# DESY Summary

Ingrid-Maria Gregor, Julia Fourletova, Tobias Haas, Katsumasa Ikematsu,
Tatsiana Klimkovich, Ulrich Koetz, Lukasz Maczewski,
Alessandro Montanari, Carsten Muhl, Jolanta Sztuk

Slides prepared mostly by Ingrid!

- Testbeam Infrastructure and Magnet
- Telescope Simulations
- Measurements with Mimostar2

EUDET Annual Meeting
18 October 2006

# Preparation of Test BeamArea 24/1 for PCMAG

Entrance of Test Beam Area 24/1

•The test beam area is rearranged and renovated by MEA (Norbert Meyners).

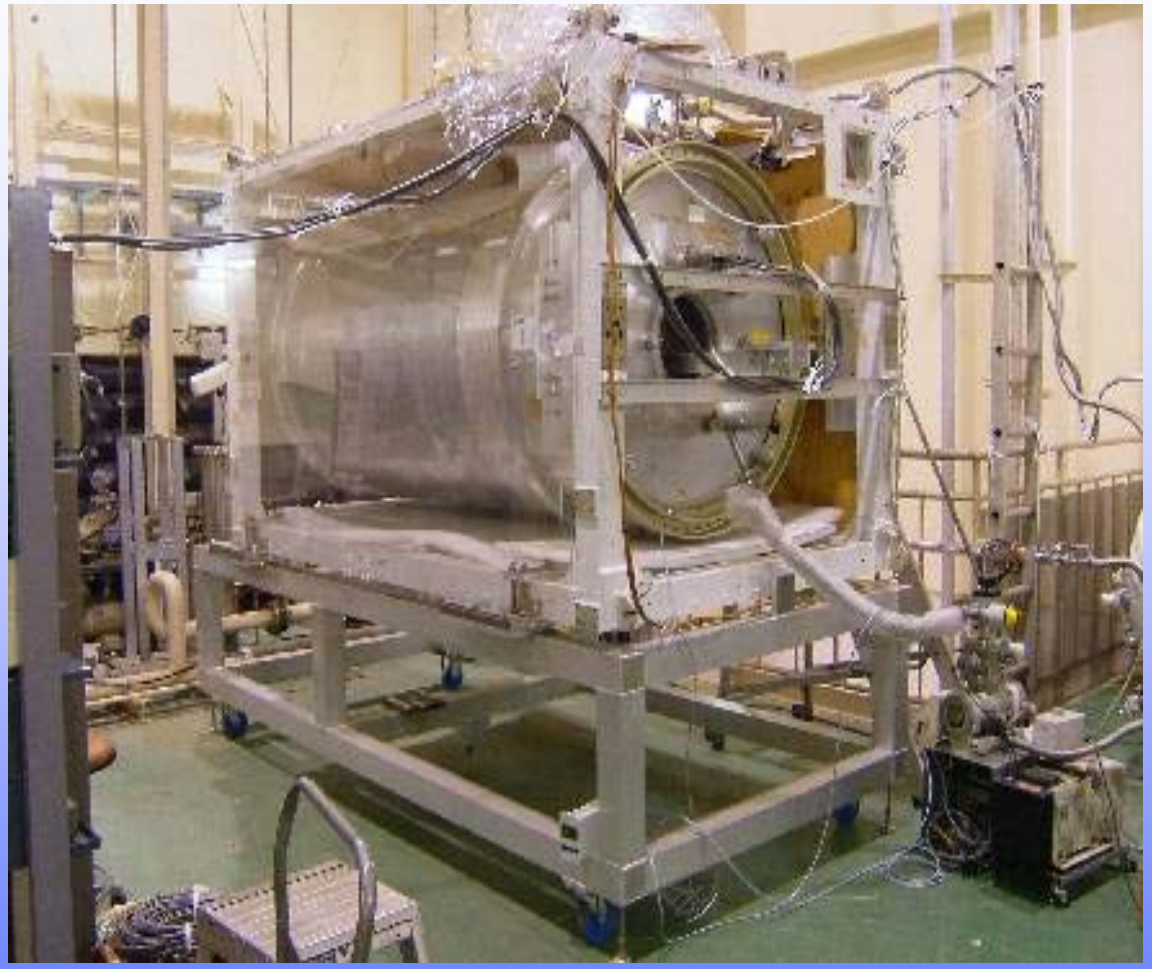
Concrete Block as Base for PCMAG

• A concrete block is placed in the area as base for the PCMAG.

• Two holes with Ø 100mm are drilled in the floor, to access the cable trays in the cave, which connected the test beam area 24/1 with the control hut.

• The helium return line is installed.

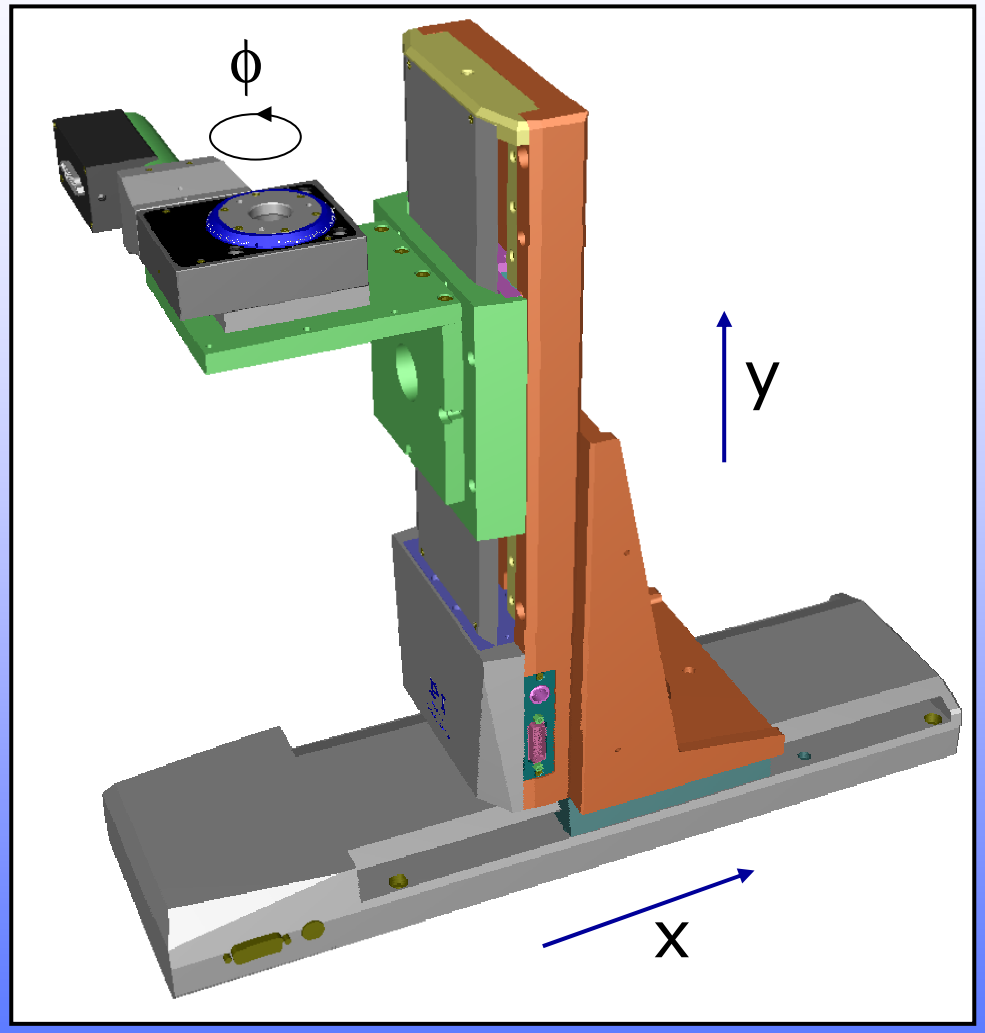
# PCMAG



Recommissioning @ KEK

- All administrative issues about the transfer to DESY are clarified.
- Magnet arrives @ DESY in November
- Commissioning to take place @ DESY in November

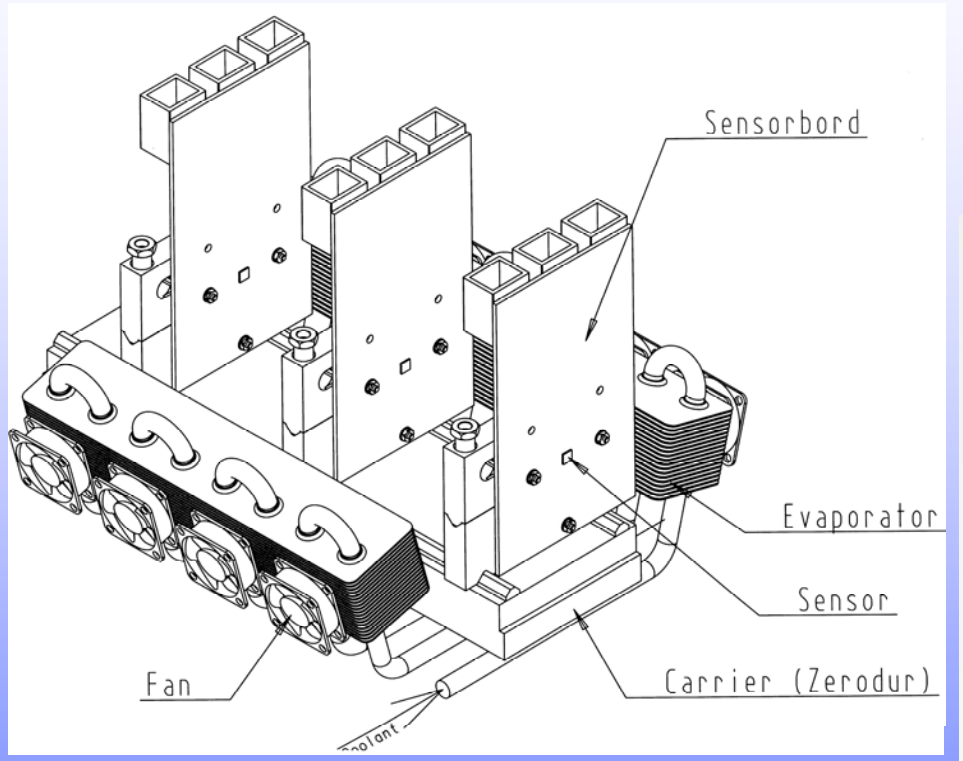
# DUT Positioner

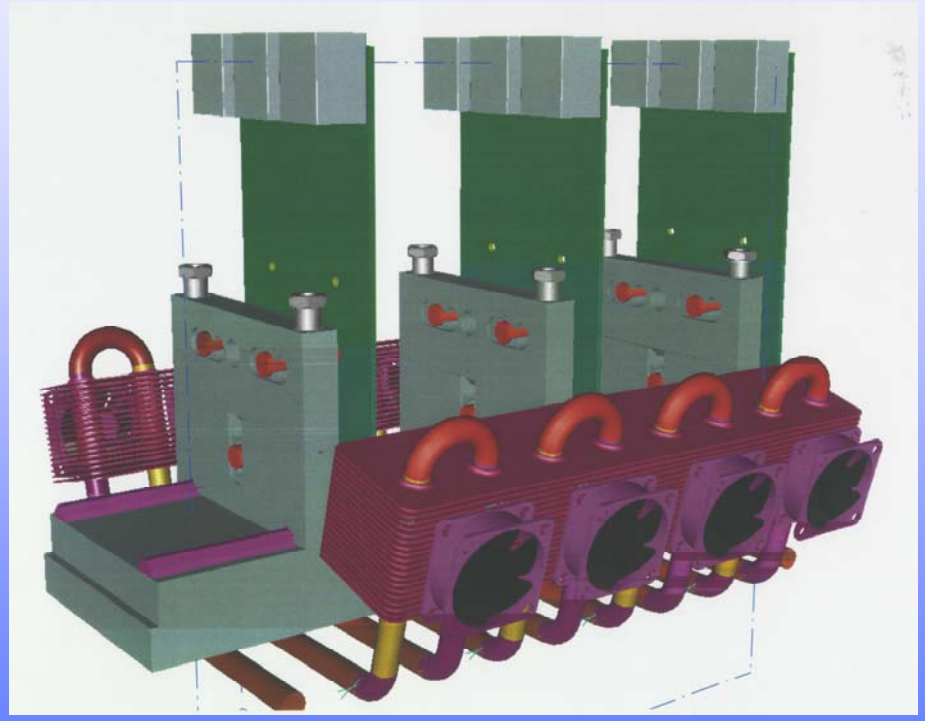



- 10 offers evaluated.
- Decision for PI-offer as best choice for price-performance ratio, with respect to our needs.
- Expected preciseness in the order of a few microns.
- Stage ordered already complete assembled and surveyed with steering components and software
- Delivered to DESY in October 2006, but had to be sent back since it came unassembled and uncalibrated.
- Will be set up in the lab for testing in November
- Ready for integration in spring 2007

Carsten Muhl

# Senor Boxes are Under Development



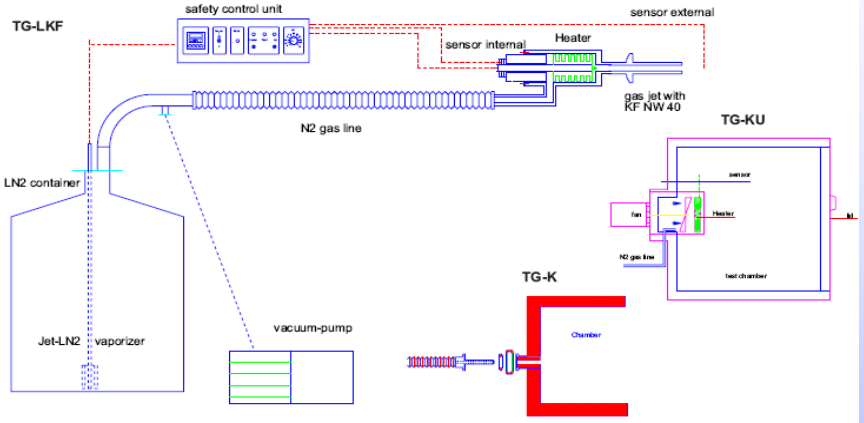



Pictures show a first design iteration. Cooling and fixations will change!

Carsten Muhl

# Cooling for Sensor Boxes and DUT

## Regulated Cold N2 Gas System




The TG-LKF 63/50 KALTGAS system includes a standard safety control unit (a temperature controller with current value/set point display and a safety controller), a KF-NW 50 siphon with an LN2 vaporizer (Jet), a flexible, evacuable $N_2$ gas line with an integrated post-heating module (heater), a PT100 temperature sensor and a vacuum pump with accessories.

Cold Gas System : +170°C …-180°C

(N2-Stream Temperature Accuracy ±0,1°C)

-Expensive

-Safety regulations required

+Quick

+Precise

+Wide range of temperature

+DUT cooling possible with the same device

Carsten Muhl

## Evaporation Cooling Based on R404A

R404A/R507

| | Kälteleistung in W | | | | | | Verdampfungstemperatur in °C | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Liquefier 1 | -45 | -40 | -35 | -30 | -25 | -20 | -15 | -10 | -5 | 0 | 5 | 10 |
| Liquefier 2 | 64 | 85 | 110 | 141 | 177 | 218 | 265 | 318 | 378 | – | – | – |
| | – | – | – | – | – | – | 265 | 314 | 377 | 450 | 528 | 588 |

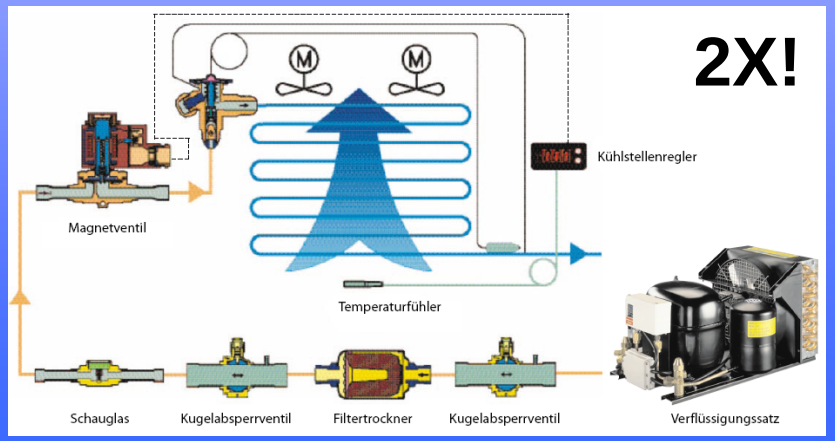
-Large area for evaporator needed → Increases Size of sensor box

-2 systems needed between -40°C and +10°C

-Slow and complex regulation

+No danger

±Standard Components except evaporator



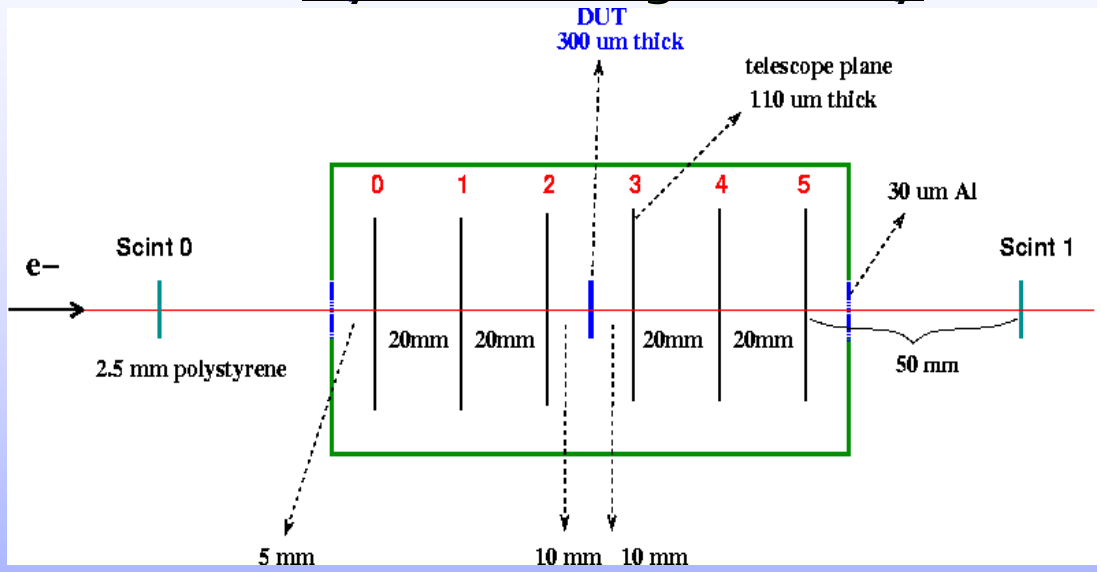
# Simulations of EUDET Telescope

## ILC Software Tools

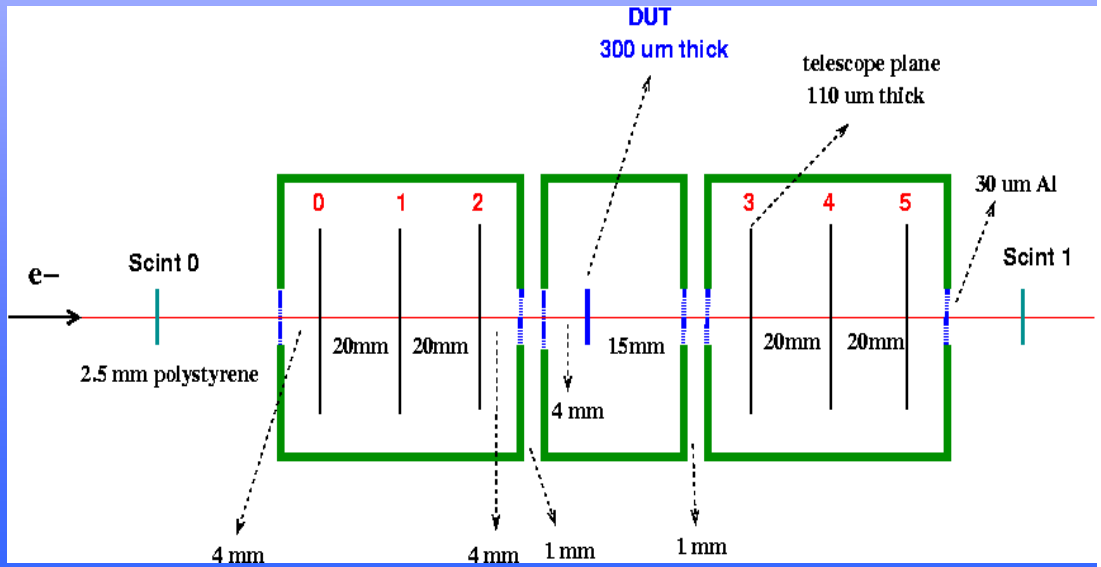
- Full simulation: Mokka (based on Geant 4) and MySQL database
- Straight line track fit
- Output: LCIO format files
- Stored information: hit position, deposited energy, ...
- Analysis: Marlin and Root
- Simulated 50000 events
- Assumed telescope plane intrinsic resolution – 3 um (hit positions are smeared)

Tatsiana Klimkovich

## Symmetric geometry




## Asymmetric geometry



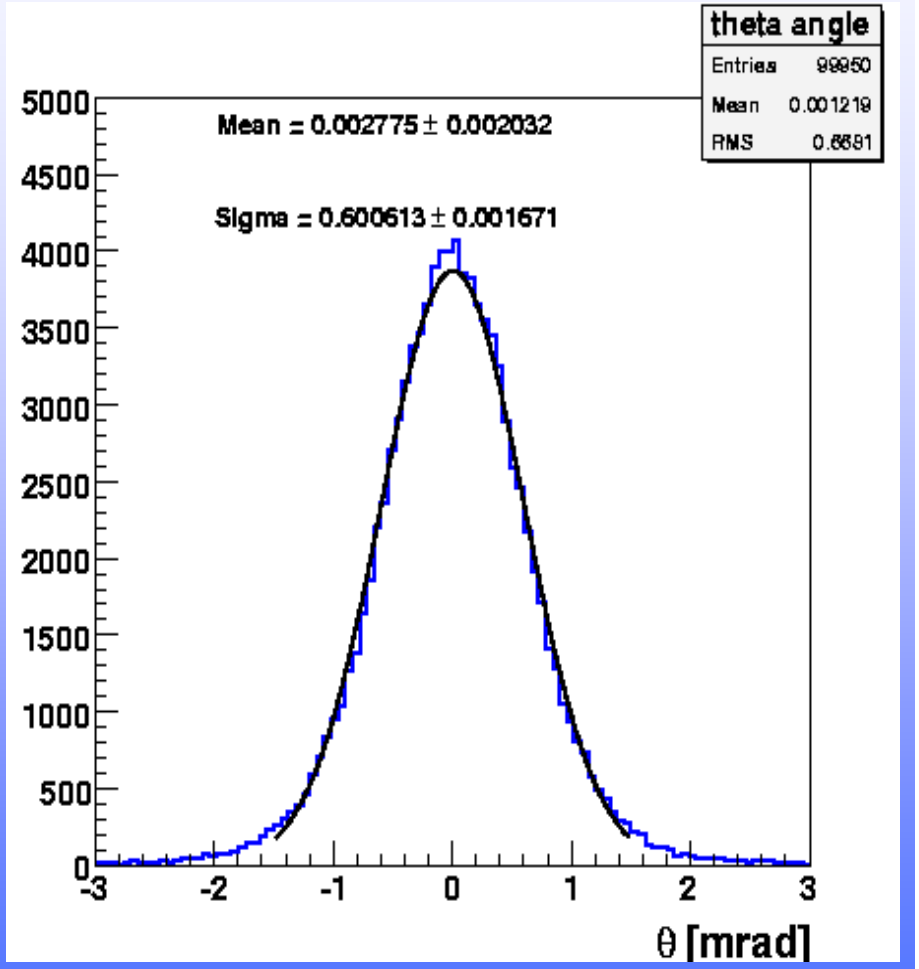
# Validation of Multiple Scattering Model

- For small scattering angle Gaussian approximation is used for the width of the projected angular distribution:

$$\theta_0 = \frac{13.6MeV}{\beta cp} z \sqrt{\frac{x}{X_0}} \left[ 1 + 0.038 \ln\left(\frac{x}{X_0}\right) \right]$$

To check the validity of MS description

- Simulate silicon wafer of 300 um thickness
- Shoot 1 GeV electrons (100000 events)
- Look at the projection of scattering angles
- Theory prediction: 0.602 mrad

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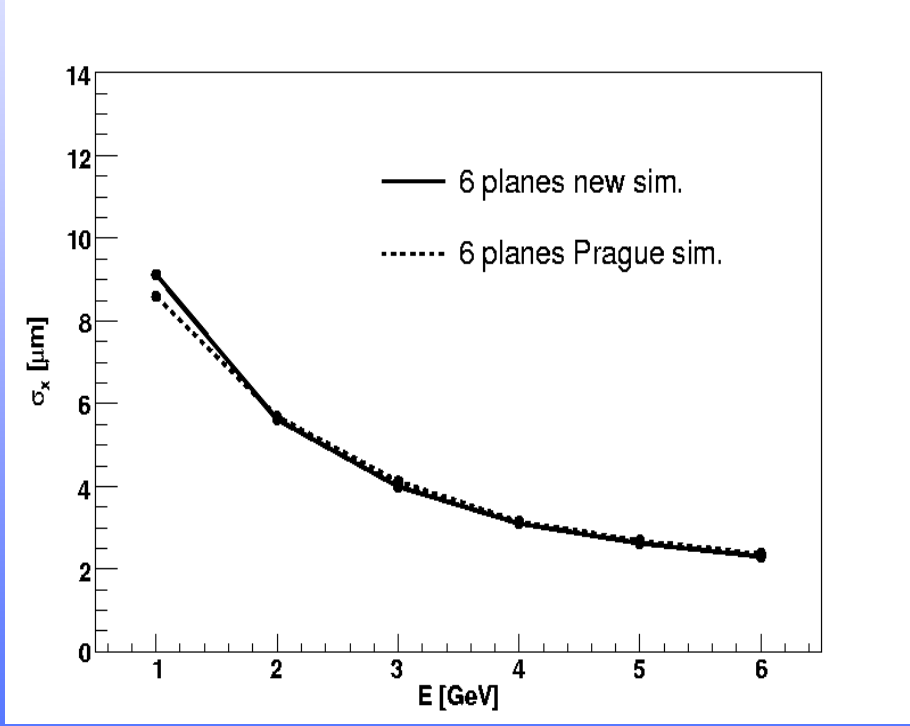
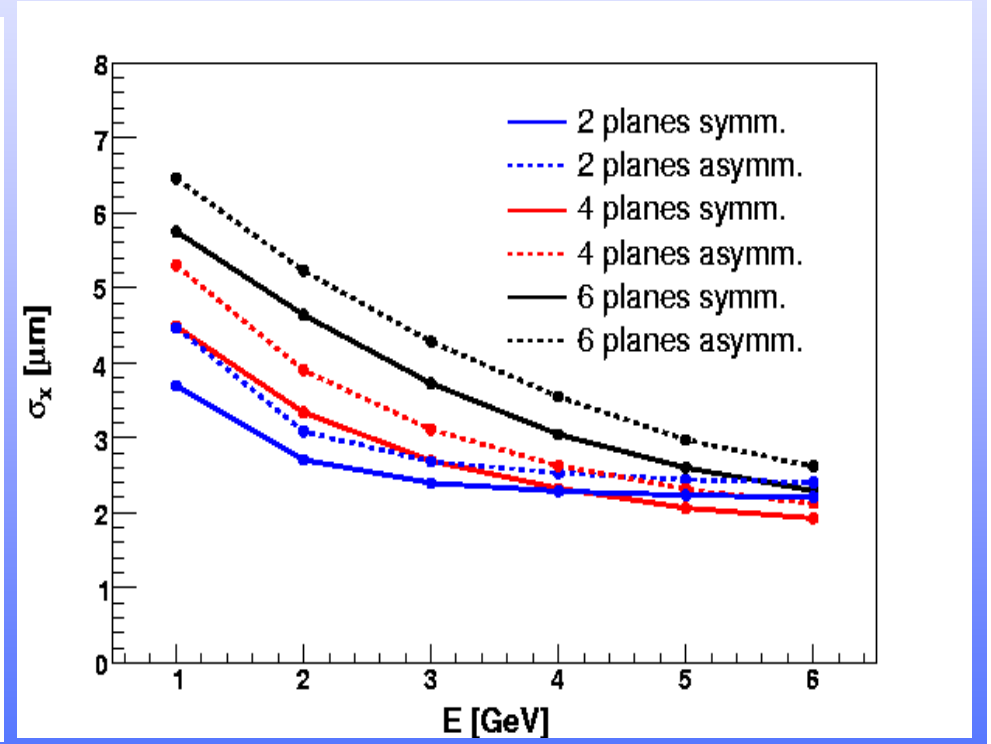
# Results

Comparison of new simulation (Mokka) with Prague simulation (Geant 4) for 6 plane symmetric geometry




Comparison of different geometries (Mokka simulation, after cuts on chi2 and track slope):




Note: Straight line track fits!

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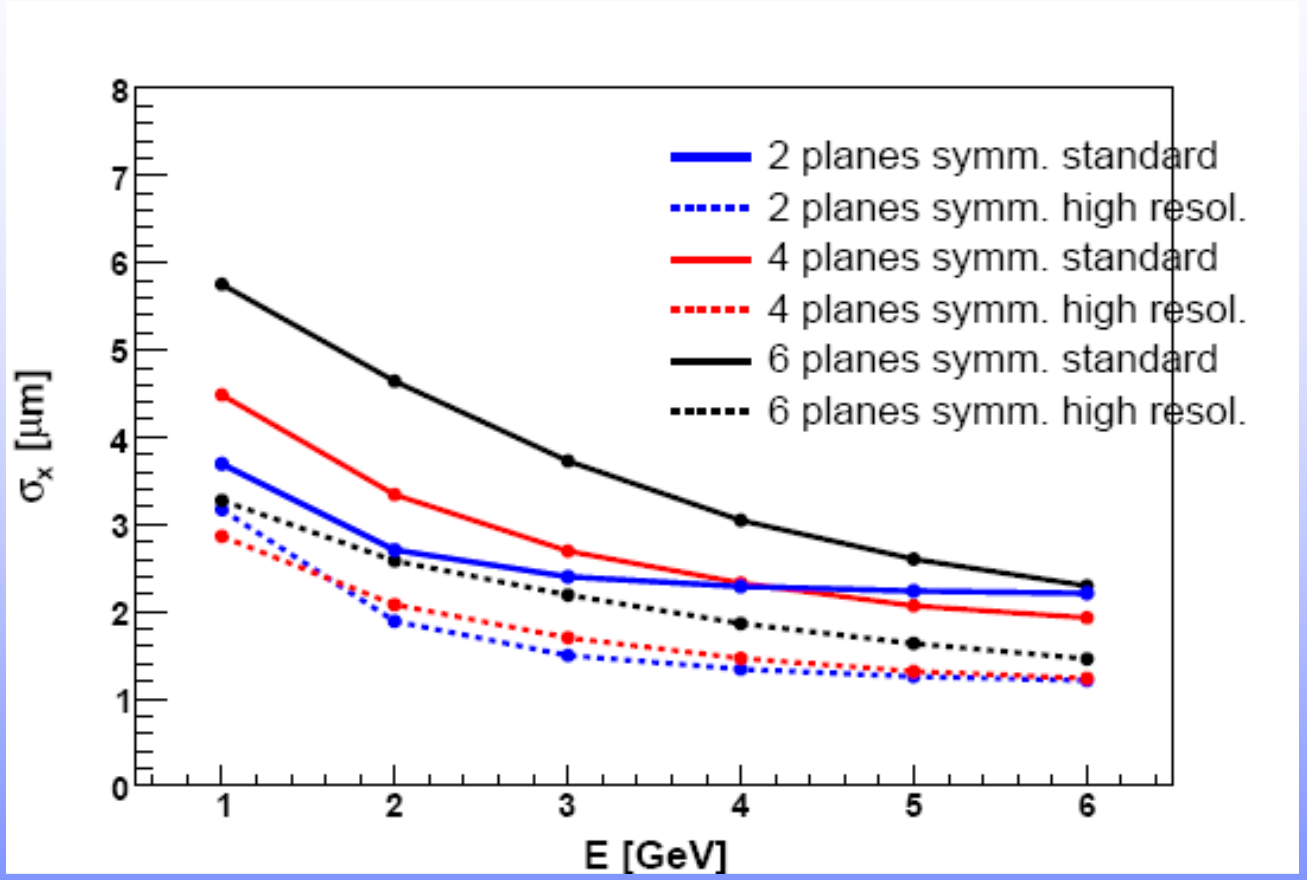
# HiRes Effect




- Standard: all planes have 3 μm resolution
- HiRes: 2 planes closest to DUT have 1.5 μm resolution
- Achieve: 1.5 (2) μm on DUT at 6 (3) GeV/c

Tatsiana Klimkovich

# First look at Alignment

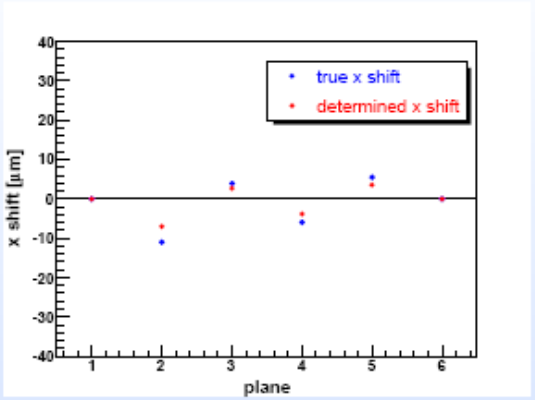


## Alignment package Millepede

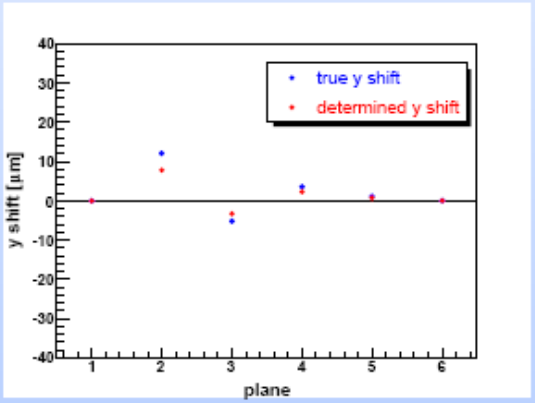
- When detector is ready a proper software alignment will be an important issue for telescope precision
- $\Longrightarrow$ Test alignment procedures with simulated data
- Alignment package Millepede is developed by Volker Blobel (Uni Hamburg)
- Used in H1, ZEUS, CMS for tracker alignment
- Aligns all planes simultaneously
- Based on linear least squares fits
- Simulated 50000 events (6 GeV electron beam) for 6-plane symmetric telescope configuration without DUT

## First try to find alignment parameters

x shifts




y shifts




Should investigate more, play with constraints, etc.

# Summary

- Testbeam area ready for the magnet and telescope
- Magnet will arrive at DESY in November
- XYϕ table for telescope delivered in October but went back for calibration
- Mechanical setup and cooling for telescope under development
- Simulation tool (Mokka) ready and validated: First results available.
- Measurements with Mimostar2 were done in the lab