

PANDA straws: testing plans in Julich.

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Goal: investigations of tracking and particle identification by multiple ionizations measurements;

Testing and optimizing of different types of FEE – preamplifiers, amplifiers-discriminators; digital electronics ; gas mixtures;

Plans for coming weeks, work in progress:

assembling of a straw detector prototype for test in laboratory with cosmic rays and radioactive sources,

150 cm long straw tubes available from previous production,
10 mm diameter, double side aluminized mylar,
8 layers of 16 straws

Integration of this prototype in an existing laboratory setup with tracking detectors, with test electronics and data acquisition

Detectors:

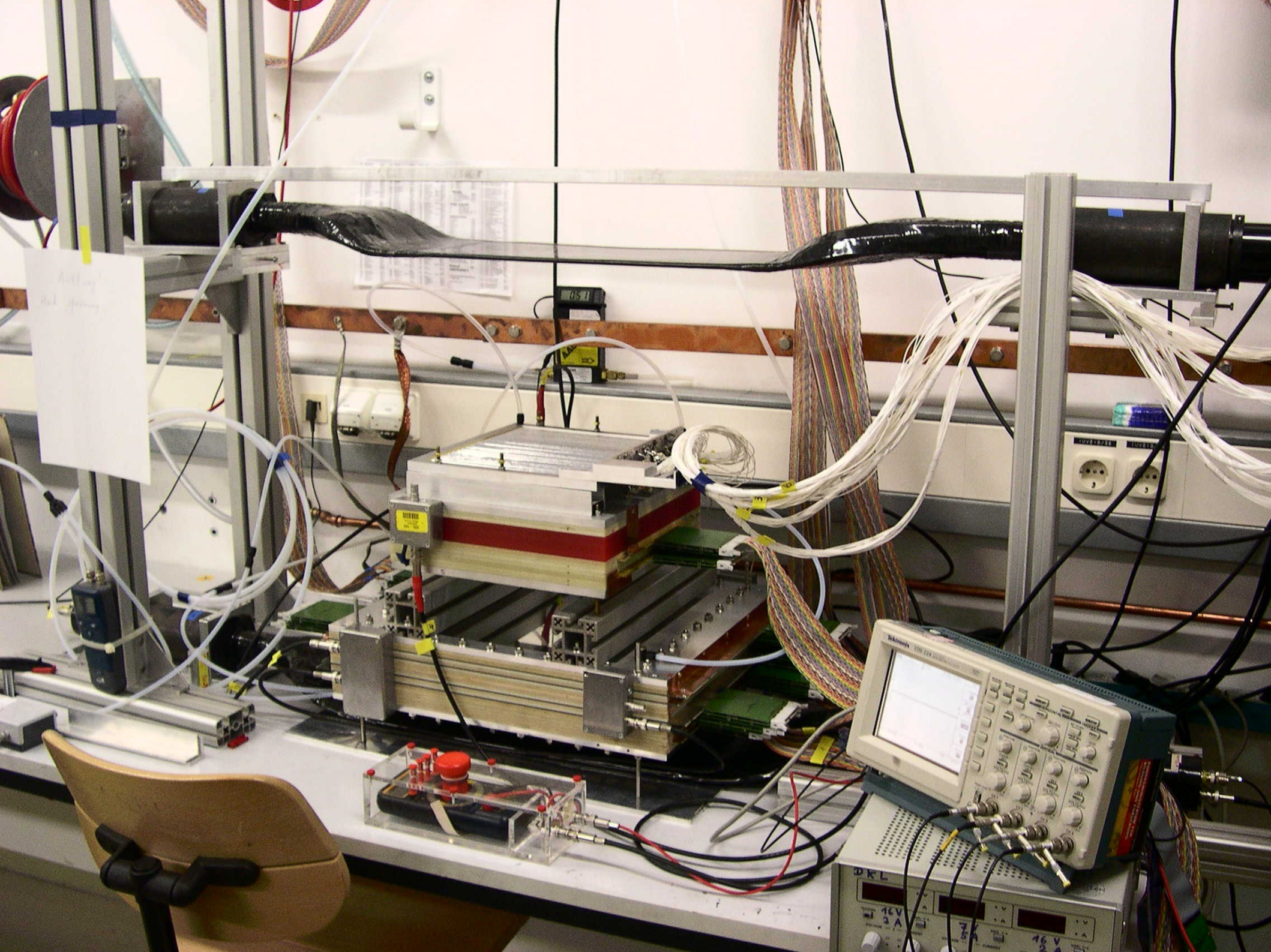
- straw tube detector:

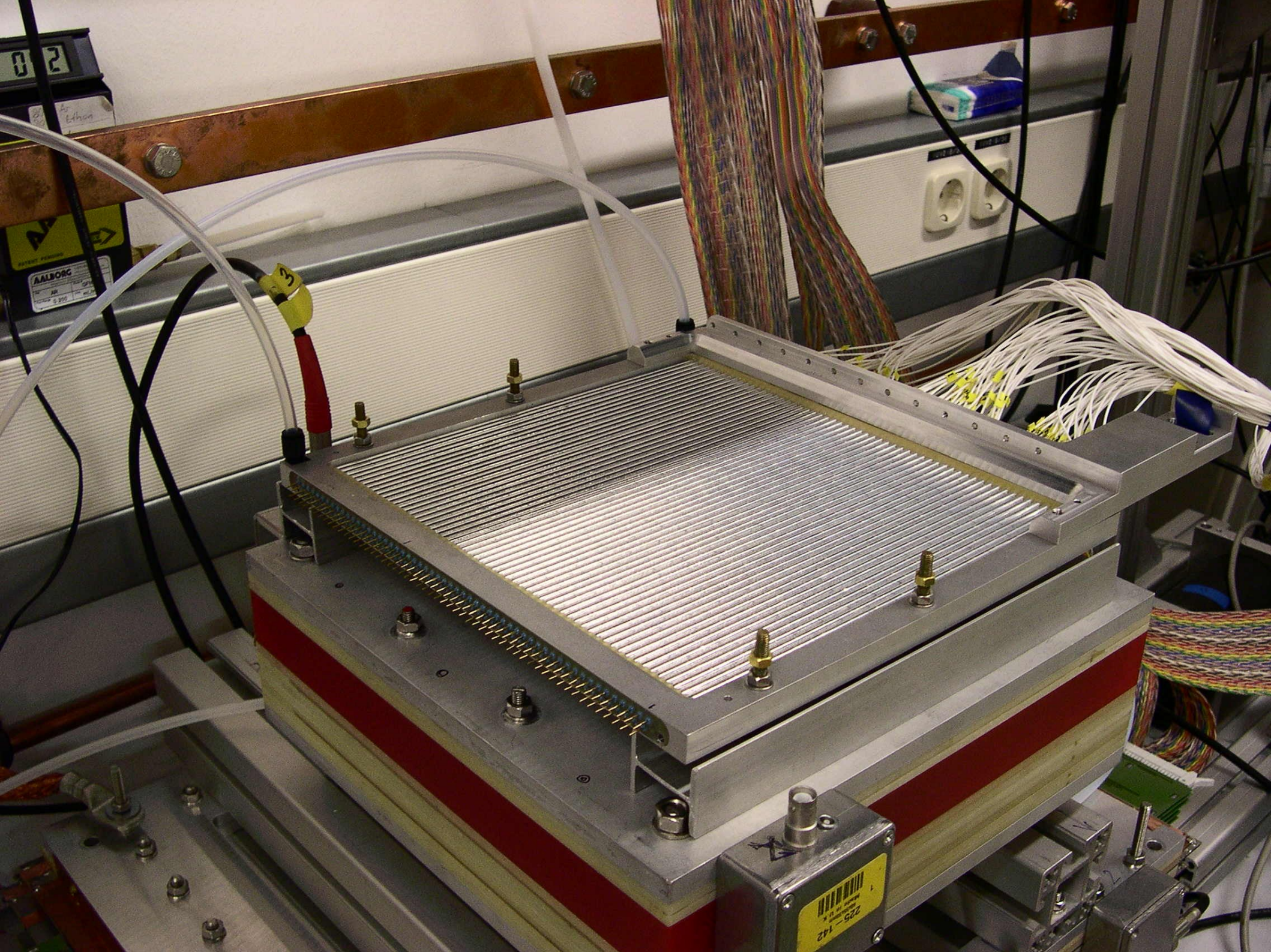
straws 4 mm diameter, 2 layers, $S=4.4$ mm, $dZ=4$ mm,
111 straws, sensitive area $\sim 23\text{-}24$ cm²

- 6 plane module drift chamber:

2*X, 2*+30deg, 2*-30 deg, 10 mm drift cell (+- 5 mm)

a hybrid detector – with GEM foil - gas electron multiplier,
inserted in a drift chamber as a preamplifier for registration
of ionization clusters





Available test electronics

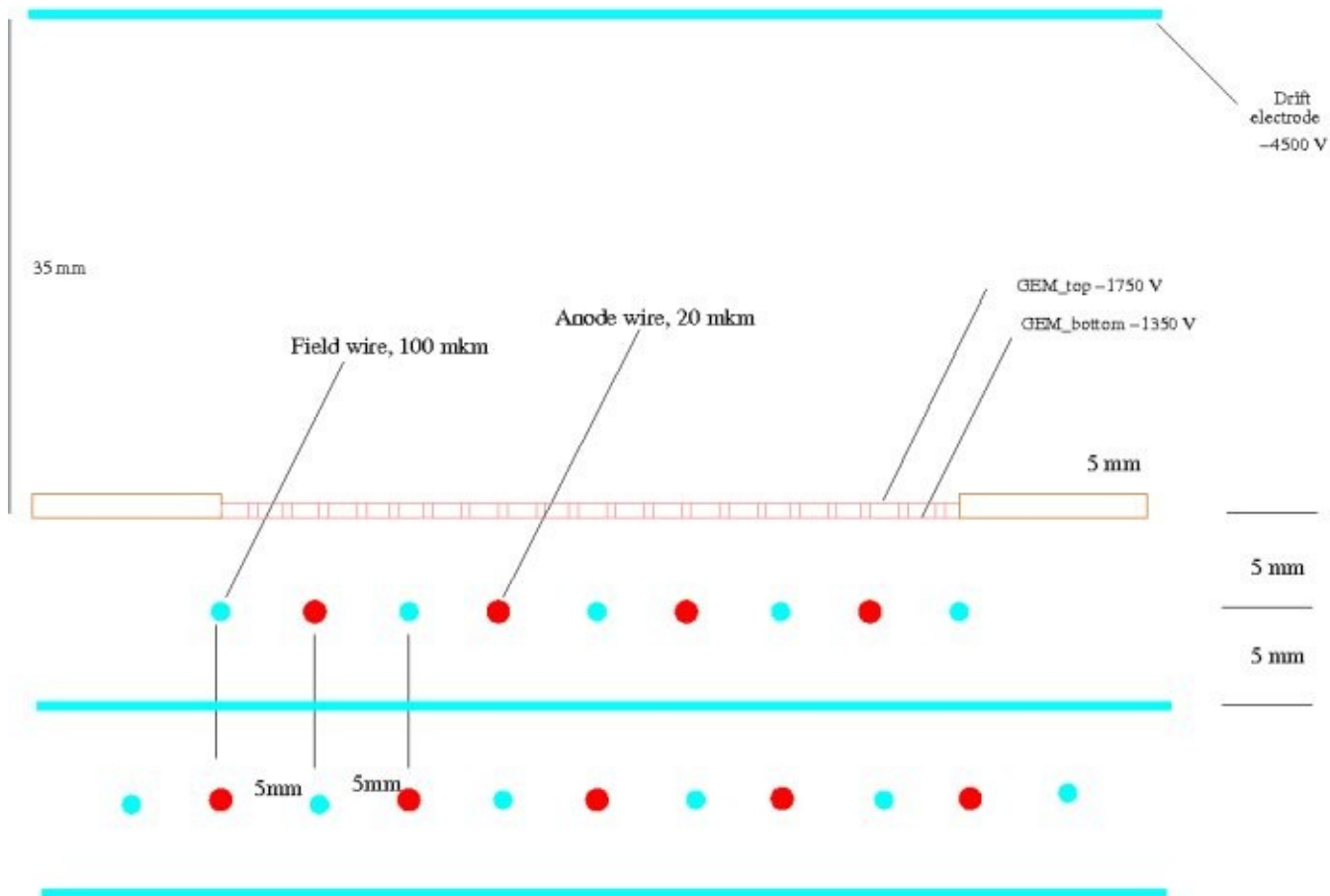
- a 16 channels current amplifier (CMD componenets), gain 10 mV/mka, rise time < 8 ns, noise ~ 1 mka; bipolar output;
- amplifier-discriminator CMP 16, amplification 8 mV/mka rise time 7 ns, LVDS output
- adapters and booster amplifiers for creating unipolar signals and matching between analog and digital electronics
- preamplifiers and discriminators from TOF experiment
- some FEE electronics from WASA CELCIUS experiment

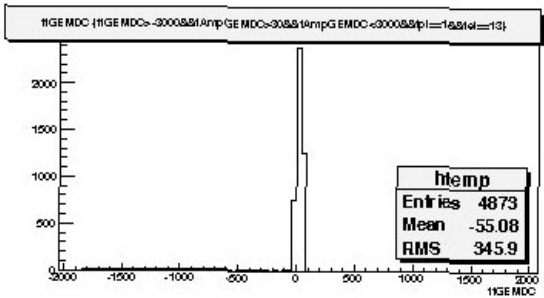
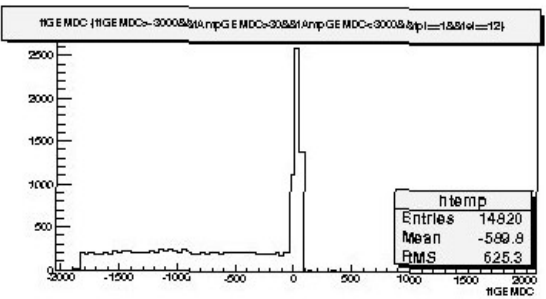
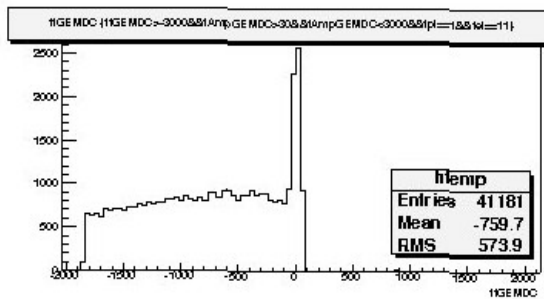
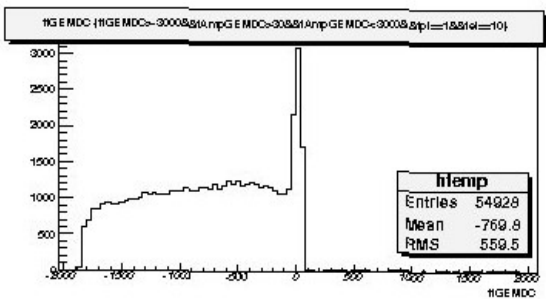
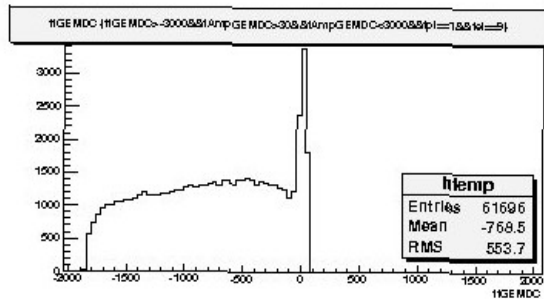
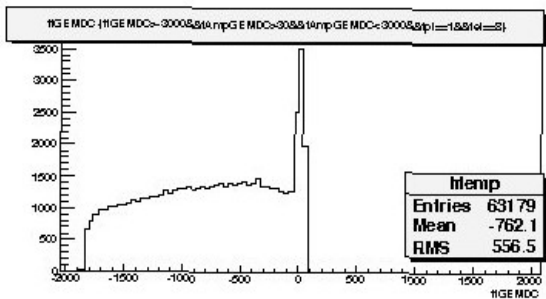
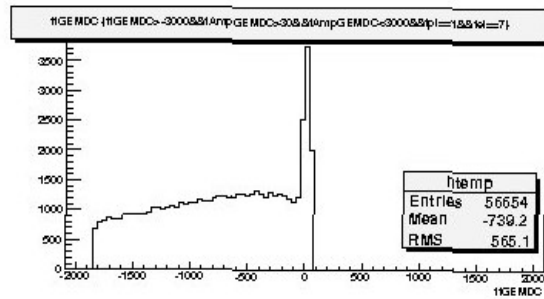
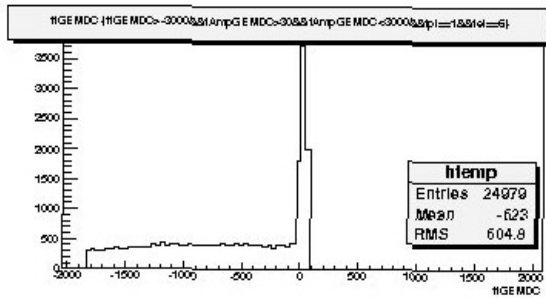
Digital electronics

TDC-F1, 64 channels, LVDS input, in normal resolution mode 7.8 nks measurement range, resolution 120 ps LSB, used in WASA and ANKE at COSY

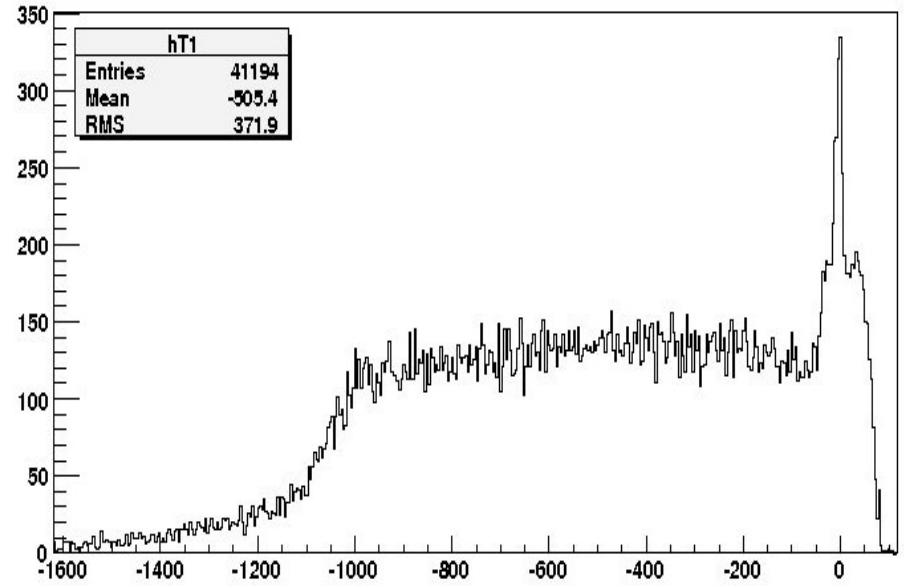
Fast QDC – a flash ADC with a sampling frequency of 160 MHz, range 6.4 nks, 11 bits, up to 0.4 V.

FPGA programmed algorithm which identifies the number of pulses, time position (~ 1.56 ns), amplitudes, charges, used in WASA at COSY

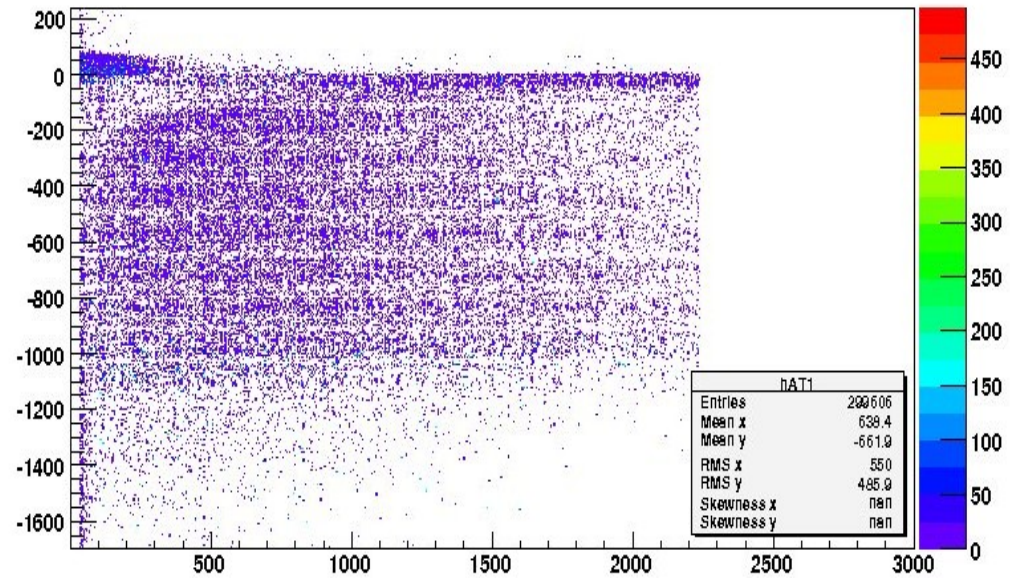


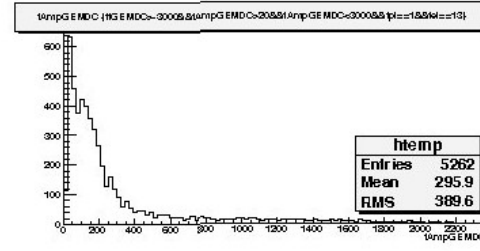
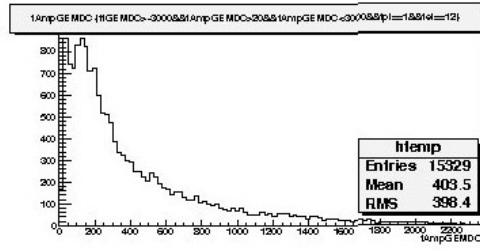
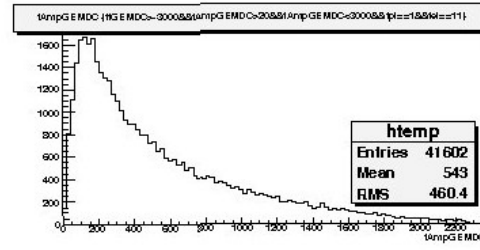
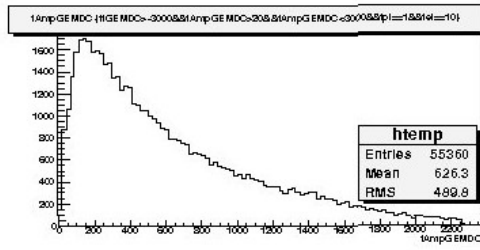
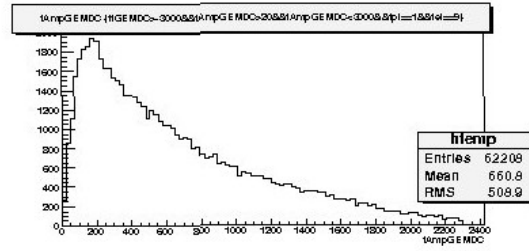
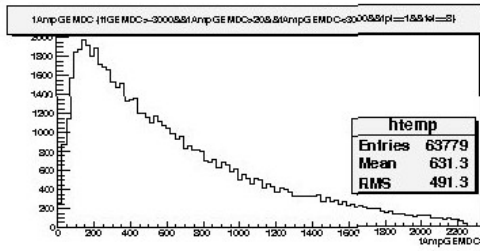
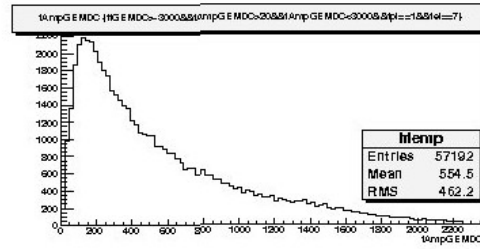
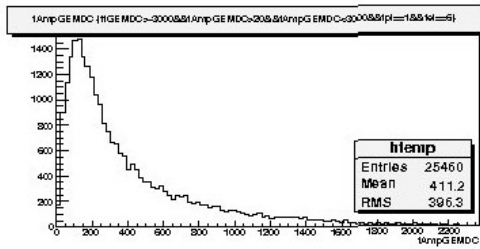


Time in Plane1, GEMDC

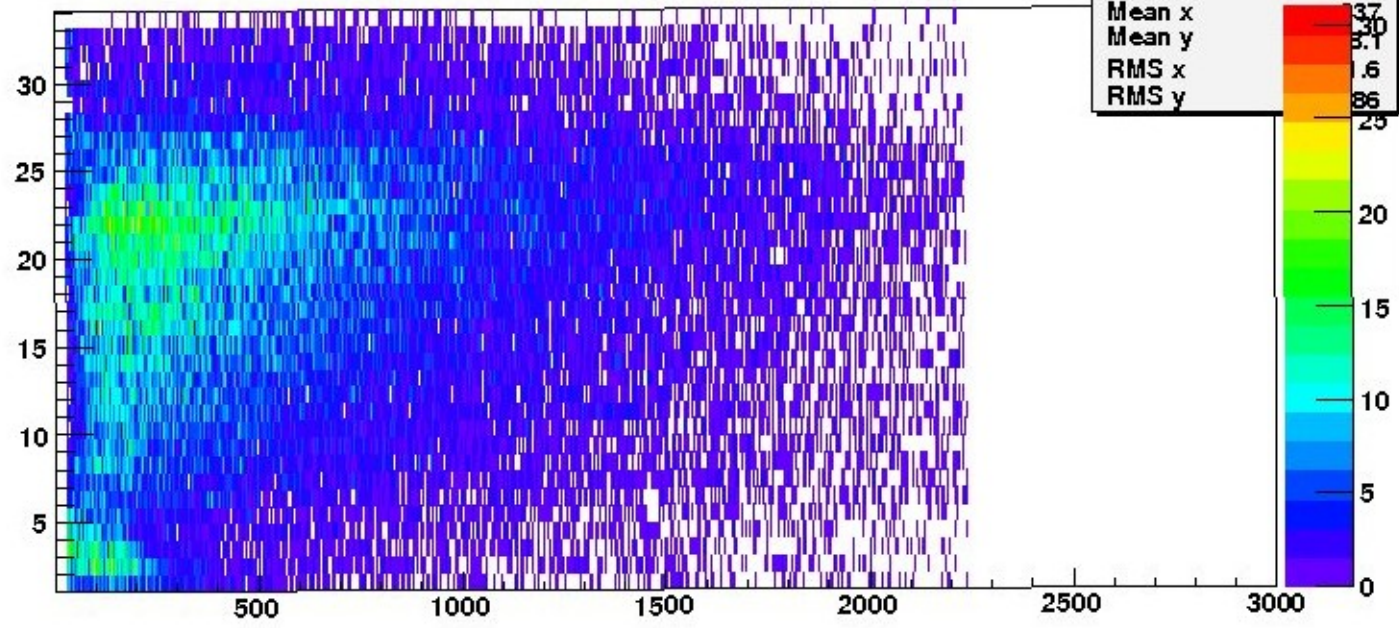


Amplitude%Time, Plane1

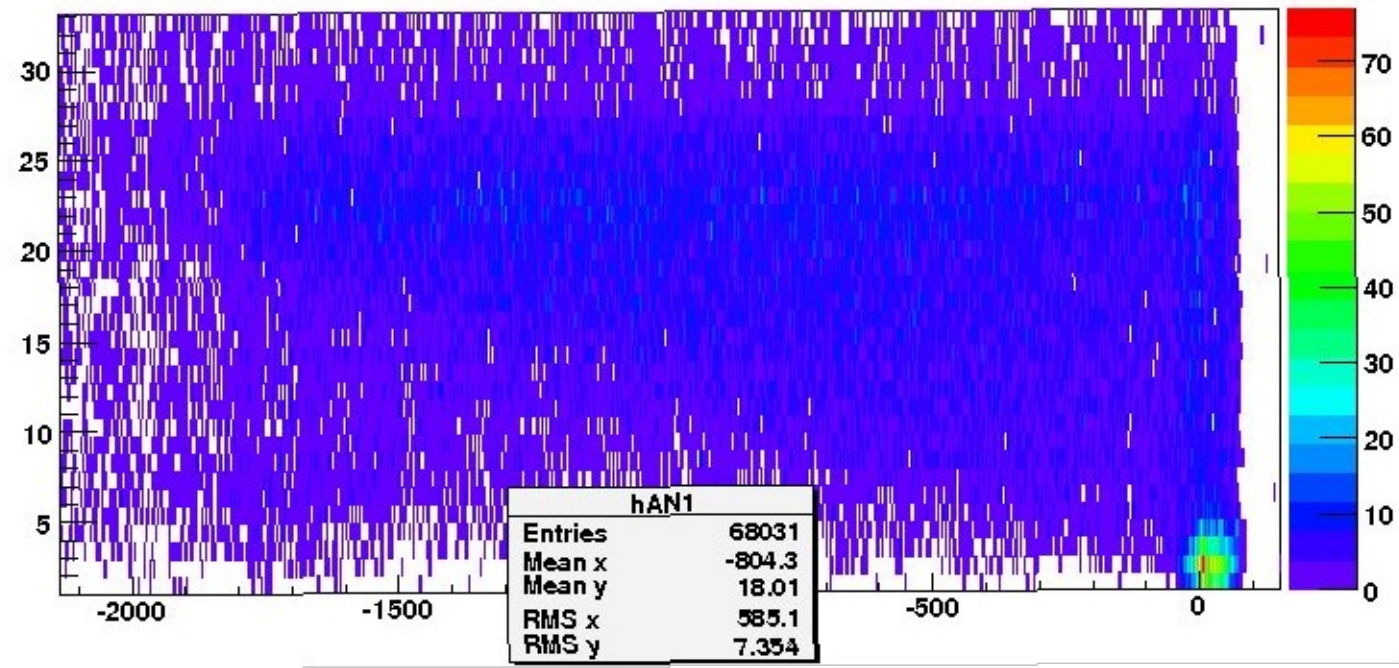




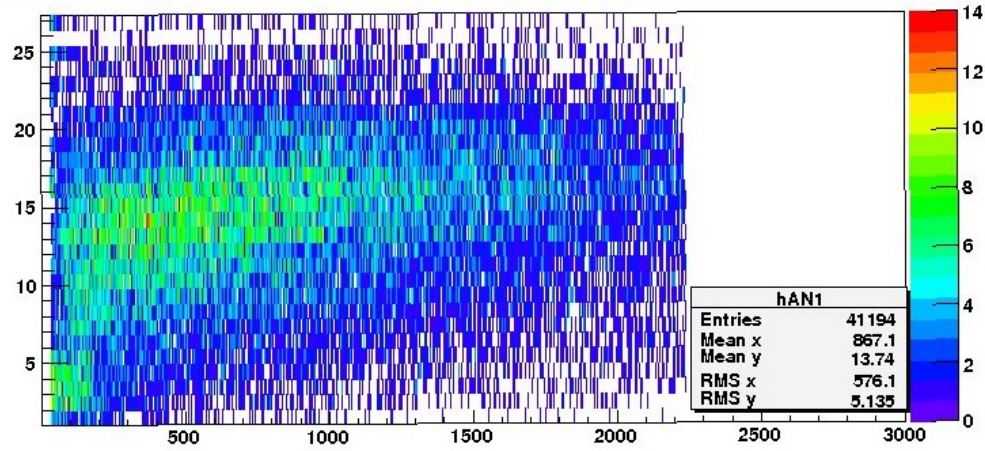
Amp1%N1, Plane1



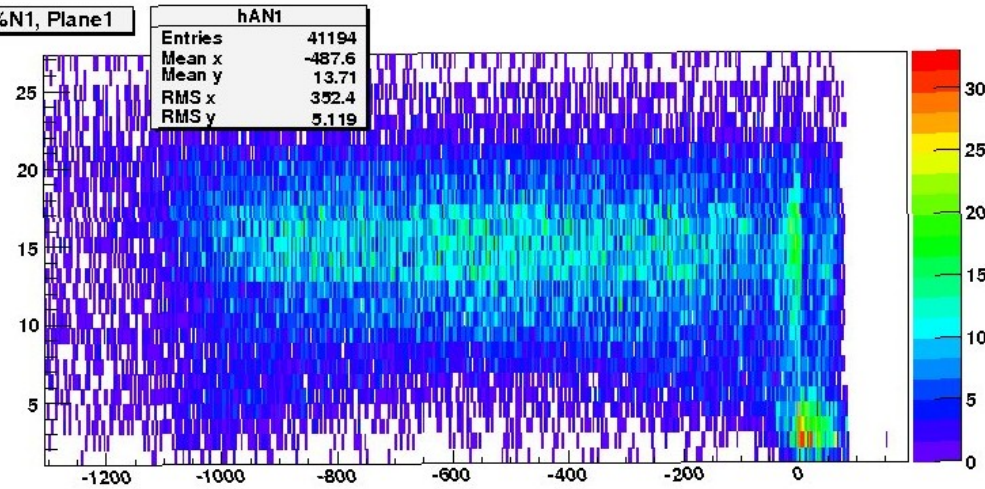
T1%N1, Plane1

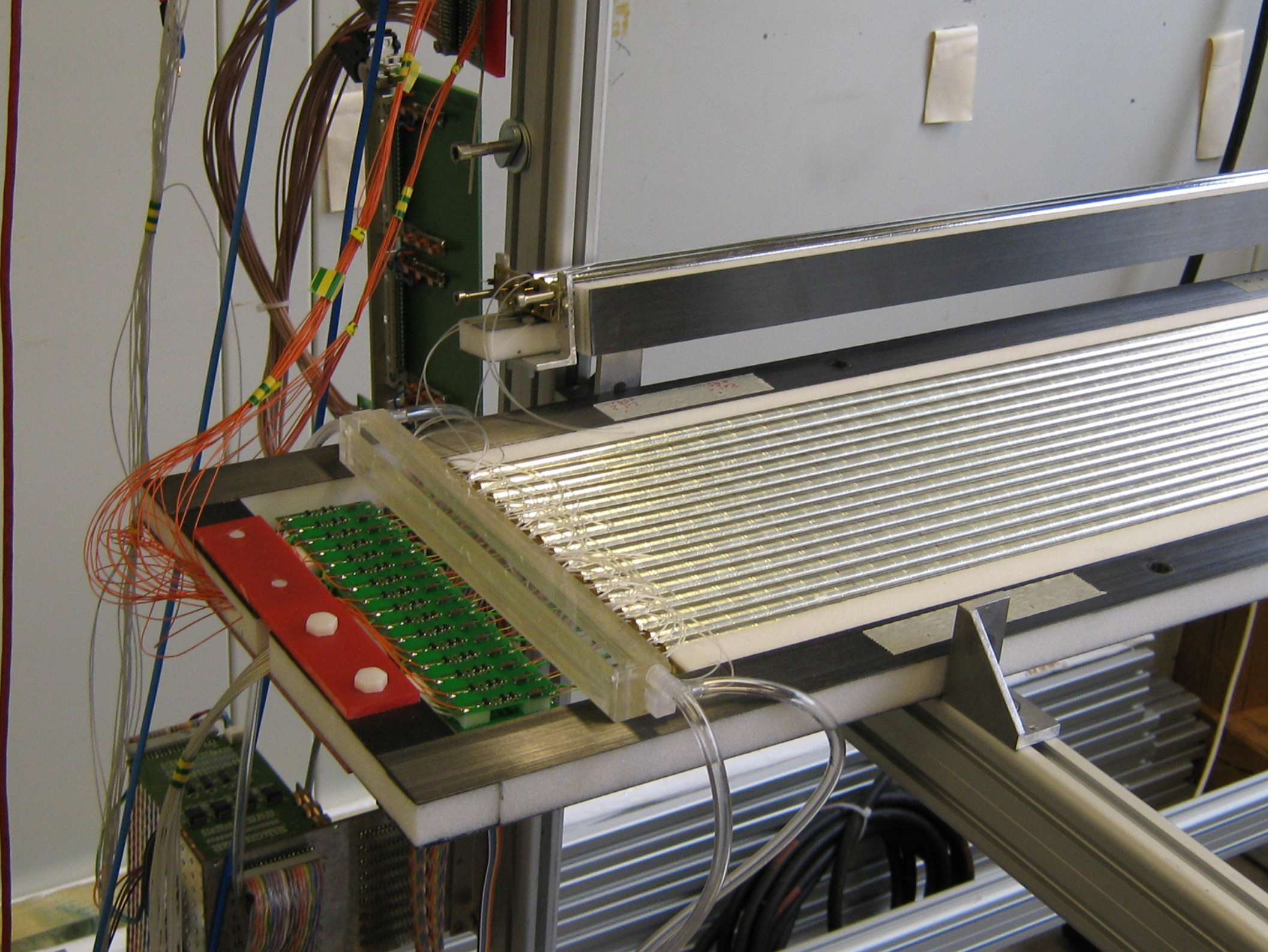


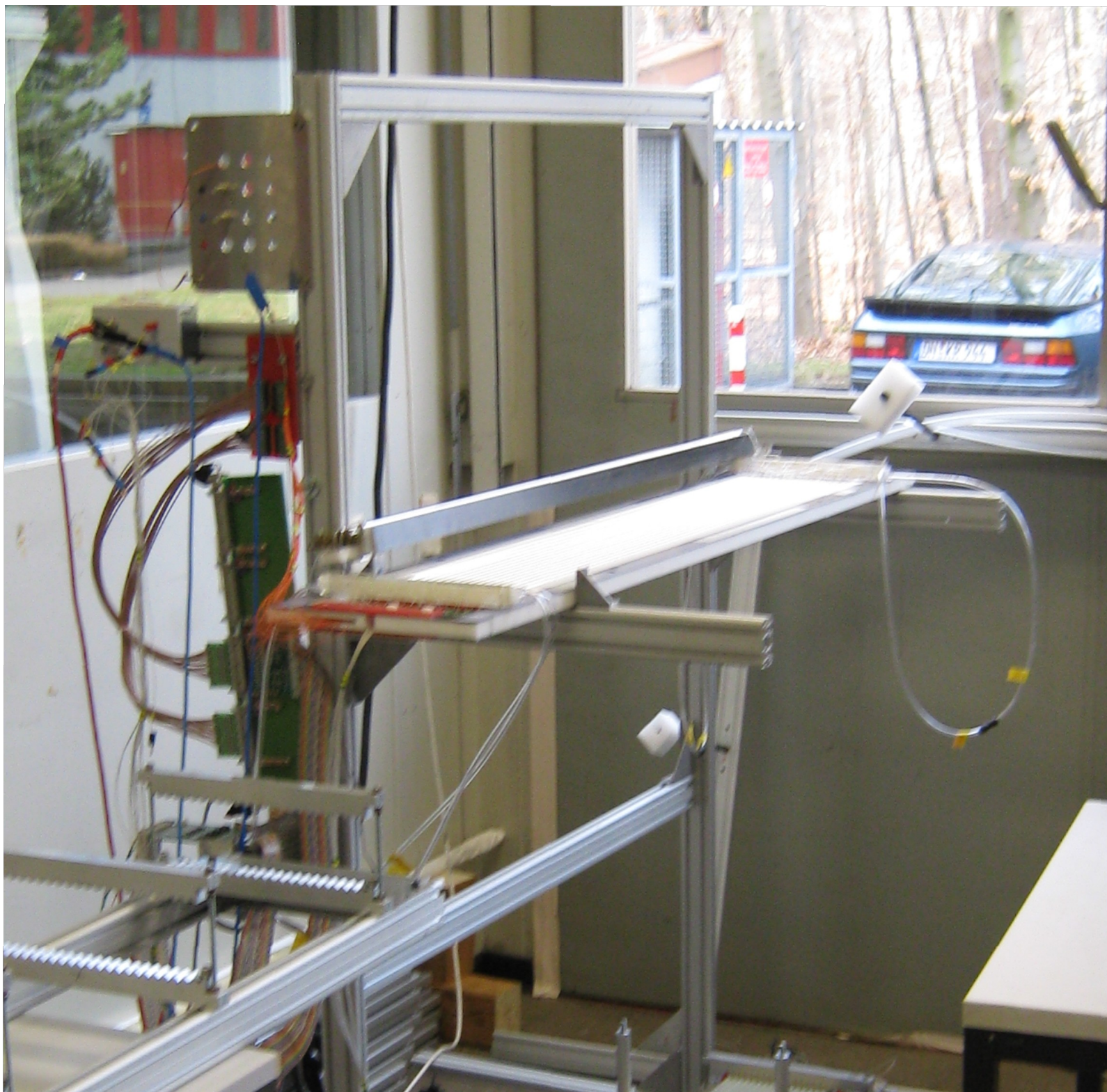
Amp1%N1, Plane1



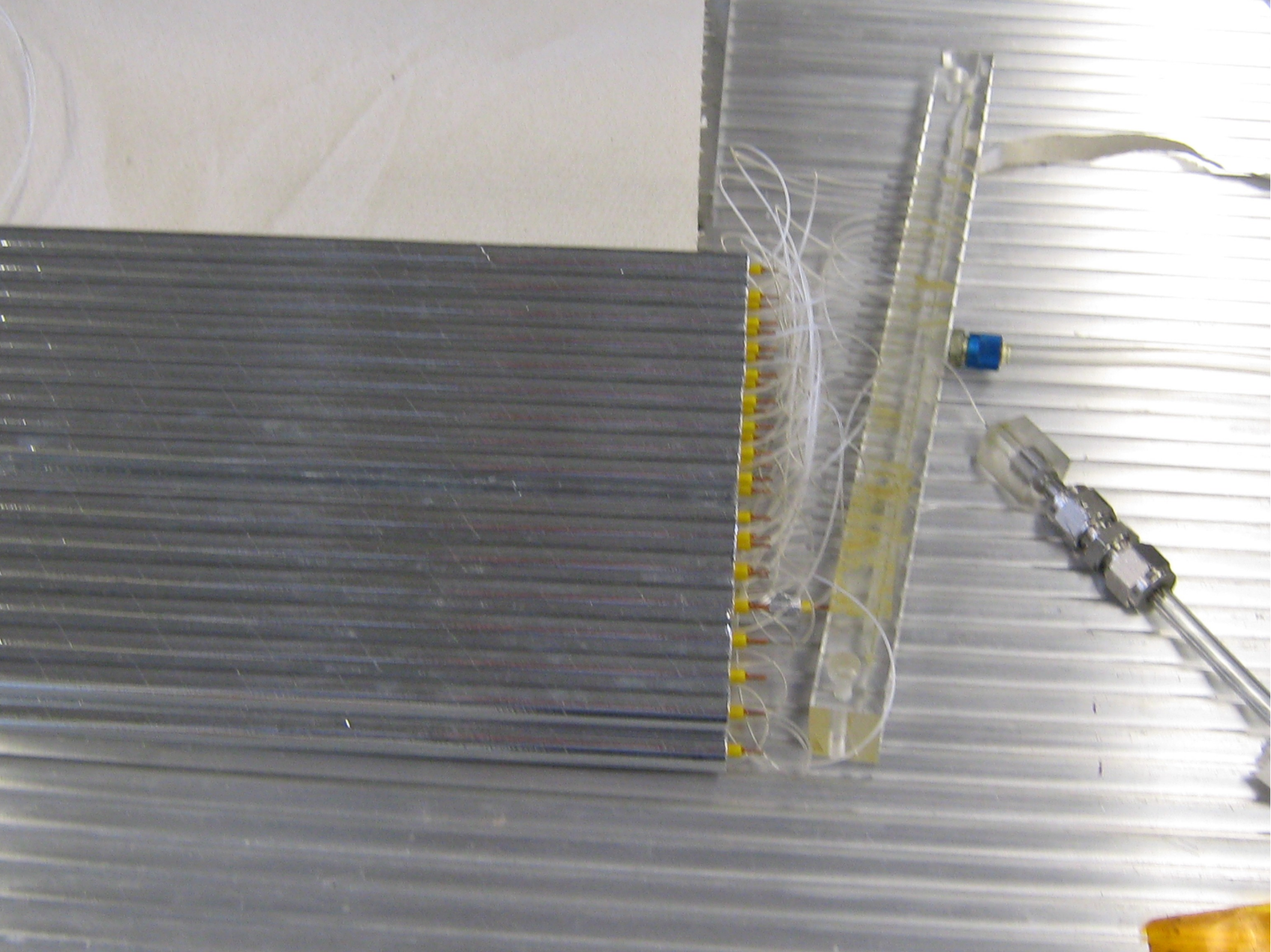
T1%N1, Plane1











space and double-hit resolution; gas mixtures:
Ar/CO₂, Ar/C₂H₆, Ar/CO₂/CF₄

identification power: comparison of GEMDC measurements
and multiple ionization measurements in straw tubes;
algorithms;

choice of the preamplifier-discriminator, splitting into analog
and digital parts, optimization of the noise, grounding;

digital electronics, data acquisition, software for data
analysis;

implementation of a sector-prototype with a realistic mechanical
design;