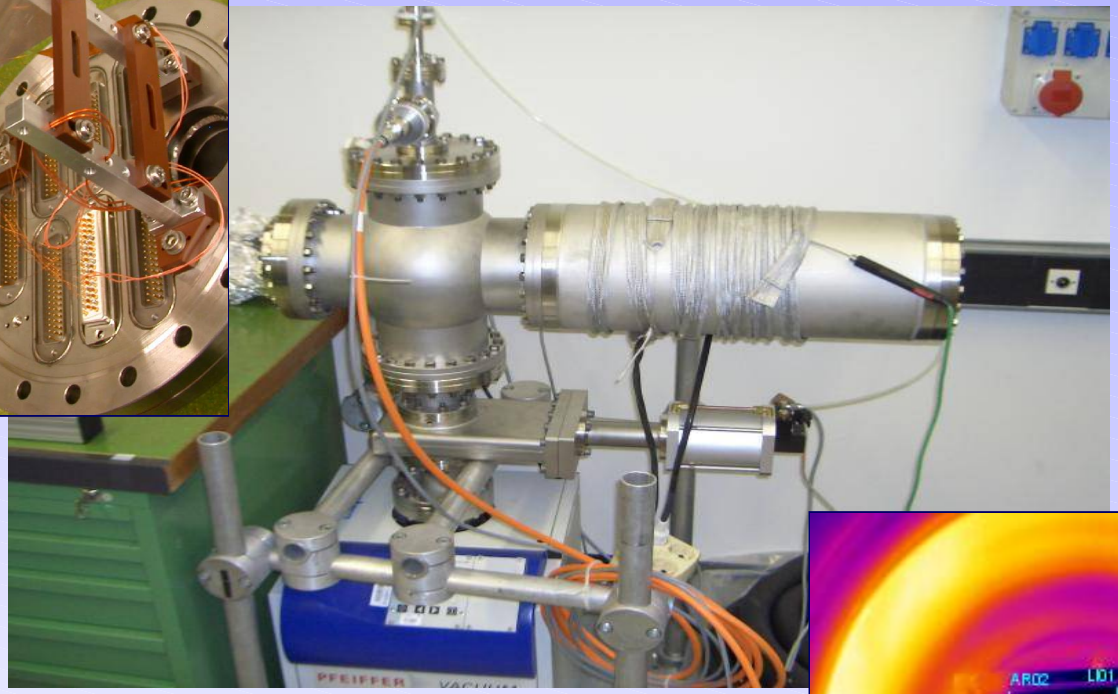
Detector Test Stations

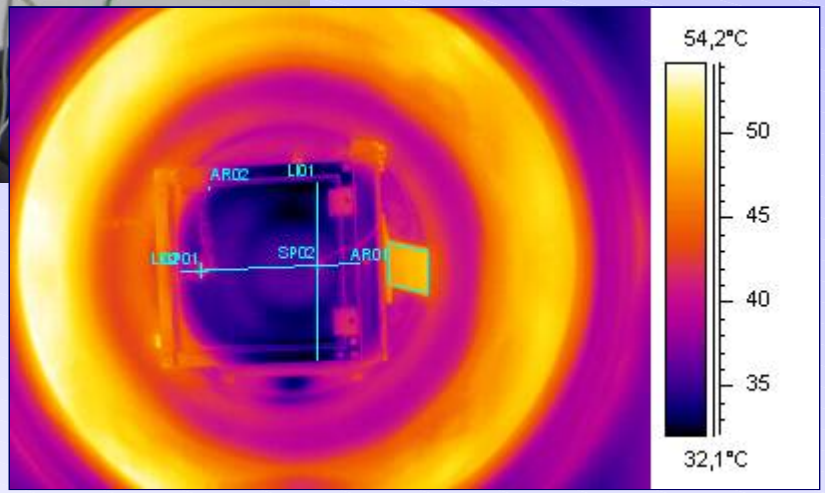


Detector Test Stations



Did we kill one detector by fast cooling/heating?

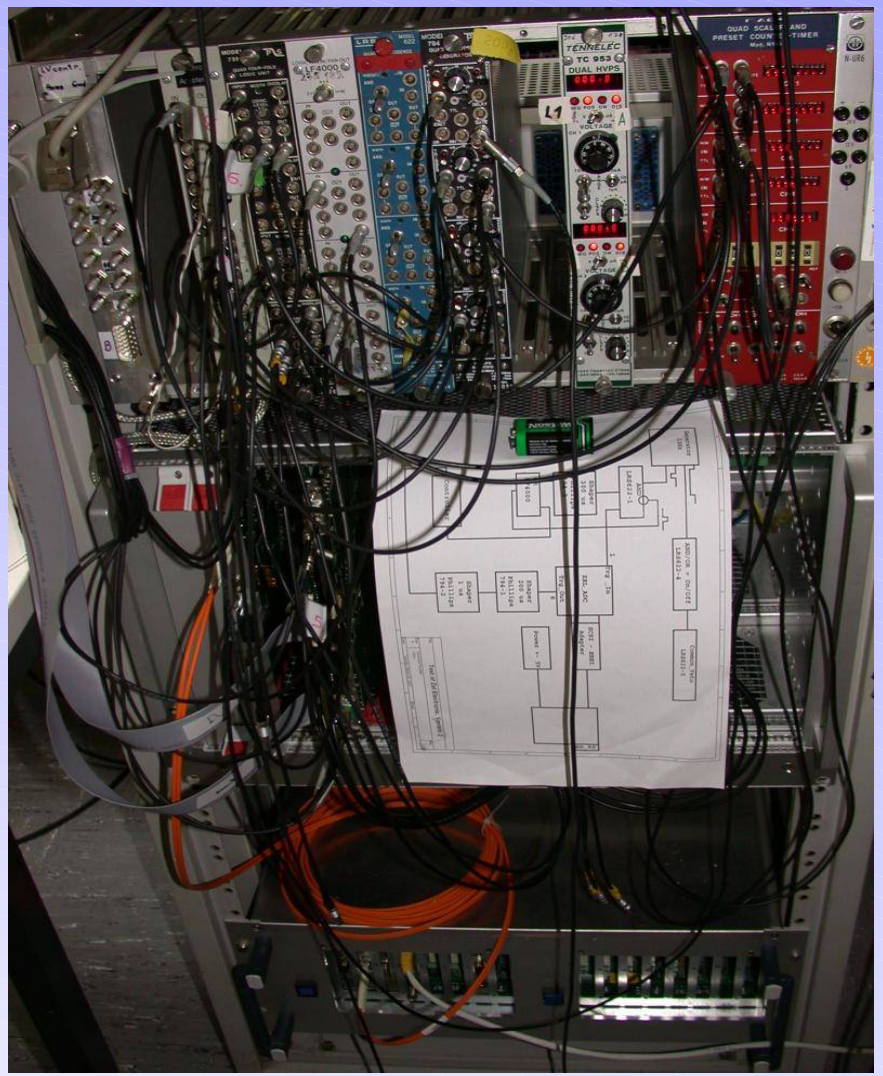




→ Sergey Merzlyakov

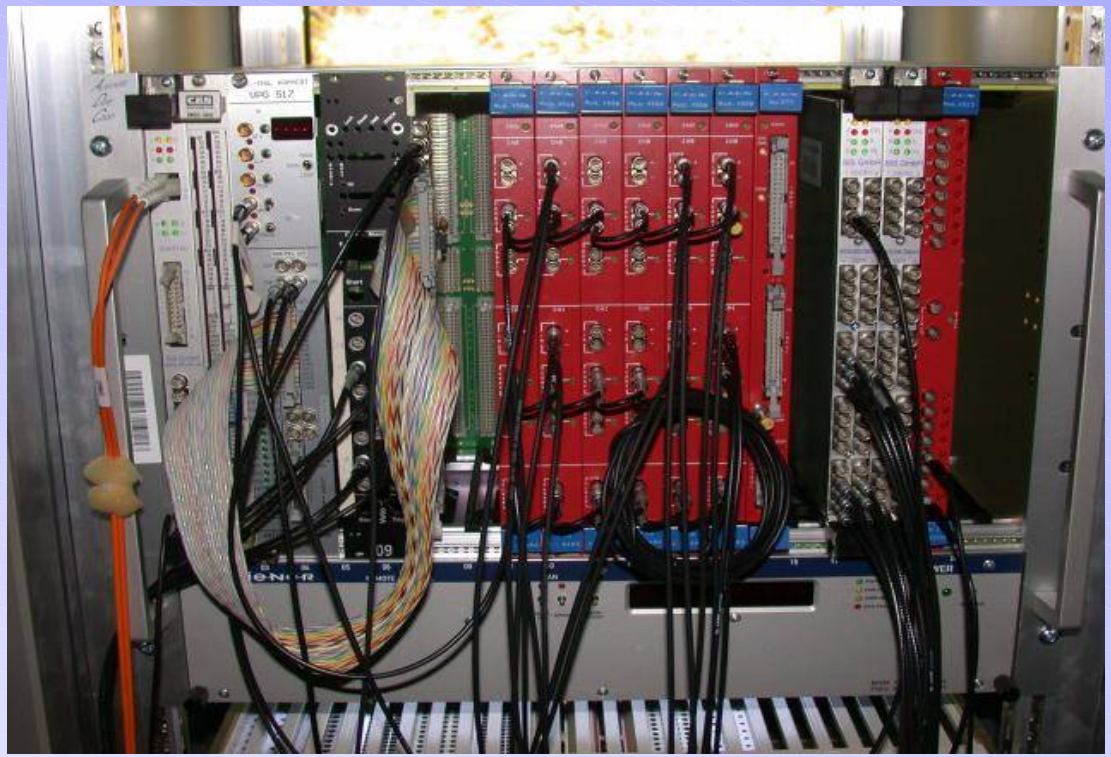
New ZEL DAQ System

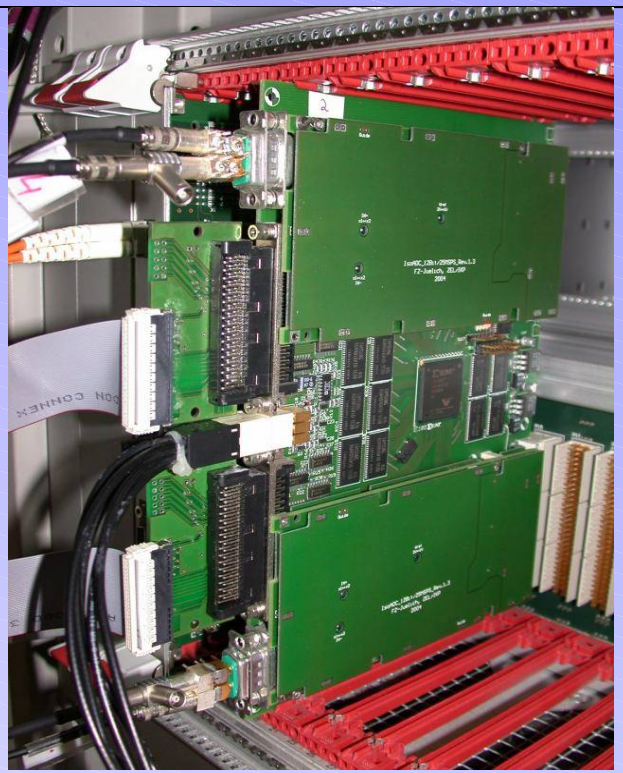
- Check new DAQ System



→ Luca Barion

New ZEL DAQ System





VME based system:

- 12Bit ADCs, 2MHz sampling
- One common sequencer
- No common-mode correction

→ ~1ms dead-time
~5MByte/s for one telescope

ZEL Vertex ADC (LVDS based system):

- 12Bit ADCs, 10MHz sampling
- One sequencer per detector side
- Hardware common-mode correction
→ zero suppression (< 0.1MByte/s)

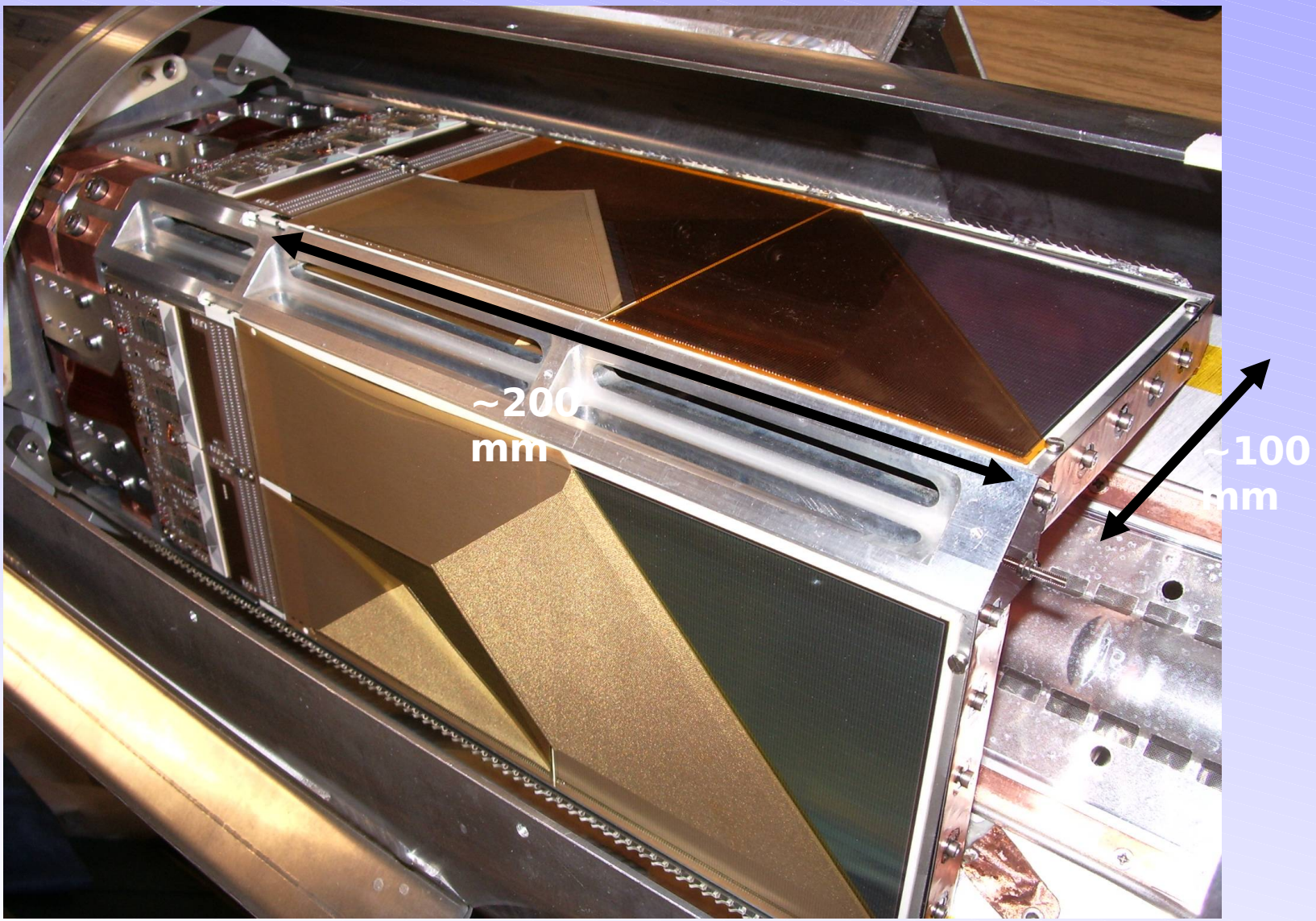
→ < 50 μs dead-time

HERMES Recoil Detector goes PAX

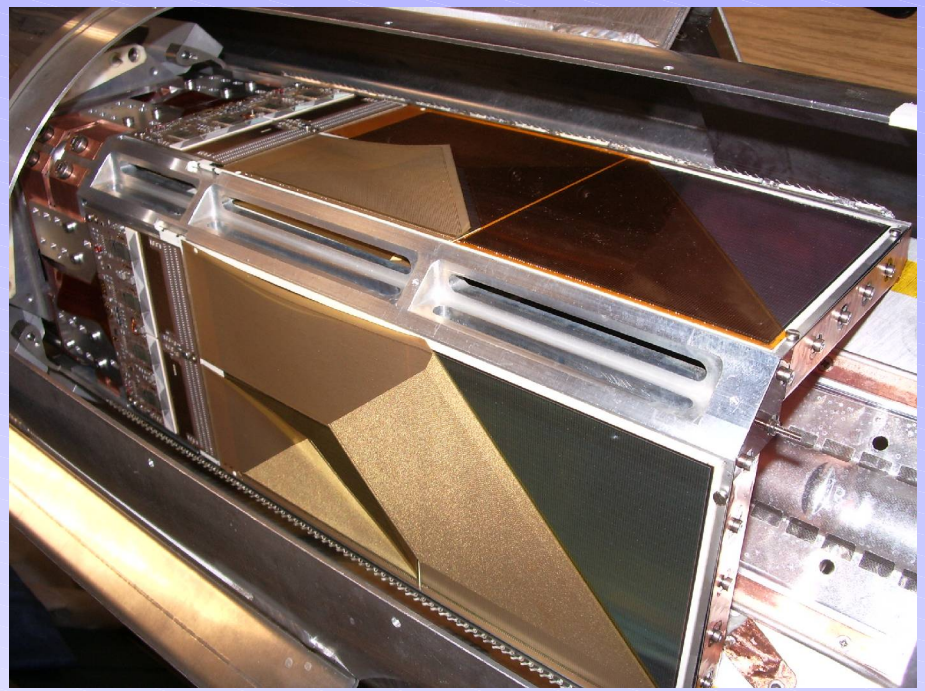
Silicon Detectors
LASER Test Station
Dimitrius

HERMES goes PAX: Silicon Detectors

4 modules * 2 layers * 2 detectors = 16 detectors



HERMES goes PAX: Silicon Detectors

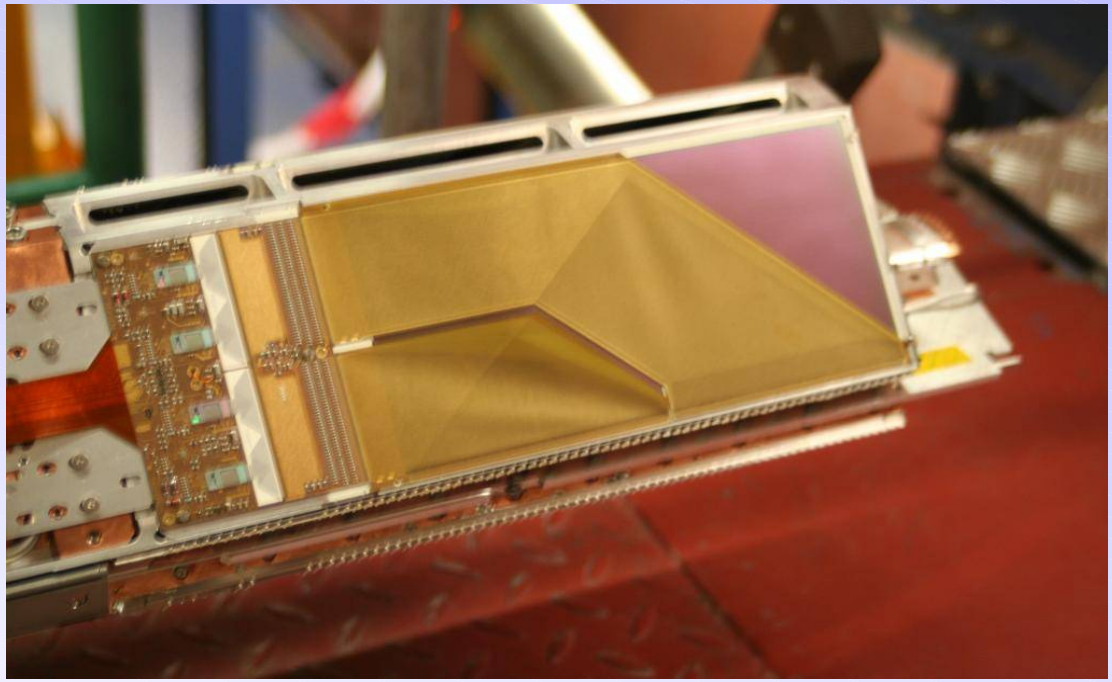


For Spinfiltering:

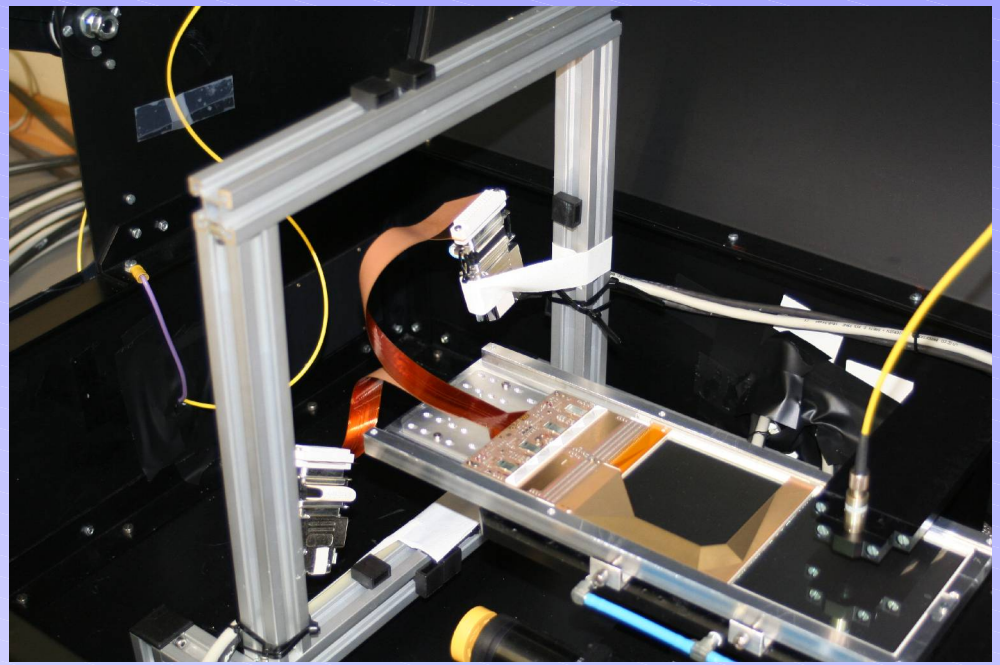
Self-Triggering front-end chips

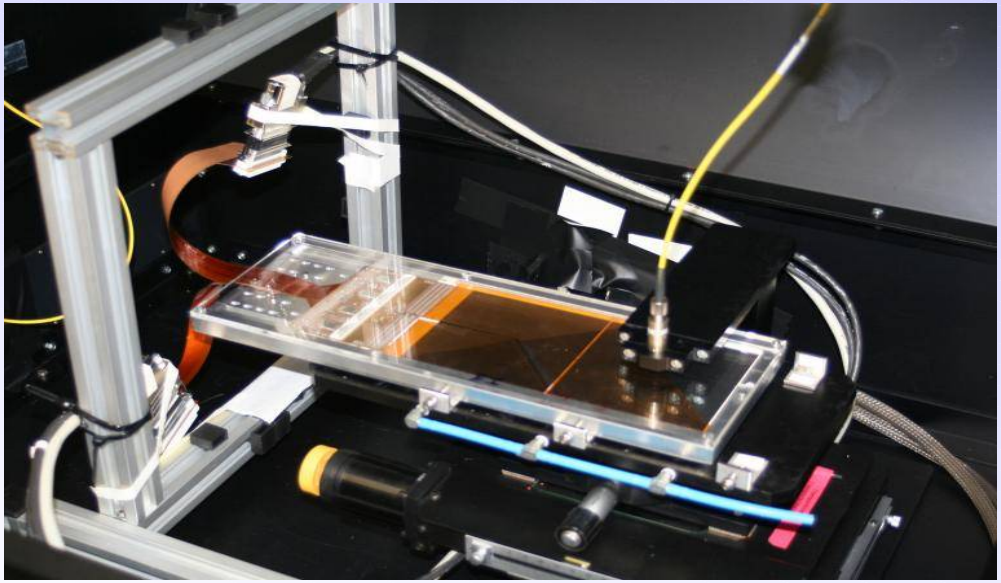
Mechanical assembly

Cooling

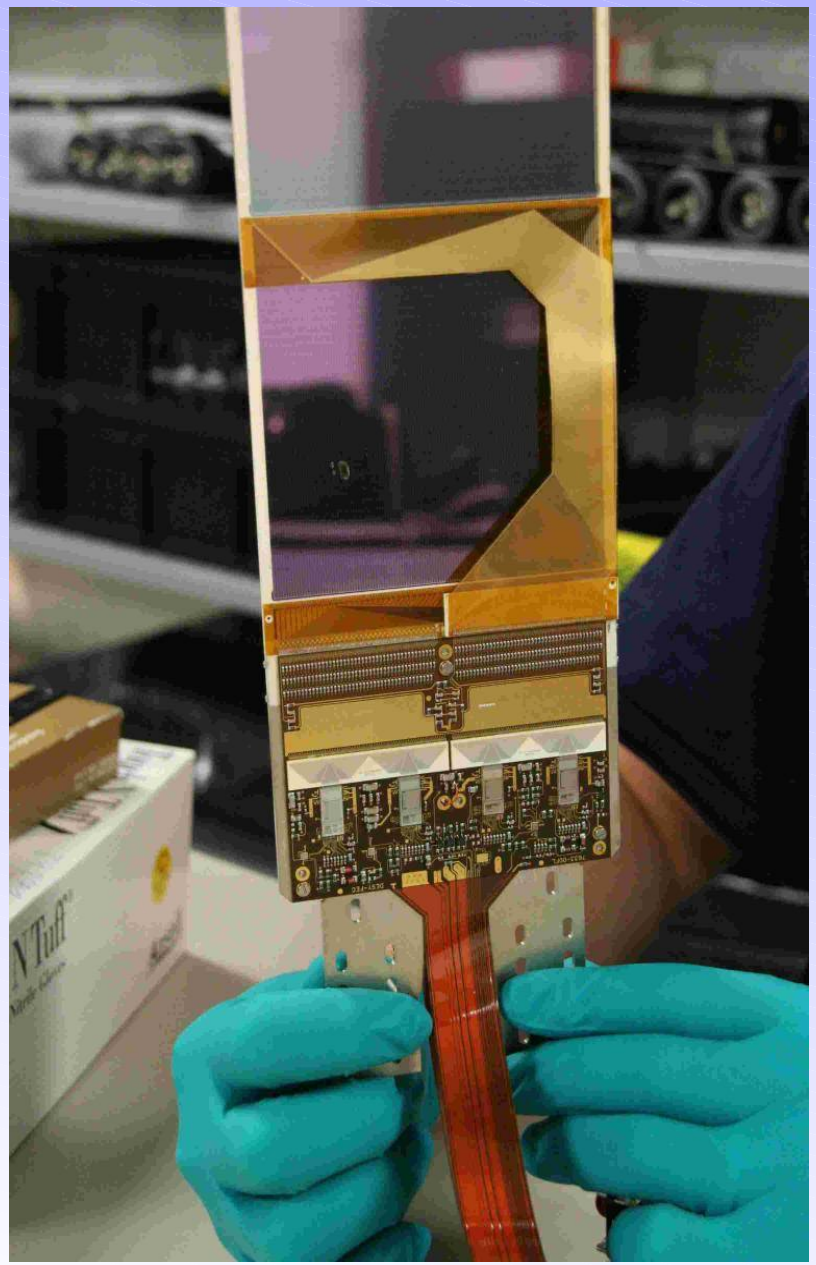


HERMES goes PAX: LASER Test Stat

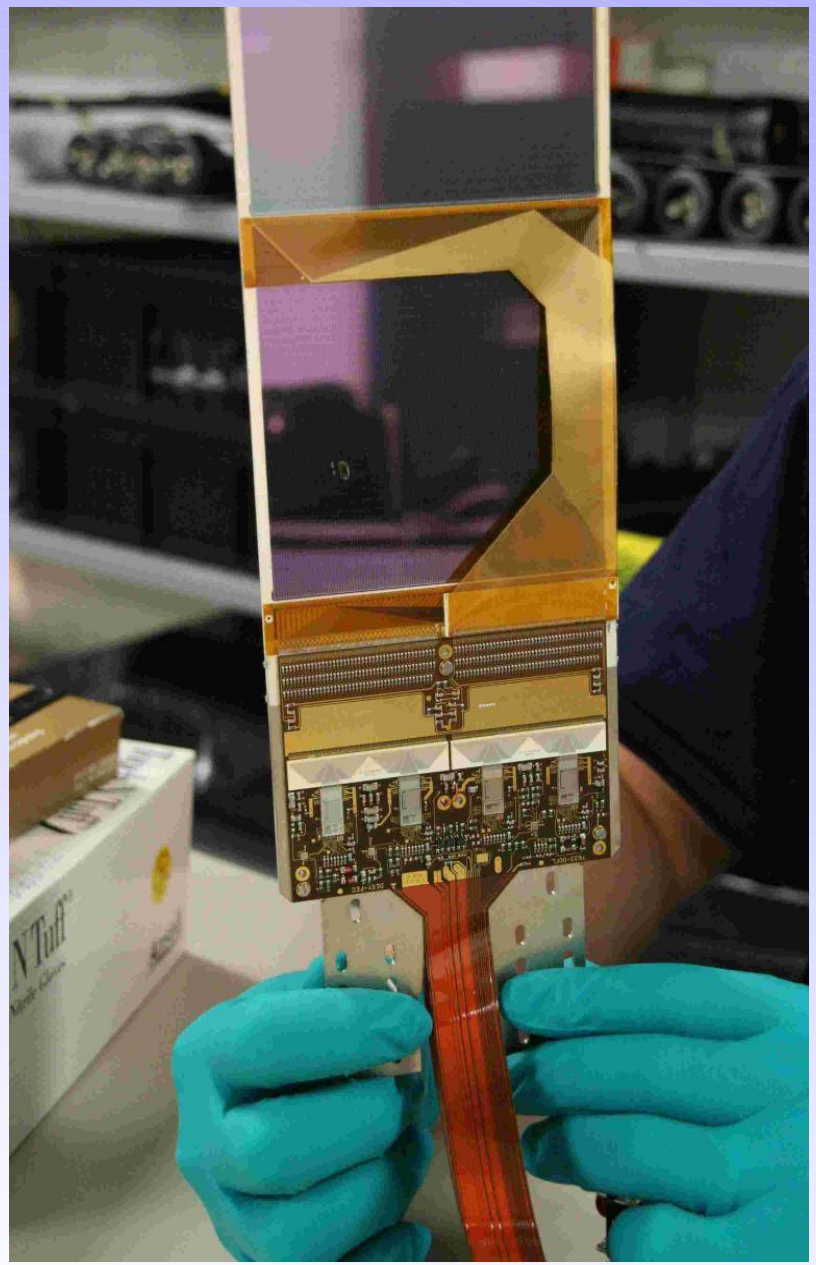




HERMES goes PAX: Dimitrius



HERMES goes PAX: Dimitrius



Dimitrius goes PAX in Summer 2007:

Remove exisiting Helix front-end.
Design new pitch adaptor to VA32TA2 board.
→ Check trigger 50keV trigger threshold!
Also at COSY.

Fix mechanical cobstraints.

Check Dimitrius with atomic hydrogen!

Check cooling capabilities!

Prepare storage of detectors for end of 2007:

Depolarization: Summary

Telescopes:
- Mechanics → Heidi Straatmann (ZAT), Peter Wieder (IKP)
  IKP workshop
  ZAT workshop
- Electronics → Sergey Merliakov (IKP)

Silicon Detectors:
- Si(Li) 5mm → Davor Protic (IKP)
- Detector Test Stations → Sergey Merzliakov, Sergey Mikirtychiants
- Selection of Micron detectors → Alexander Ramseger (IKP phD)

Cooling system and detector control → Alexander Klingler (IKP)

Vertex-ADCs: → ZEL/Jülich
- Performance Test → Luca Barion (INFN/Ferrara)
- Sequencer Programming → Stefano Chiozzi (INFN/Ferrara)
- Implementation into ANKE DAQ → Peter Wüstner (ZEL), Sergey Mikirtychiants
- Implentation into Software → Sergey Trusov (IKP), Peter Wüstner

VME Trigger System → Angelo Cotta (INFN)

Software Development → Sergey Trusov (IKP)

Online Analysis → Mischa Nekipelov

Some open issues

< 50 keV trigger thresholds? Actually ~ 200 keV
Activation of material?

Radiation Damage: Learn how to anneal the different detector types.

Cooling/Heating: Which temperatures do we need?

CERN/AD First Generation Experiment?