ANKE Technical Issues

An attempt to coordinate at least some of
the ANKE activities

COSY-ANKE

- **Vacuum**
- **Signal Interfacing**

Targets

- **Strip Targets**
- **Clustertarget**
- **Polarized Target**

Trigger & Data Acquisition

Detectors

- **Positive Side Start Counters**
- **Negative Side Counters**
- **Multi Wire Chambers**
- **Forward Hodoscope and Sidewall**
- **Spectator Detectors**

ANKE Alignment

Summary

Ralf Schleichert for the ANKE-collaboration 1. March 2004

COSY-ANKE:
Vacuum

Accidents:

- crash of turbo pump between D2 and D3
- uncontrolled ventilation during spectator beam-time

Installations:

- turbo pump at the target chamber (done)
- Installation of an ion-getter pump at the ‚D2-Erker'
- nitrogen ventilation as a standard tool
- COSY-ANKE S7 interlock system,
  - automatic slow evacuation/ventilation system
  - fast HV-off option for spectator detectors and detector cooling.
  - COSY-ANKE interlock for spectator operation

How to check the interlock system?
When fast shutters will be installed?

*IKP2 Technical Team, Ralf Schleichert**,***
***COSY (Ulf Bechstedt)**,*
IKP Electronics (Janos Sarkadi),
ZAT (Franz Klehr)

COSY-ANKE:
Signal Interfacing

1. beam current BCT
2. Schottky spectra
3. Spin-bits
4. BPM information.
5. *... ?*

Proposal:

- Include all signals directly into the ANKE-DAQ.
- opto-link connections
- V/f converter? GSI I/O Unit? Scaler?

Which BCT signal?

How to include the Schottky spectra?

What to do with our strip-target control?

Who writes the software?

Michael Hartmann, *Sergey Mikirtychiants, Frank Rathmann*
IKP Electronics,
ZEL

Targets

Strip target:

- new geometry: 26cm close to D2.
- switch off all Kryo-pumps at the target chamber.
- in collision with the lamb-shift polarimeter.

IKP2 Technical Team, Ralf Schleichert, IKP Mechanical Workshop

Cluster target:

- leakages in gas-cabinet, upgrade gas-cabinet, change position of gas-cabinet?
- check for leakage(s) at the cluster target.
- improve resolution for temperature measurement?
- include pressure, flow, T, ...etc into DAQ?
- prepare for rapid exchange with ABS.

Münster, Ralf Schleichert, IKP2 Technical Team, ZAT

Polarized target:

- remove ground-loop of electrical installation.
- prepare ANKE for the ABS installation in 2005.

Ralf Engels, **Frank Rathmann**, *(Hellmut Seyfarth),*
IKP2 Technical Team
IKP Mechanical Workshop
ZAT

Trigger & Data Acquisition

Proposals for the trigger system:

- monitoring of trigger logic!
- more trigger inputs
- (dead-timeless) prescaler
- (almost) programmable trigger system
- Do we need a ND-trigger?

Anatoly Kulikov, Sergey Merzliakov, **Sergey Mikirtychiants**, Ralf Schleichert

Software support is requested.

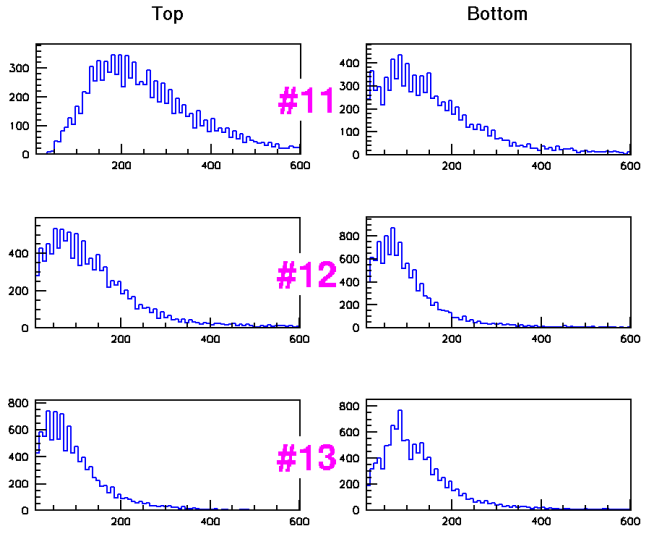
Proposals for the Data Acquisition:

- Implement an additional VME-system.
- Implement 5 Tbyte harddisk array for data-taking (6000-8000 events/s).
- Set up 5 Tbyte File server.
- Re-arrange MWPC read-out.
- clean-up sync-bus.

Karl Watzlawik, Peter Wüstner

Detectors:
Positive Side Start Counters

Most PMs operated at the maximum voltage, nevertheless low amplitudes!



1,2: dead
4 low: semi dead
7, 8 up: semi dead
11-13: low efficiency

Proposal:

- Disconnect D2 from the detector platform (KW19-20).
- Find the reason(s) for the low amplitudes (KW19-20).
- Check/decide how many PMs have to be exchanged.
- Start already now to prepare scintillators and light-guides for all 23 start counters.

Sergey Barsov, Irakli Keshelashvili,
Sergey Mikirtychiants, ***Ralf Schleichert,***
IKP2 Technical Team,
IKP Mechanical Workshop

Detectors:
Negative Side Counters

Do we need a better time-resolution?
Repairs?

Michael Hartmann, *Irakli Keshelashvili, Yoshi Maeda,*
IKP2 Technical Team

Detectors: Multiwire Chambers

Backward drift-chamber:

- Find the reason for dead pre-amps (May)
- *Decide how to proceed (June).*

New chambers in 2004:

- 1 Rossendorf Start- and 1 Stop-Chamber.
- Replacement of 1st FD-chamber,
  u,v,w-planes: 32 wires?, *1 cm spacing?*

New ZEL read-out electronics:

- CMP16 preamplifier.
- *time-measurement* by F1-based TDC.

prototype test Monday/Tuesday KW11,
chamber + electronics

Detectors: Multiwire Chambers

Is the GEM drift-chamber a reasonable BD?

Which FD resolution is needed for the experiments?
Do we see an angular dependent resolution?

Do we need FD spare chambers?
Which experiment(s) need a thinner exit window?

Pavel Kulessa, Anatoly Kulikov, ***Henner Ohm,***
IKP2 Technical Team,
IKP Elecronics,
IKP Mechanical Workshop,
ZEL

Detectors:
Forward Hodoscope and Side Wall

Ideas/proposals for a new FD hodoscope:

- Improve the support structure!
- install a permanent 3rd layer!
- Introduce a horizontal scintillation layer?
- Replace Cherenkov by thick schintillators?
- Minimize FD/Side wall gap?
- Change SD+ stop-chamber position?

Shall/can we change the FD-acceptance?
How does an optimized FD/SW acceptance look like?
Can thick scintillators be used instead of Cherenkovs?

Andro Kacharava, Anatoly Kulikov, Sergey Mikirtychiants,
***Frank Rathmann**, Ralf Schleichert, Sergey Yashenka,*
IKP2 Technical Team,
IKP Mechanical Workshop

Detectors: Spectator Detectors

Next production steps:

- Saphire frames for the thin detectors.
- 65/300/500um detectors from Micron Semiconductors.
- 5100um Si(Li) detectors from IKP detector laboratory.
- upgraded floating low voltage supplies.
- serial production of front-end vacuum elecronics.
- upgraded mechanical support, cooling system.

On-going technical developments:

- ZEL read-out electronics (Sequencer, floating ADCs, TDC, common mode, zero suppression).
- Front-end adaption for ZEL-electronics.
- ANKE-COSY vacuum interlock, emergency switch-off.
- Slow control by IO2C-bus.

Analysis/Software developments:

- **Understand detector performance (tracking, energy resolution).**
- Implement (semi-) automatic calibration.
- Study pp, dd, dp and dp-elastic.
- pn $\rightarrow$dω from August 2003.

Detectors: Spectator Detectors

Cologne-Tandem p,d-beam in autumn 2004

- check one telescope under different angles.
- check energy calibration and tracking.
- check trigger effiency.

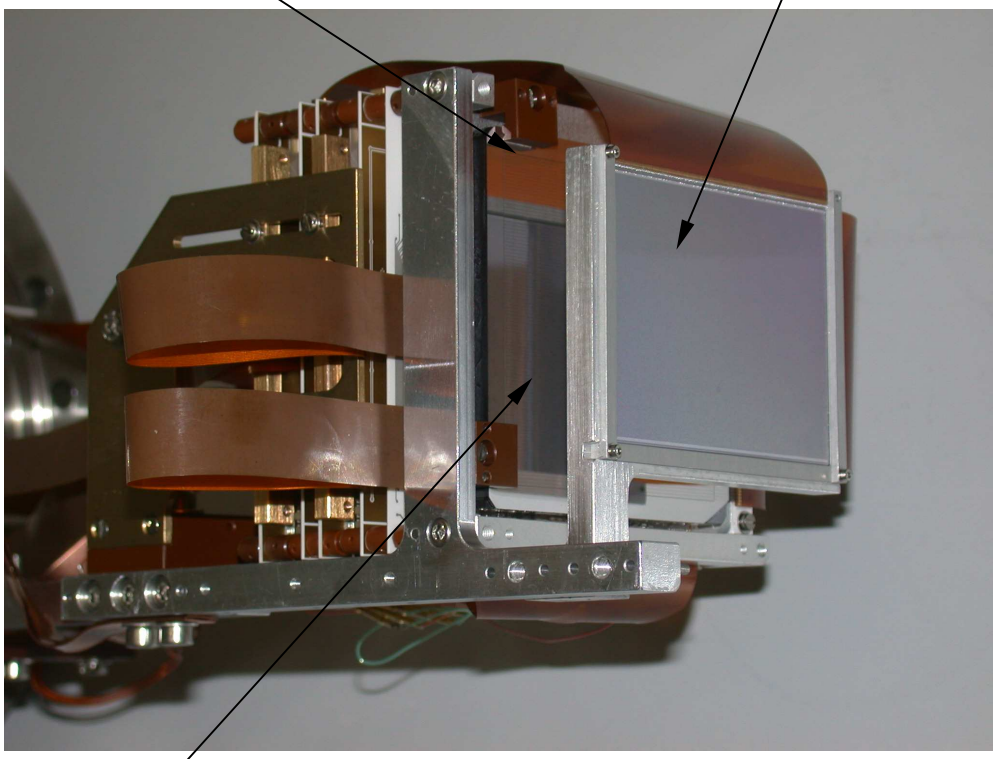
Goals for 2005:

- 2π spectator detector (4 telescopes).
- Prepare (easy-to-use) software.
- pp-(quasi) elastic as standard tool for luminosity determination.
- polarimetry.

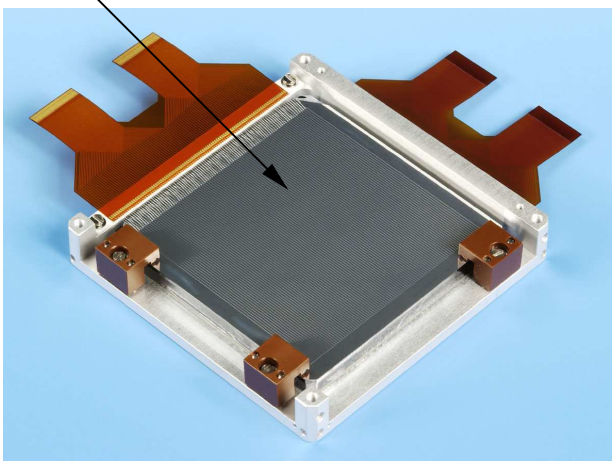
Sergey Barsov, Vladimir Leontiev, Sergey Merzliakov, Andreas Mussgiller, ***Ralf Schleichert****, Sergey Trusov,*
IKP2 Technical Team,
IKP Detector Laboratory,
IKP Elecronics,
IKP Mechanical Workshop,
ZEL

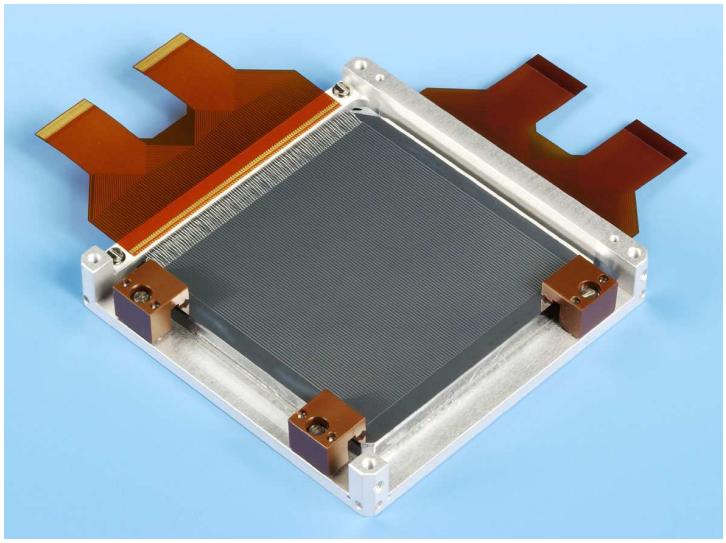
300 μm Si detector is missing

69 μm Si detector



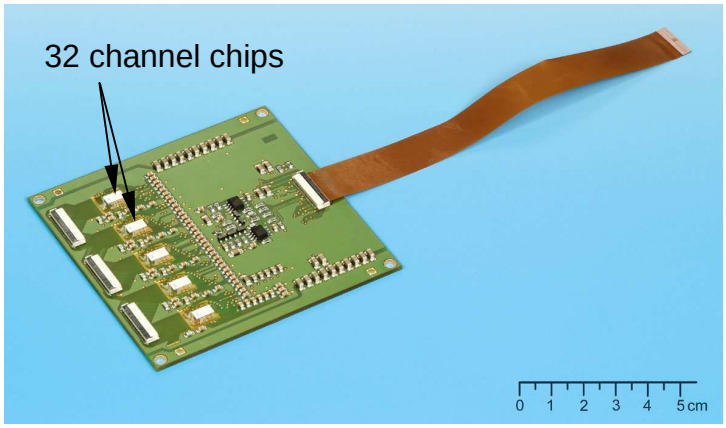
5100μm thick Si(Li) detector





Si(Li) detector

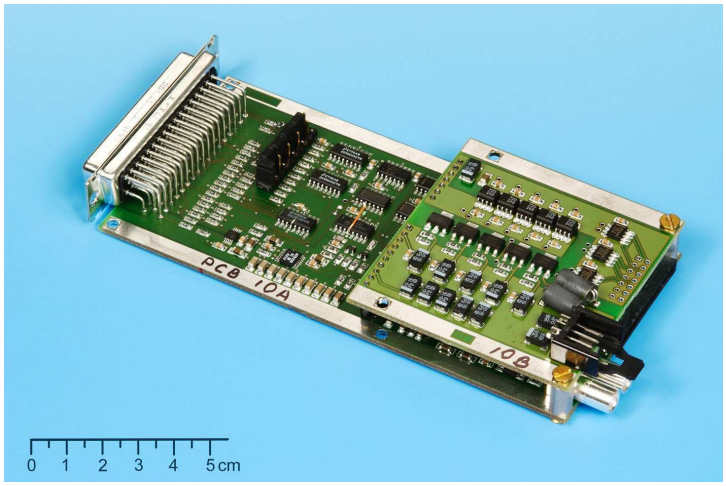
- thickness: ~5.3 mm
- sensitive area: 64 x 64 mm^2, surrounded by the guard-ring
- 96 x 96 strips, 666 µm pitch



5 chip ceramic hybrid

- input: 151 strips
- output:

  1 multiplexed energy to ADC
  5 timing (one per chip) to TDC



opto-decoupling from the detector bias and analog and digital chip control

ANKE Alignment

Geometrical uncertainties with respect to D2:

- detector positions reproducable < 1mm (0.5mm).
- FD internal geometry fixed < 0.2mm.
- Absolute FD-position predictable within 2mm.
- *Target position? BPM-positions? ND? BD?*

For ONE ANKE-setting:

- use ONE magnetic field-map.
- use ONE target postion/extension.
- use ONE COSY-beam setting.
- use ONE detector geometry.

Proposal:

Evaluate the possibilities of using LED plus CCD‘s to measure the complete ANKE geometry.

(CERN/CMS, RWTH-Aachen).

Willi Borgs, Helmut Hadamek, Franz Klehr, Ralf Schleichert

Summary

Maintenance ...

- new 1st FD chamber! FD spare chambers!
  new MWPC electronics for FD (no more spare!).
- new start counters!
- upgrade (replace by iseg-system?) HV-system
- cluster target leakages, gas-cabinet.
- BD chamber (?)

...upgrades ...

- new spectator detector.
- trigger & DAQ
- COSY vacuum interlock, slow ventilation.
- COSY and cluster target signal interfacing.
- new/modified FD hodoscope?
- position measurements?

... and prepare ANKE for the polarised measurements

- modify strip-target mechanism.
- prepare cluster-target for rapid exchange.