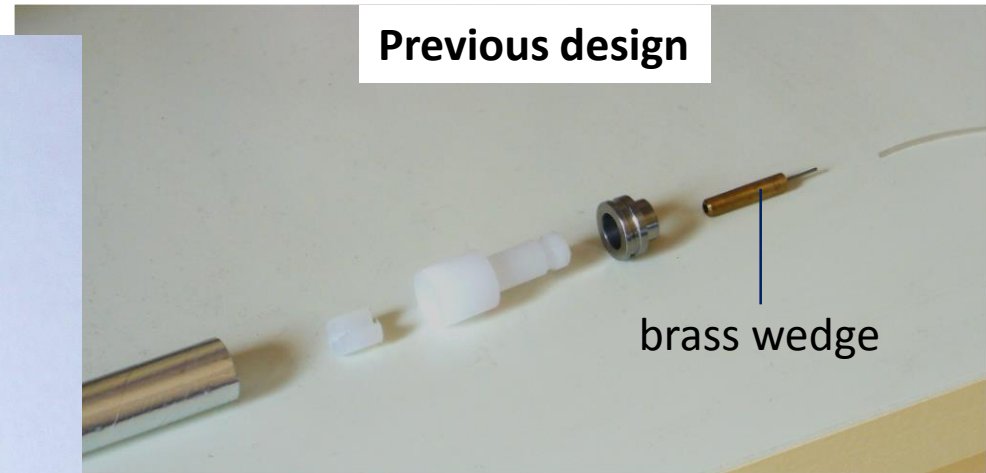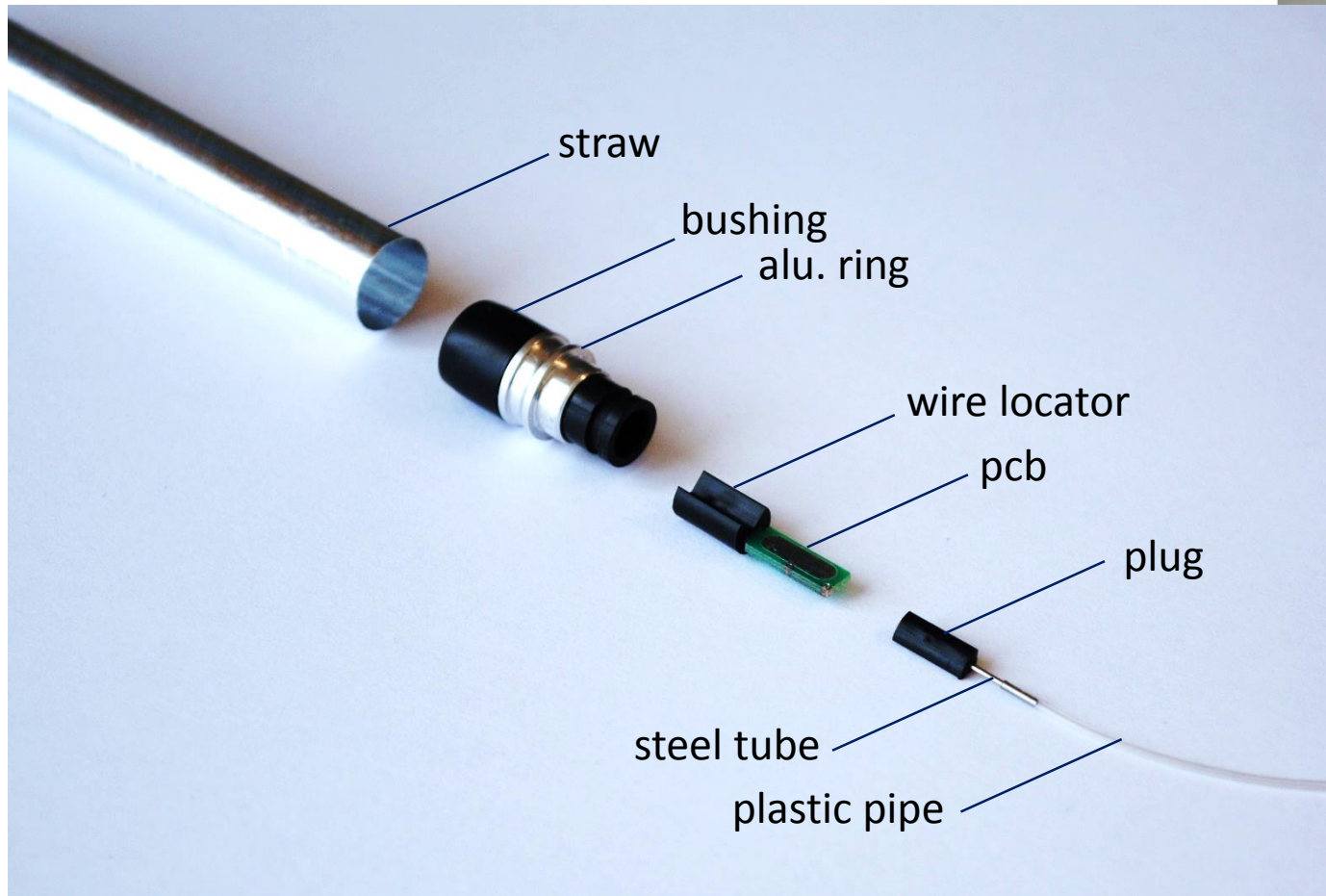# Status of the Forward Tracker

J. SMYRSKI / JAGIELLONIAN UNIVERSITY

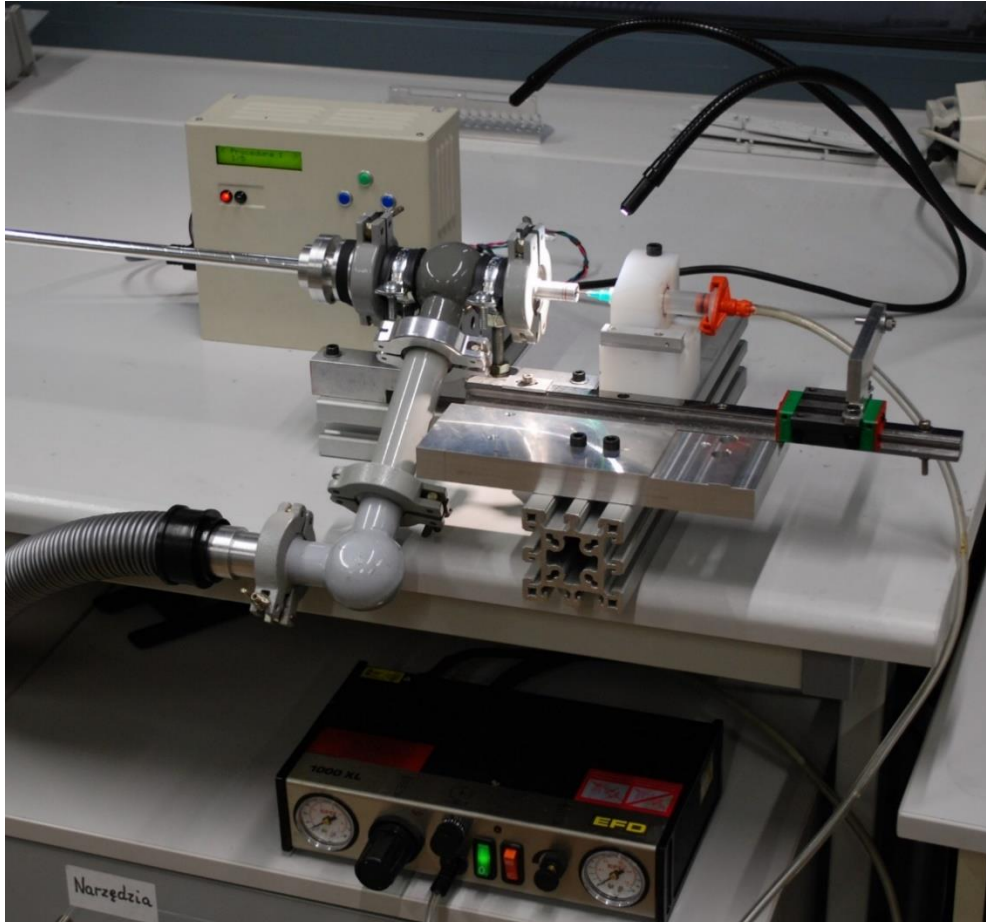# Outline

➢ Design of end-plugs

➢ Production procedure of straws

➢ Quality control

➢ Construction of prototype of FT5-6

➢ Status of the simulations for the TDR

End-plugs

straw

bushing

alu. ring

wire locator

pcb

plug

steel tube

plastic pipe

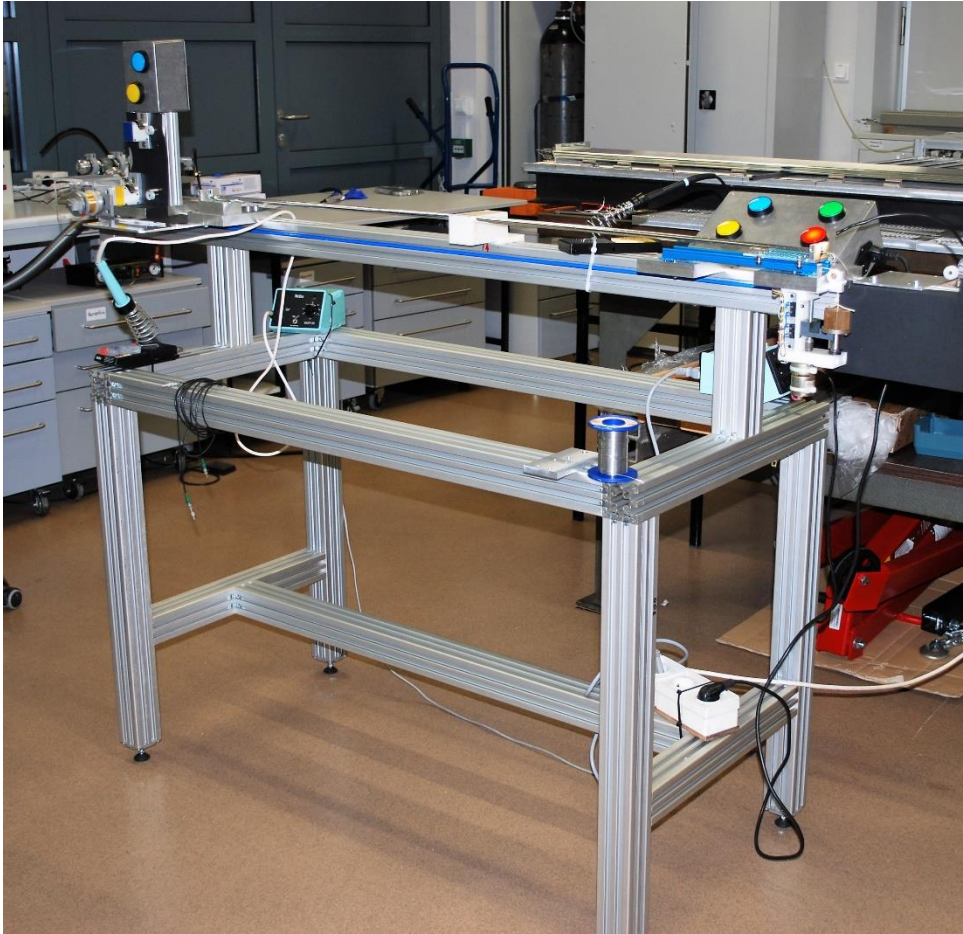**Previous design**

brass wedge

Gluing end plugs

Deposition of glue inside straw

➢ Straw held using underpressure and rotated with a stepper motor. Two component epoxy adhesive (UHU Endfest 300) applied using dispensing machine.

➢ Conductive glue (MG- Chemicals 8330S) deposited on the aluminum ring.
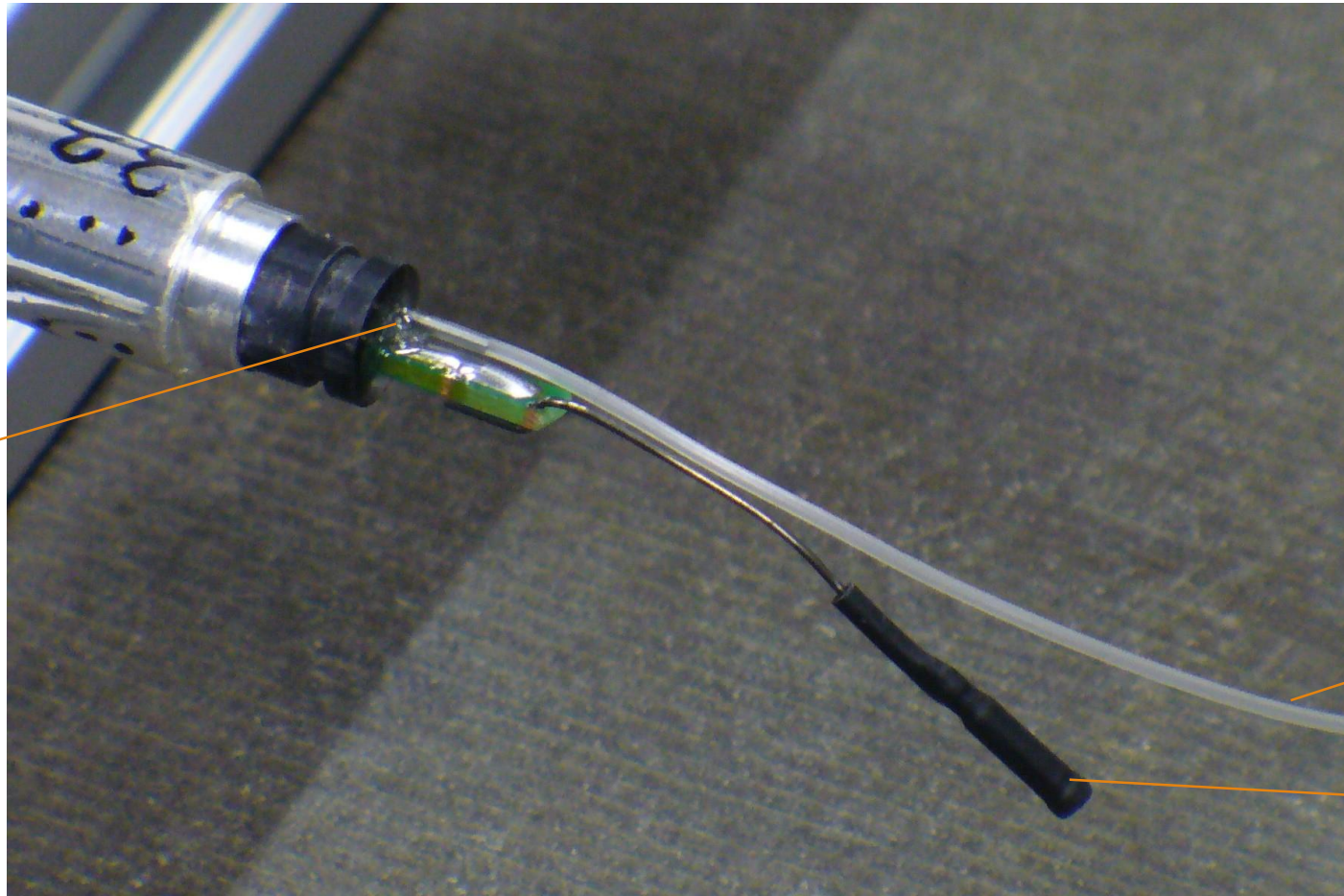
➢ End-plug inserted in the straw.

Tensioning wires

➢ Straw tensioned with a weight.

➢ Wire pulled through the straw with a guide and tensioned with 50 g.

➢ Wire locators inserted in the end-plugs at both ends of the straw.

➢ Wire soldered to the PCBs

Straw with end-plug
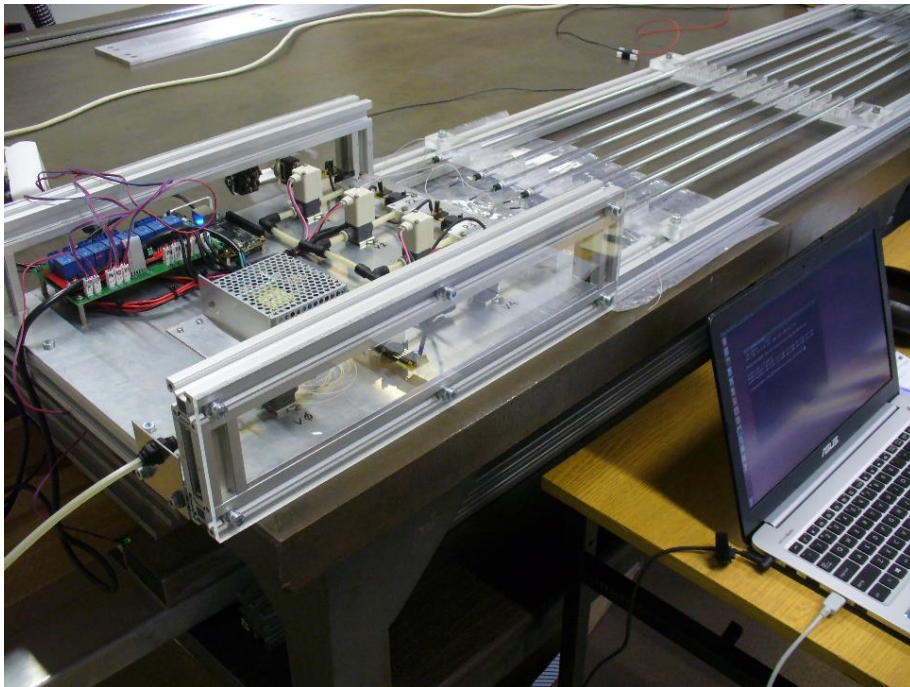

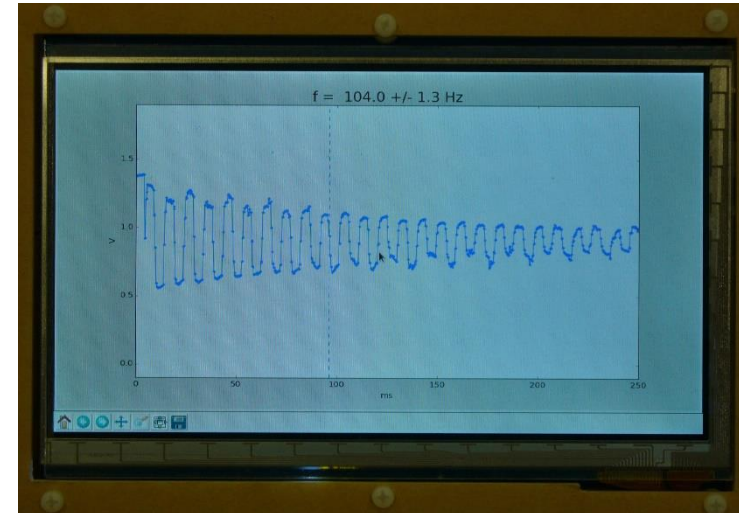epoxy adhesive sealing the wire locator

gas pipe

Signal connector

Quality control of straw tubes

Stand for measuring gas tightness of straws (*acceptable pressure drop $\Delta p/p/t$ <0.5%/h*)

Measurement of mechanical tension of wires (*acceptable tension* 50 ± 5 g)

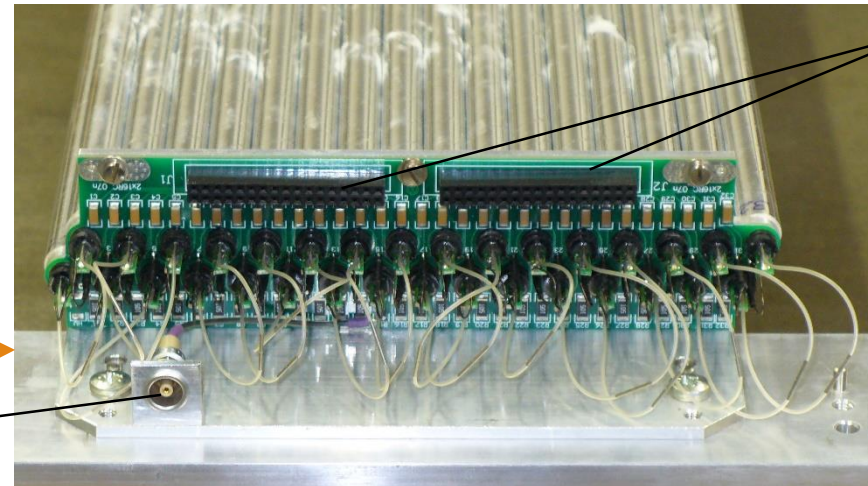# Straw tube modules for FT5-6
(straw tube length = 125 cm)
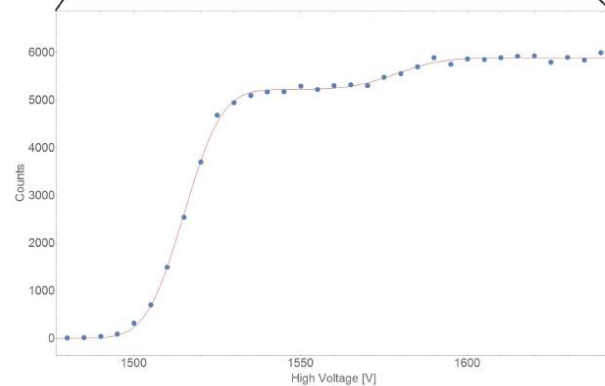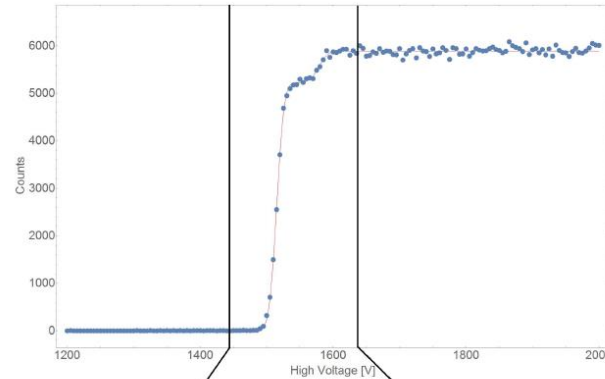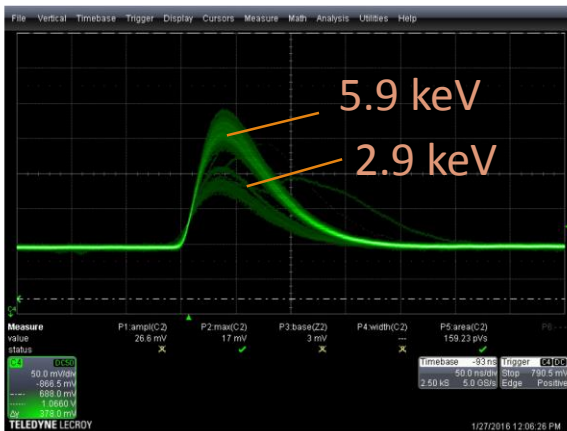

gas manifold

gas in

gas out

connectors for FE boards

HV socket

Quality control of straw tube module

➢ Gas tightness

➢ Dark current (level of 10 nA at HV=+1500 V)

➢ Plateau curve with 55-Fe source

➢ Uniformity of gas gain along straws

➢ Gas flow through individual straws

➢ Positions of straws and wires

Plateau curve with 55-Fe (counts vs. HV)

$$N(V) = N_0 \left[1 + \text{erf} \left(\frac{V - V_0}{\sigma_0 \sqrt{2}} \right) \right] + N_1 \left[1 + \text{erf} \left(\frac{V - V_1}{\sigma_1 \sqrt{2}} \right) \right]$$

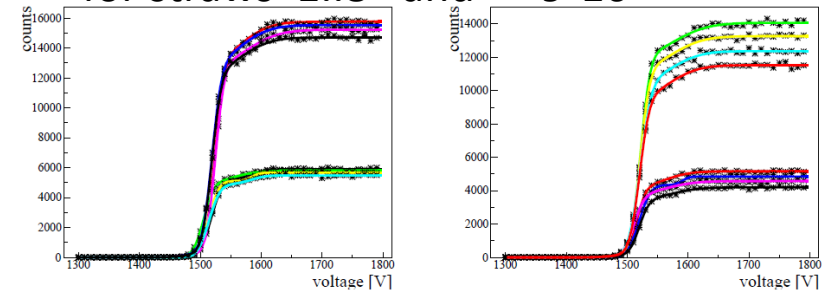**6 fitting parameters:**

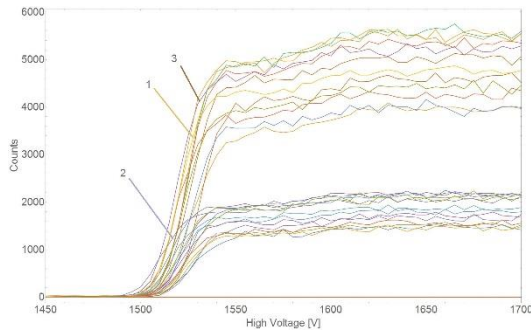N_0, N_1 - counts in the plateau

V_0, V_1 - position of slope
      (sensitive to gas gain)

σ_0, σ_1 - smearing of slope
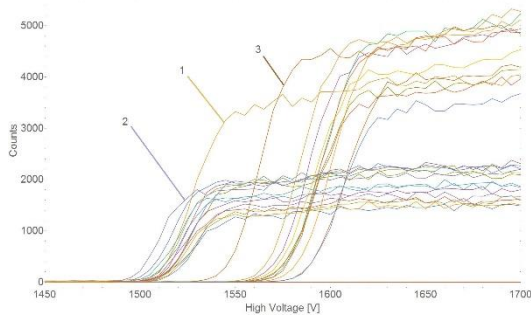   (sensitive to electronic noise level)

Example of plateau curves measued
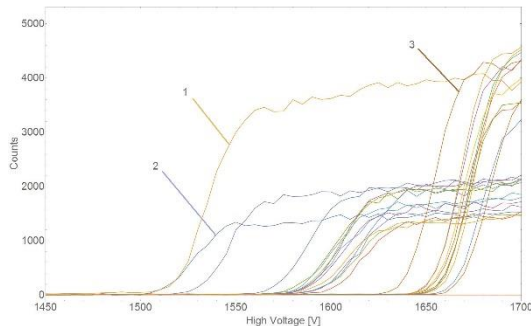for straws 1..8 and 9-16

Inspection of gas flow through individual straws

Gas mixture Ar+CO2 (90:10)

30 min. after change to Ar+CO2 (80:20),
1,2 – pair of straws with added flow impedance – 1 m of $\emptyset_{inner}$ = 0.5mm
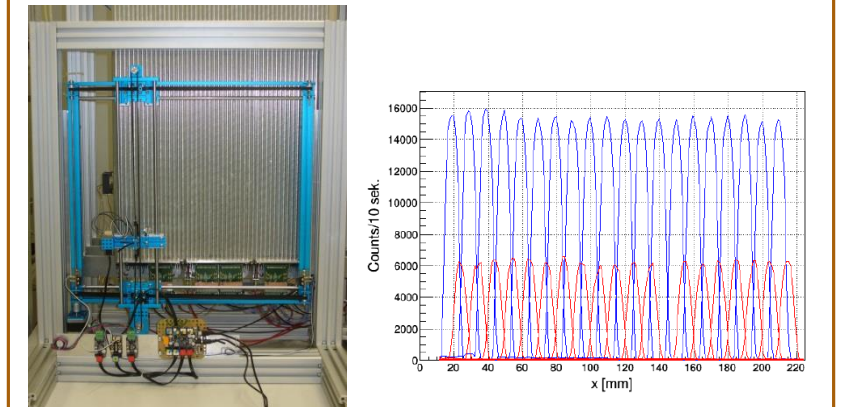
60 min. after change to Ar+CO2 (80:20)

X-ray scanner

- ➢ x-y (200 cm x 120 cm) X-ray scanner has been constructed for measuring positions of straws and of wires in a double layer

- ➢ the x-y stage works and is controlled from the DAQ computer

- ➢ first test scans with 55-Fe and with X-rays from Moxtek 40 kV X-ray source will be done in this month

Small scale prototype (x×y= 30x30 cm²)

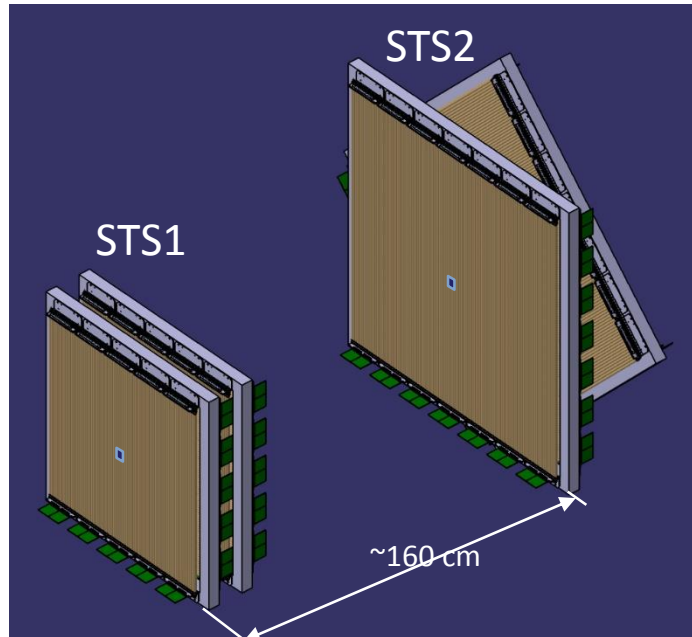# Construction of half frame with 12 modules for FT5-FT6

Verification of applied mechanical solutions:

- mounting, dismounting the modules on the frame

- precision of positions of straw tubes in the double-layer

- installation of the half-frame on the base frame
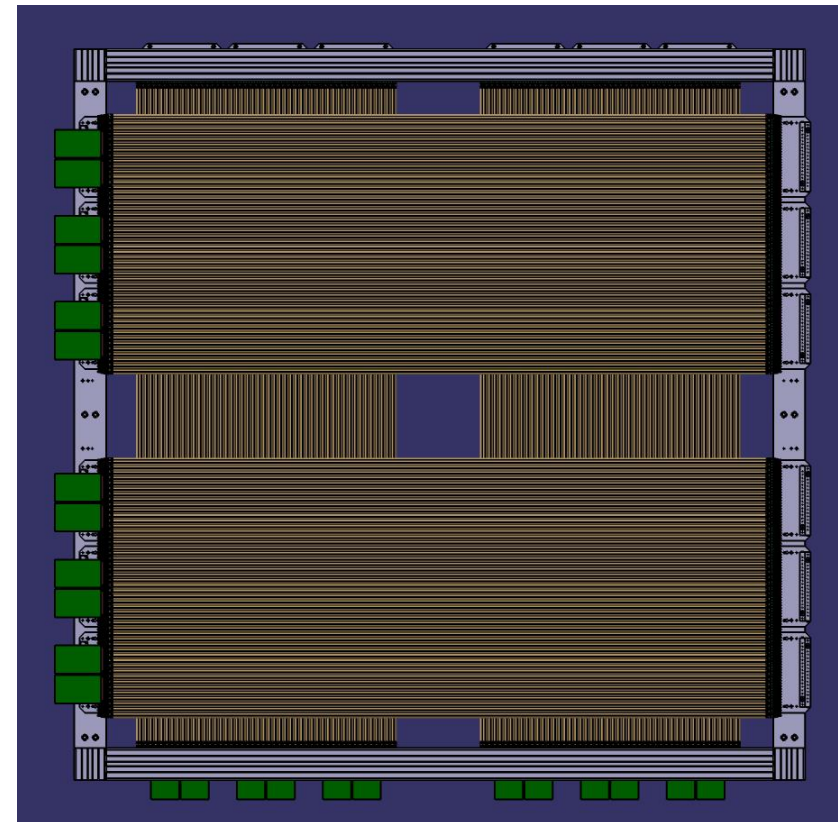
- sliding the half-frame on the linear guide

Rails for FT5 and FT6

a)
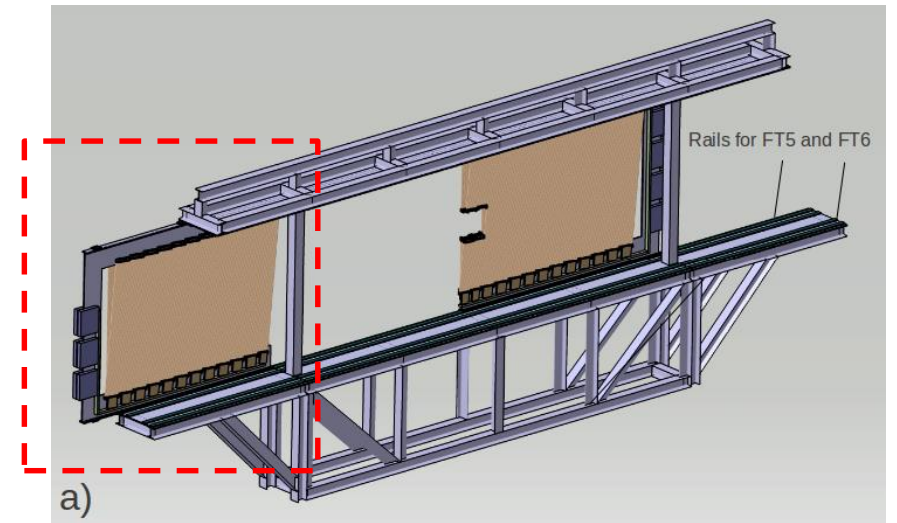
STS2 for forward tracking at HADES

two double layers for STS2 mounted on common frame : 6 vertical + 6 horizontal modules

HADES forward tracker

STS2

STS1

~160 cm

Pattern recognition in the FT

➢ The group from the Cracow Tech. Univ. (Kris Korcyl, Joanna Plazek) has prepared first version of pattern recognition code including all FT stations.

➢ Tests of the code with events containing 1, 3 and 5 muon tracks are being conducted by Witold Przygoda from JU together with K. Korcyl and J. Plazek.

➢ After positive verification, the code will be integrated in the PANDA-Root framework.

Summary

➢ Design of straw tubes for the FT is completed.

➢ Tooling for production of straws has been built.

➢ Quality control procedure is developed and most of the required instrumentation is prepared.

➢ Production of 12 modules for FT5-6 mounted on the half-frame will be completed around April 2017.

➢ The work on the pattern recognition in the FT is progressing but the date of its completion is difficult to predict.