Status of the Large TPC Prototype

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DESY

EUDET Annual Meeting 2008

06-Oct-2008

EUDET — Detector R&D towards the International Linear Collider
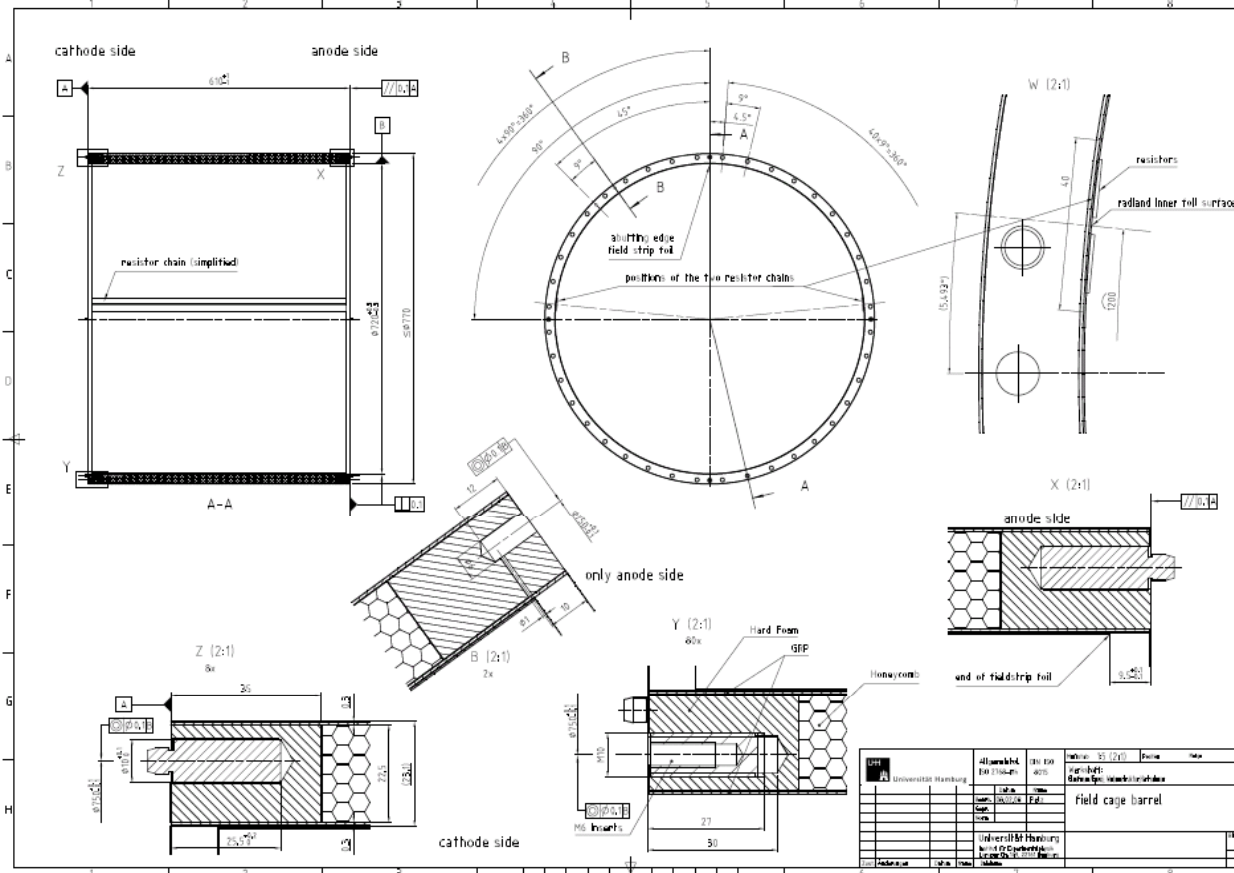
LCTPC Large Prototype
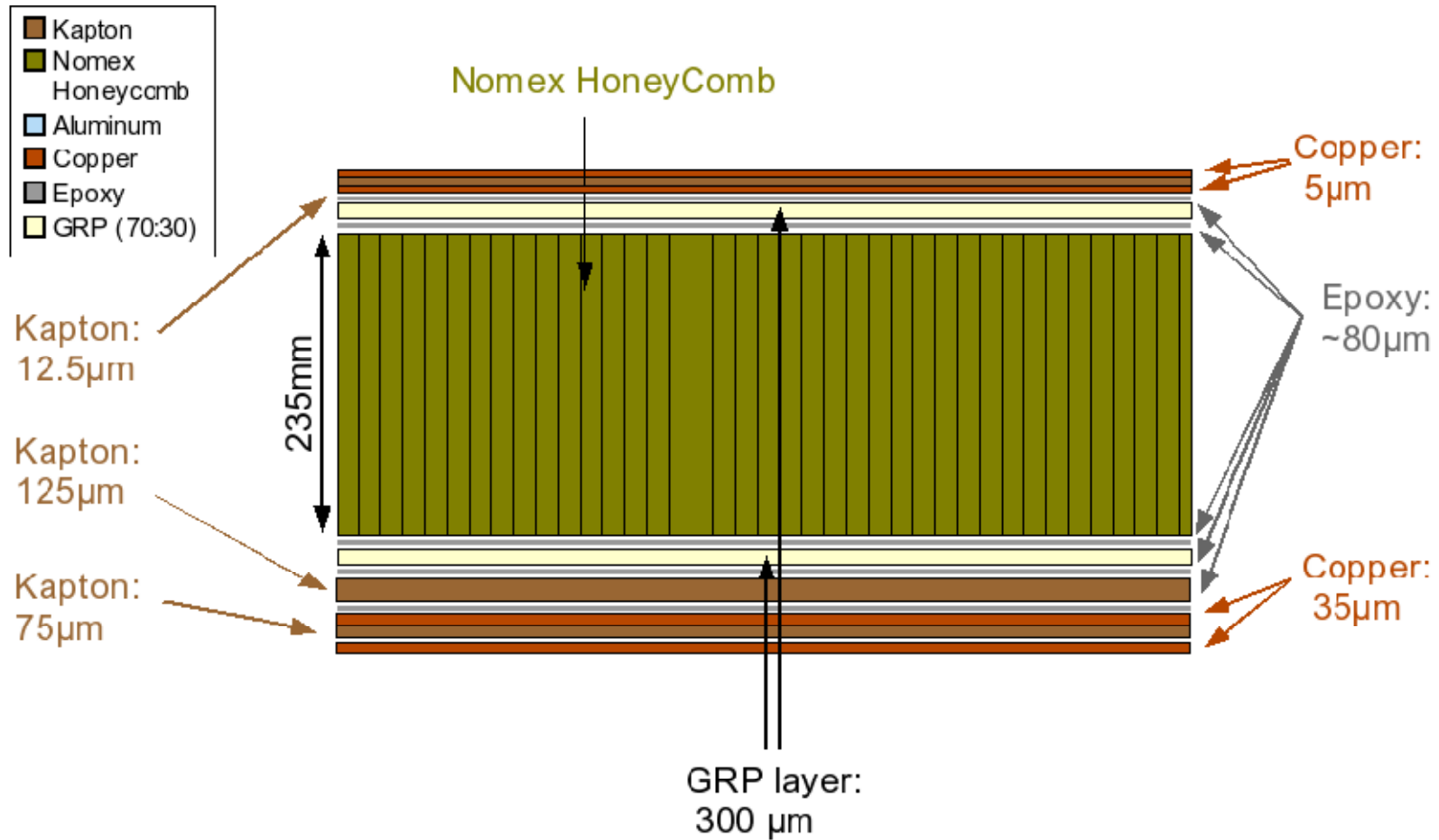
Garniture

- **Field cage**

- **Endplate**

- **MPGD detector modules**

- **Readout electronics**

- **Gas system**

- **DAQ & Monitoring**

- **Software development**

- **SiLC envelope**

- **Cosmic trigger**

- **Magnet (PCMAG)**

- **Test beam T24/1**

Field Cage

Inner Diameter 720 mm, Outer diameter 770 mm
Wall thickness 25 mm
Length 610 mm

Legend:
- Kapton
- Nomex Honeycomb
- Aluminum
- Copper
- Epoxy
- GRP (70:30)

Nomex HoneyComb

Copper: 5μm

Kapton: 12.5μm

Epoxy: ~80μm

235mm
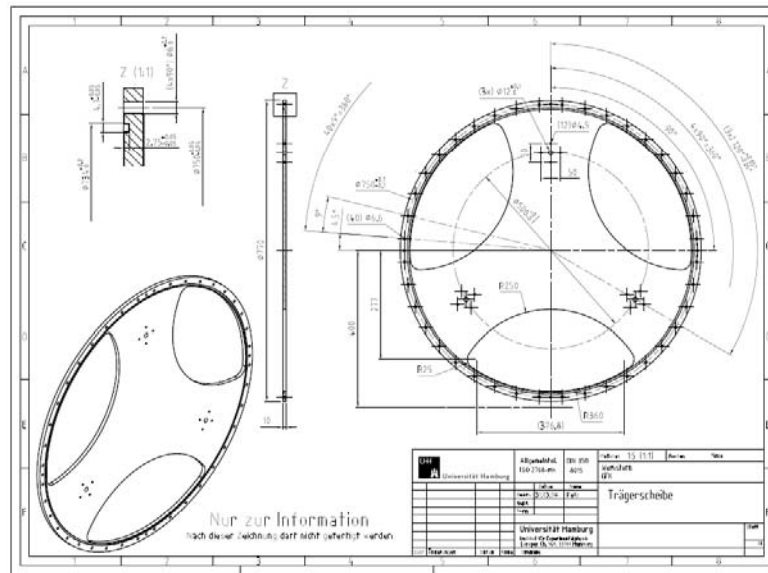
Kapton: 125μm

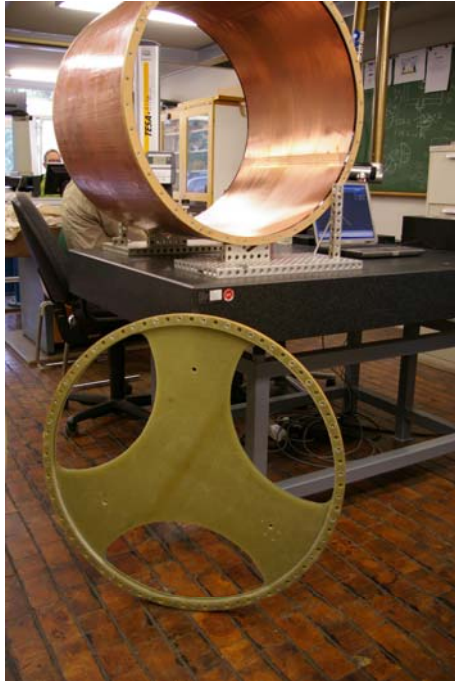Copper: 35μm

Kapton: 75μm

GRP layer: 300 μm
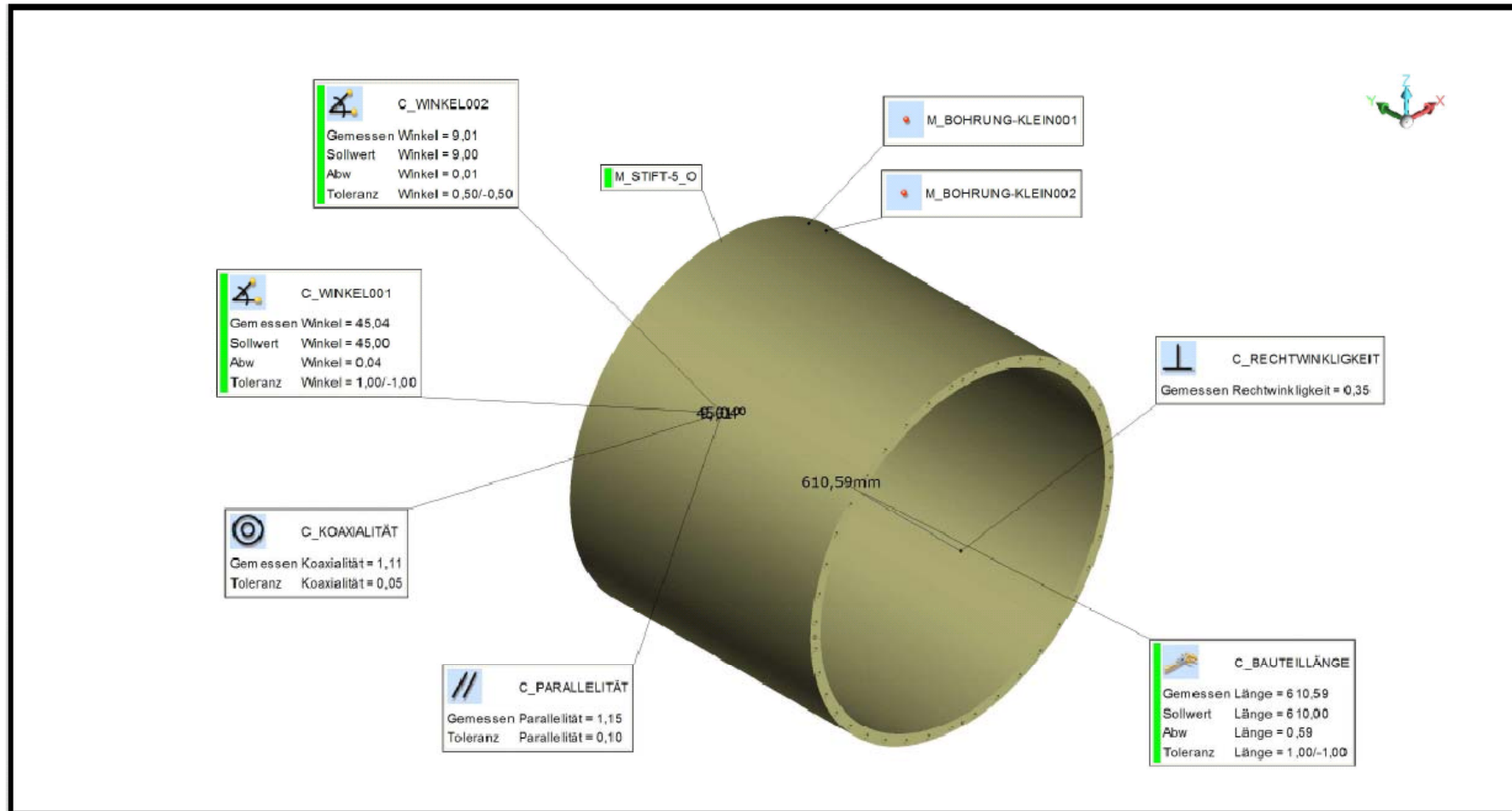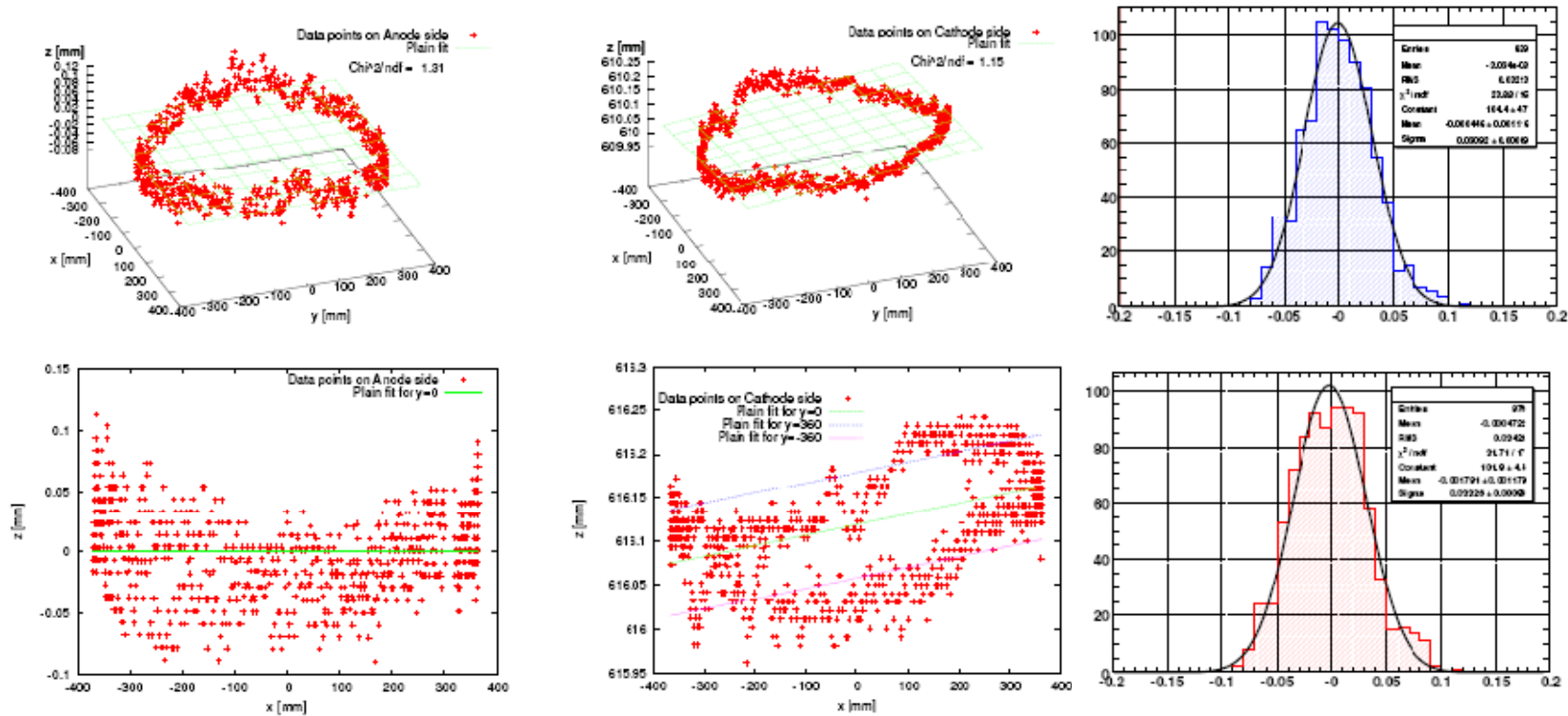
Field Cage at DESY, being inspected and tested

Field Cage at DESY, being inspected and tested

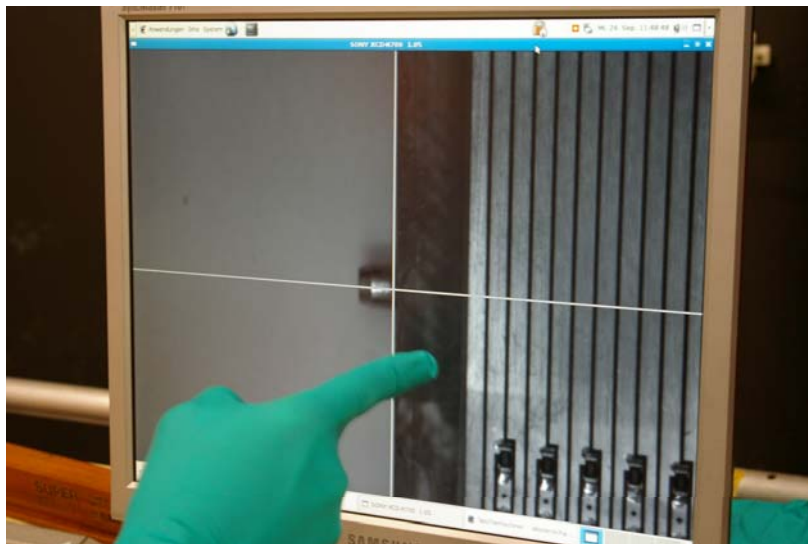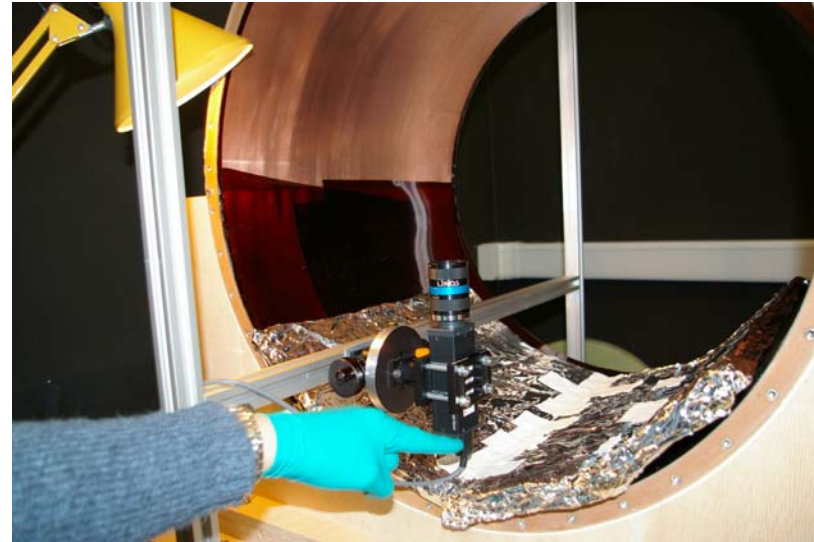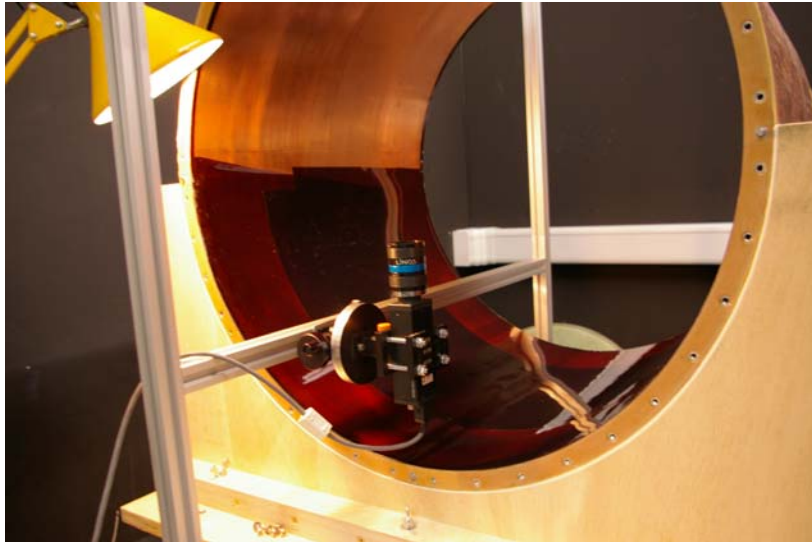## Survey results: specs seem to be within the tolerances

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Parallelism Cathode/Anode:

$$\delta = 0.110 \pm 0.003\,\mathrm{mm}$$

Peter Schade, DESY

Fieldstrip pitch:

$$p = 2.78 \pm 0.10 \text{ mm}$$

Nominal:

$$p = 2.80 \text{ mm}$$

Field Cage

Next steps

→ Measurement of the basic mechanical parameters of FC

→ Measurement of the position of strips (measure in a low-tech method by ourselves)

→ Mount a few more resistors and HV connectors/contacts to outside

→ LV test to check all electrical connections of the field cage/strips

→ Pressure test, leak test and gas purity test

→ Pressure drop of TPC exhaust gas line (the gas monitor) for a nominal gas flow rate

→ HV test

→ Memo in preparation

DAQ & Monitoring

Trigger Logic Unit (TLU) provided by University of Brussels:

• 4 comparators

• Beam trigger with scintillators

TLU outputs:

• Trigger signal (LVDS)

• Event number (LVDS) pulled

out by a data clock (LVDS)
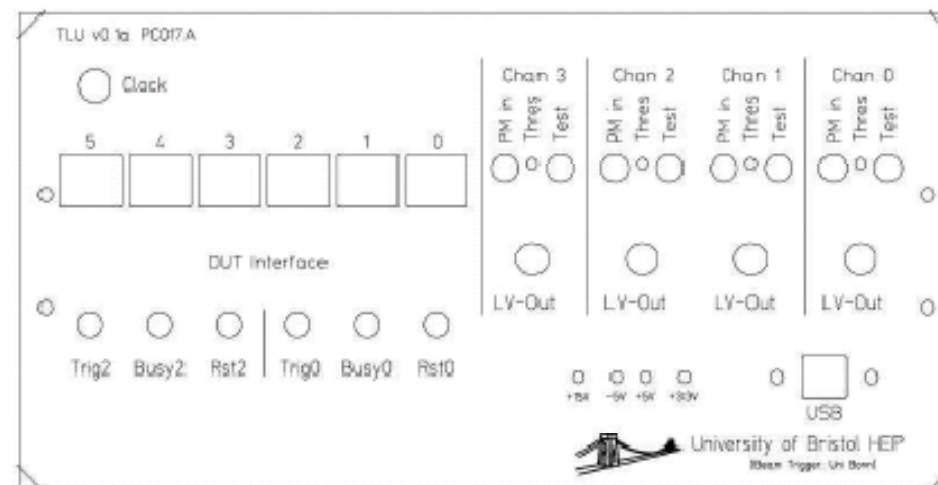
Distributor box:

• Get event# from TLU and tag event with time

• Send event # + time to DAQ computer, assert BUSY for a fixed time: waiting for DAQ PC end of r/o

• Provide common clock

DAQ & Monitoring

Monitoring via DOOCS:

Distributed Object Oriented Control System; output as LCCD
stream in LCIO format

hardware is connected to control system with Beckhoff devices

Monitored parameters (so far)

- Temperature

- Gas pressure

- Gas flow

- Impurities

- HV control

Gas System

Basic gas system on the way:

- Mass flow controller $\rightarrow$ regulating chamber pressure

- Monitoring of pressure, temperature, impurities

- Stainless steel tubing

- Safety valve

GEMs/MicroMegas/Termination plate
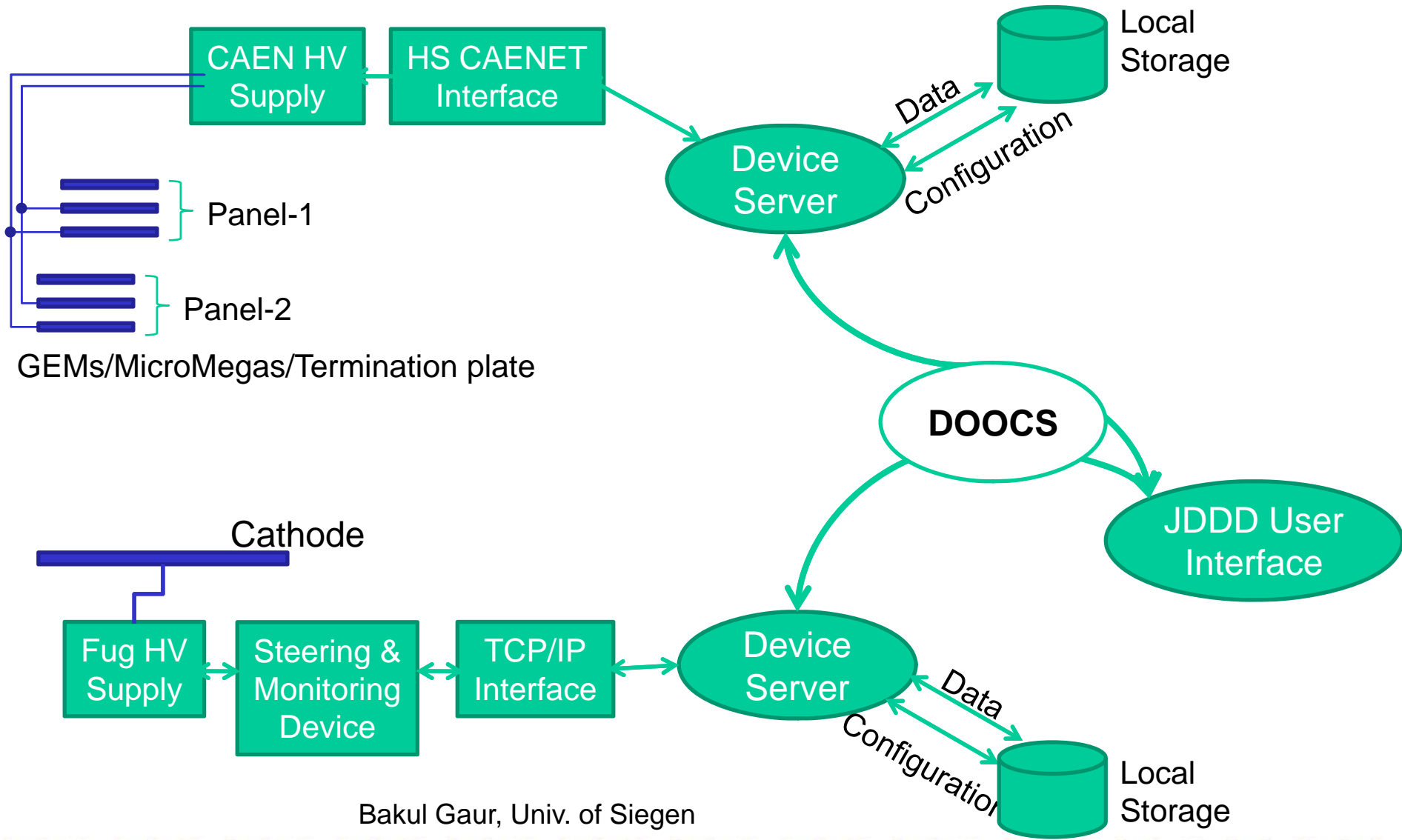
Bakul Gaur, Univ. of Siegen

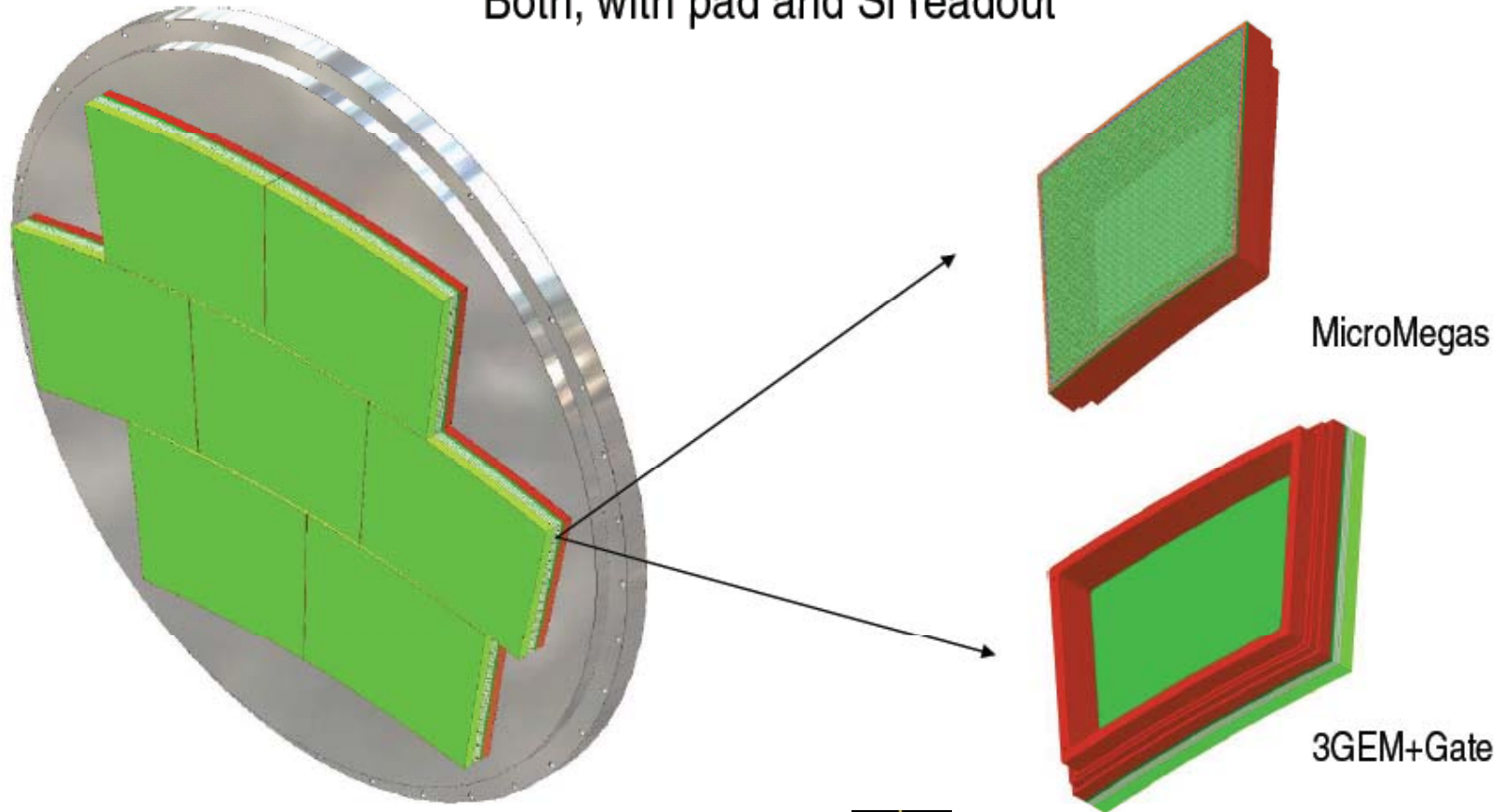# Software Development

MarlinTPC software package rather advanced

- Tools available for

  - DAQ stream

  - Data processing, reconstruction, digitization

  - Data analysis

  - TPC simulation

MarlinTPC is ready so far to be used with LP

$\rightarrow$ See talk by R. Diener in NA2
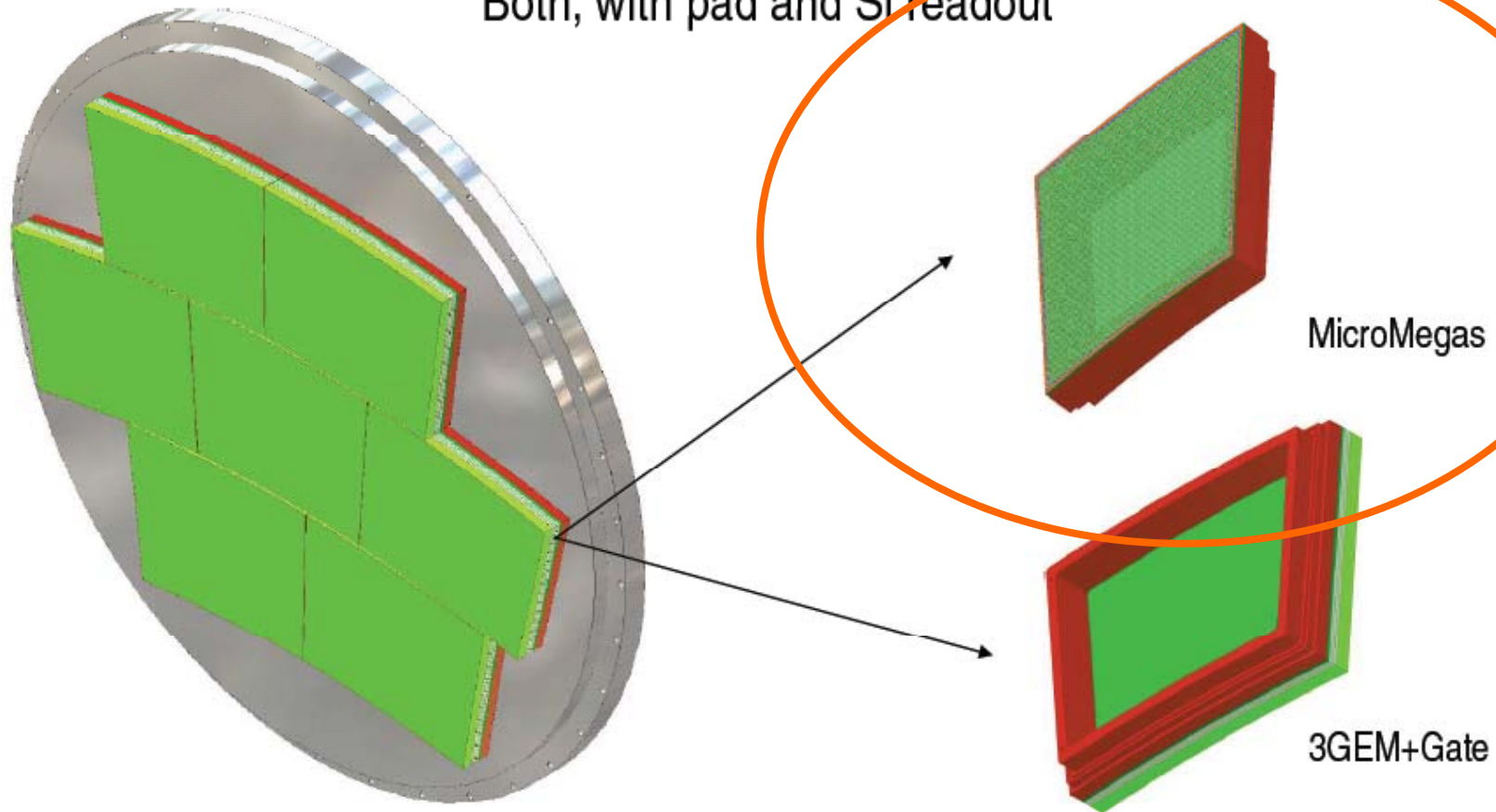
Endplate

Both, with pad and Si readout

MicroMegas

3GEM+Gate

D. Peterson, Cornell
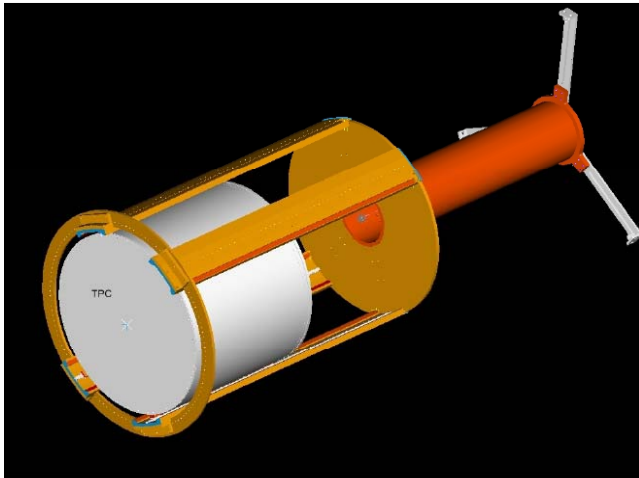
Endplate from Cornell arrived at DESY $\rightarrow$ tool
for mounting onto Field Cage under preparation

Both, with pad and Si readout

MicroMegas

3GEM+Gate

D. Peterson, Cornell

MicroMegas module in test gasbox, equipped with AFTER-based electronics: first cosmic-ray events in front of the PCMAG magnet seen.
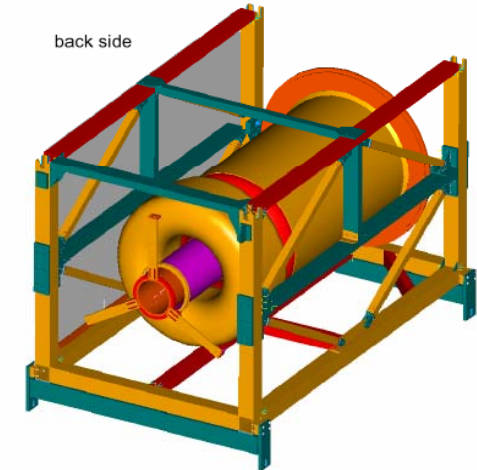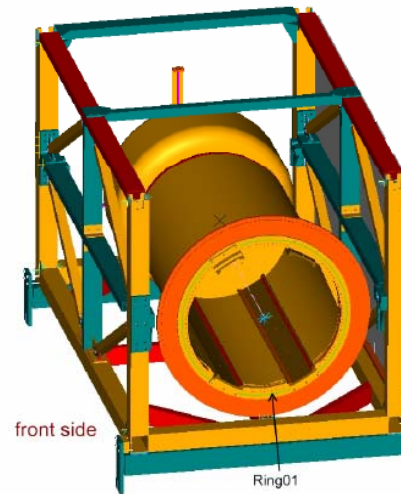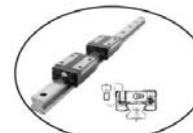
Support structures:

- TPC
- PCMAG

F. Hegner, V. Prahl, R. Volkenborn, DESY
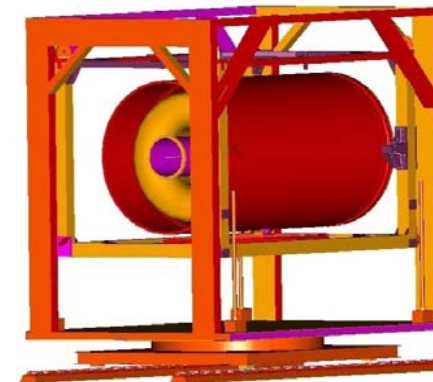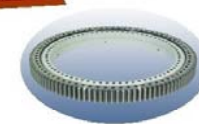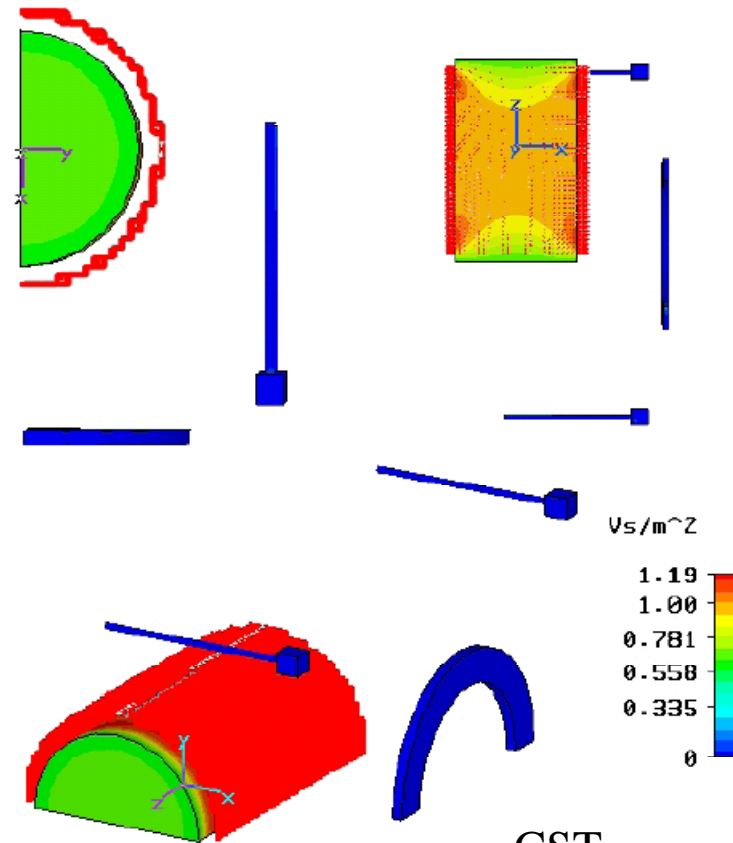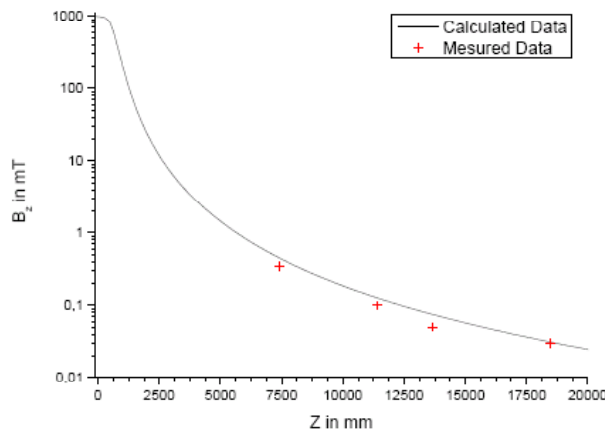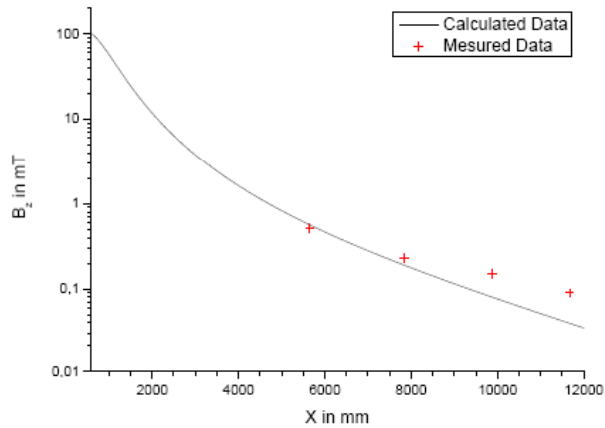
Tool in hand for determining magnetic materials

K. Zenker, TU Dresden

CST

Summary & Outlook

<u>Main components</u> are available:

- TPC needs to be assembled

- Assembled TPC needs to be commissioned

- DAQ components are available

- Slow Control / HV / Gas system available

- Magnet / T24/1 available; final handover of PCMAG with KEK cryogenic experts this week

- TPC support structure: parts are already installed at PCMAG, rest is expected to arrive in mid/end October

- Week 44: MicroMegas module to be installed

- SiLC envelope $\rightarrow$ main work to be done by HEPHY Vienna