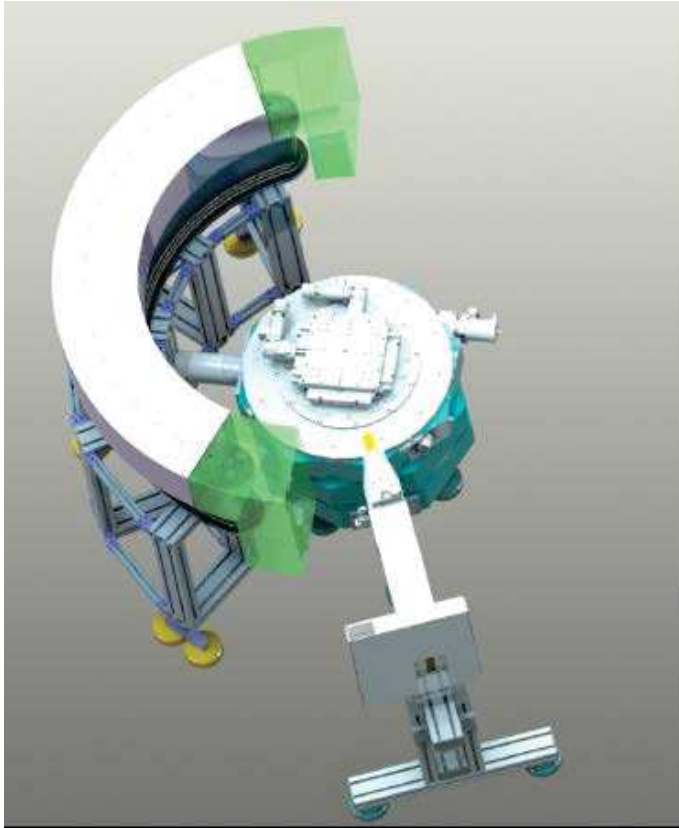


ERWIN: A new powder diffractometer @ FRM II



Curved ^3He -based MWPC covering 120°

- MWPC design closely derived from BNL-design
- 30°- demonstrator built in collaboration with ILL & PSI

CHARM detector

8 MWPC segments mounted seamless in a pressure vessel

Fully modular design

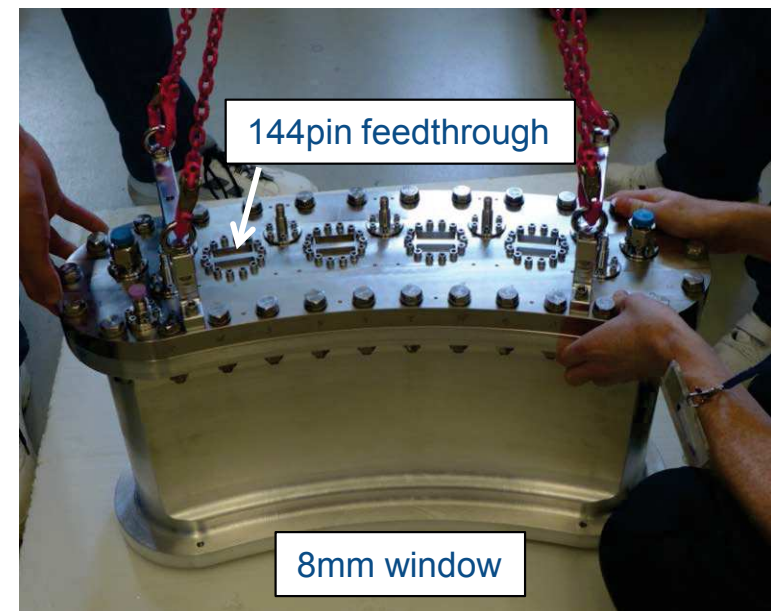
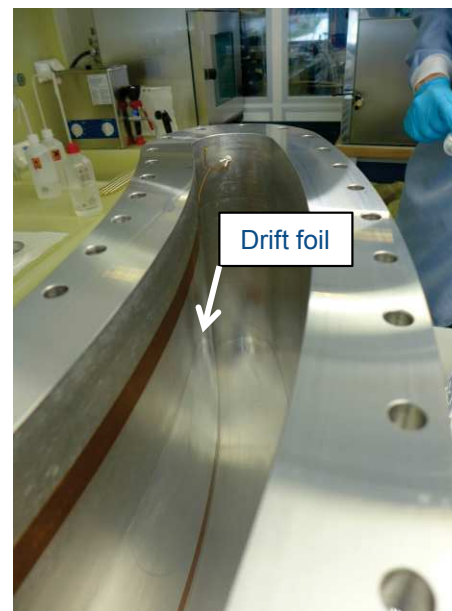
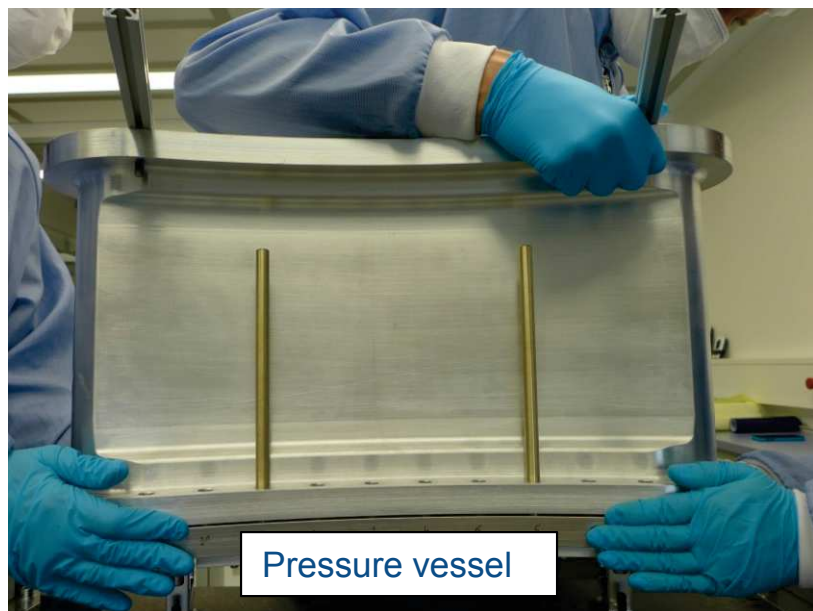
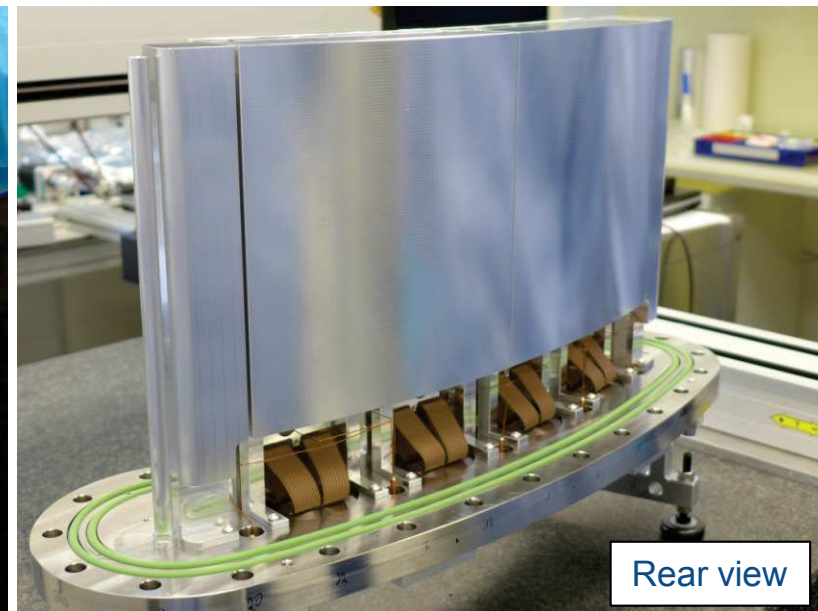
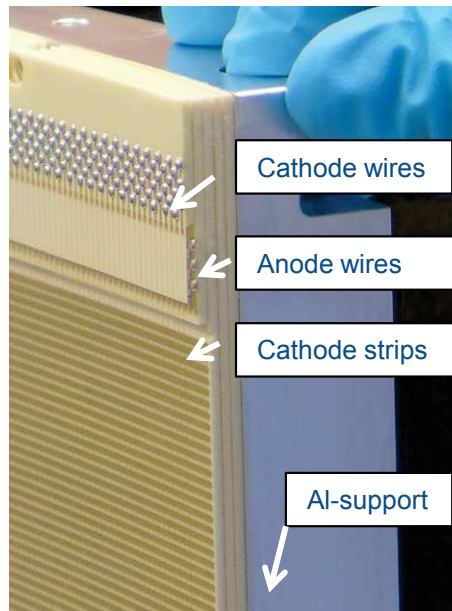
Individual wire / strip readout

ToT-based CoG algorithm for position determination

2D-position, time & energy data

Specifications:

Radius	800 mm
Aperture horizontal	$\geq 118^\circ$
Wire pitch	1,6 mm
Wire gap	1,6 mm
Resolution horizontal	0,125°
Aperture vertical	200 mm
Strip pitch	1,6 mm
Resolution vertical	0,125°
Count rate	50 kHz / wire 200 kHz / segment
$^3\text{He}+\text{CF}_4$	6.5bar + 1.5 bar
Efficiency	75 % @ 1,8A



Prototype @ TREFF

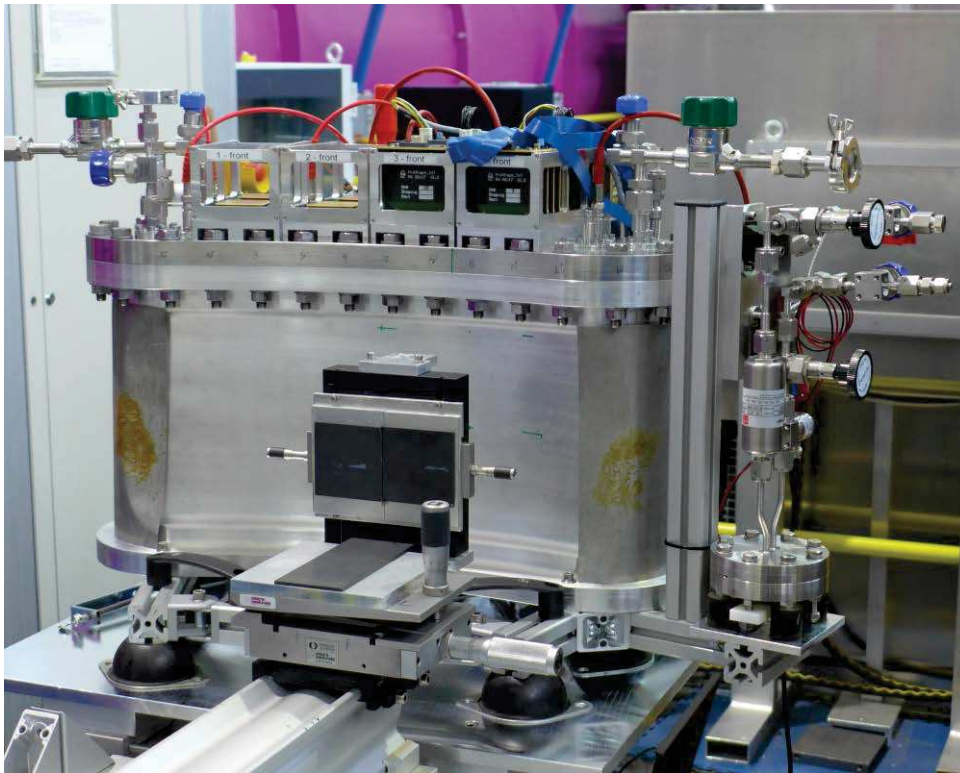
Collimated beam of $\lambda = 4.73 \text{ \AA}$ neutrons

Gas filling: 1bar ^3He + 5bar ^4He + 1,5bar CF_4

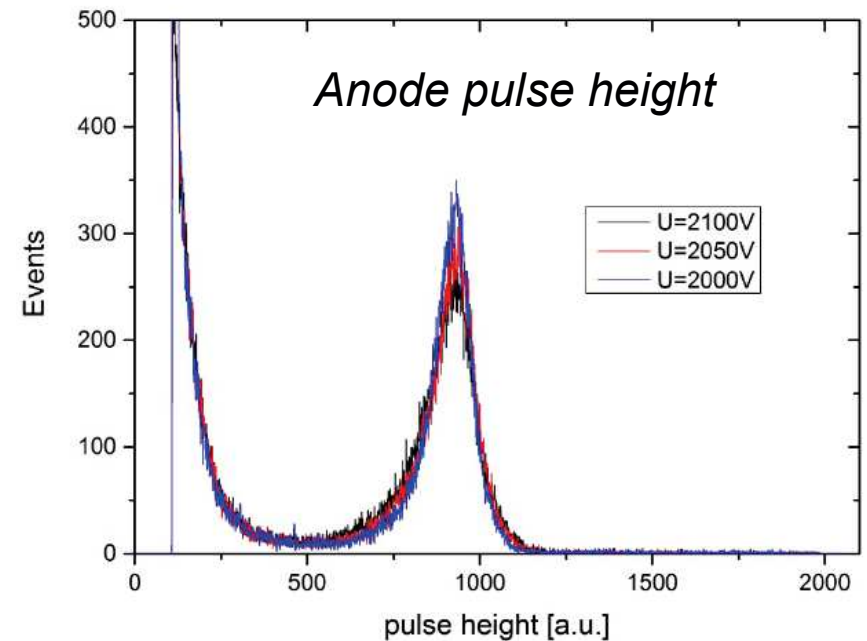
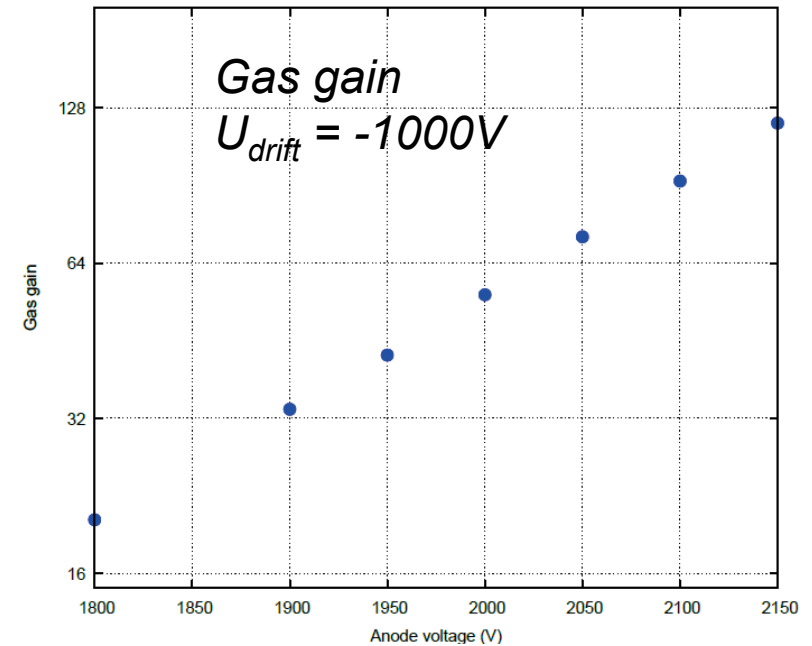
Segment #1 damaged during mounting

Short after few days \Rightarrow shut down

Segment #2 works stable and reliable

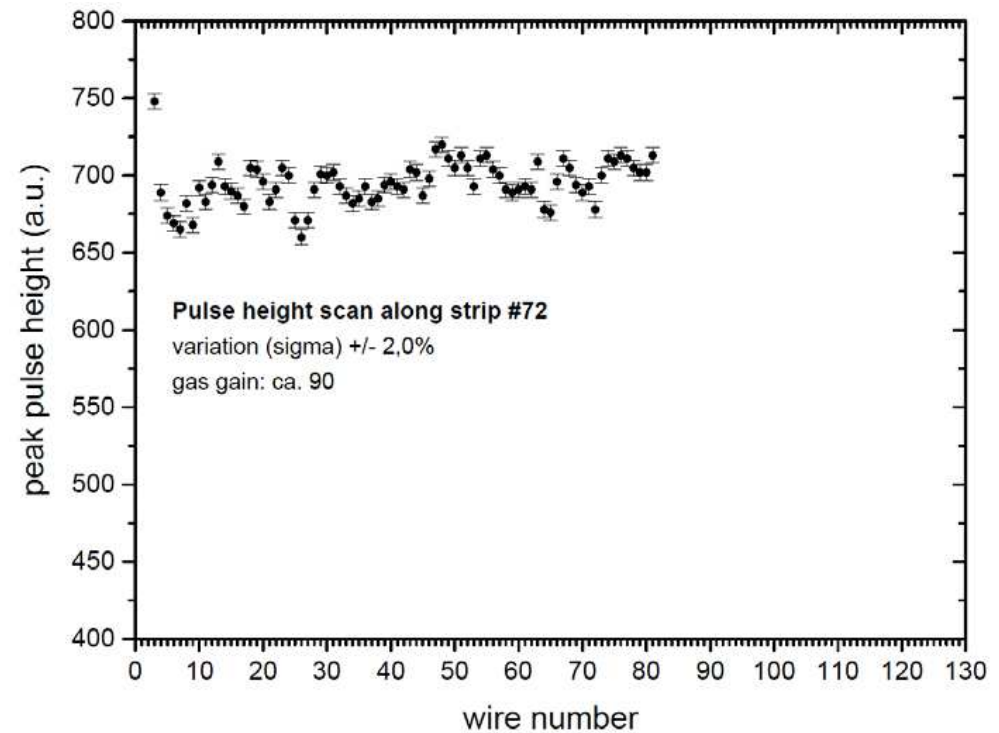
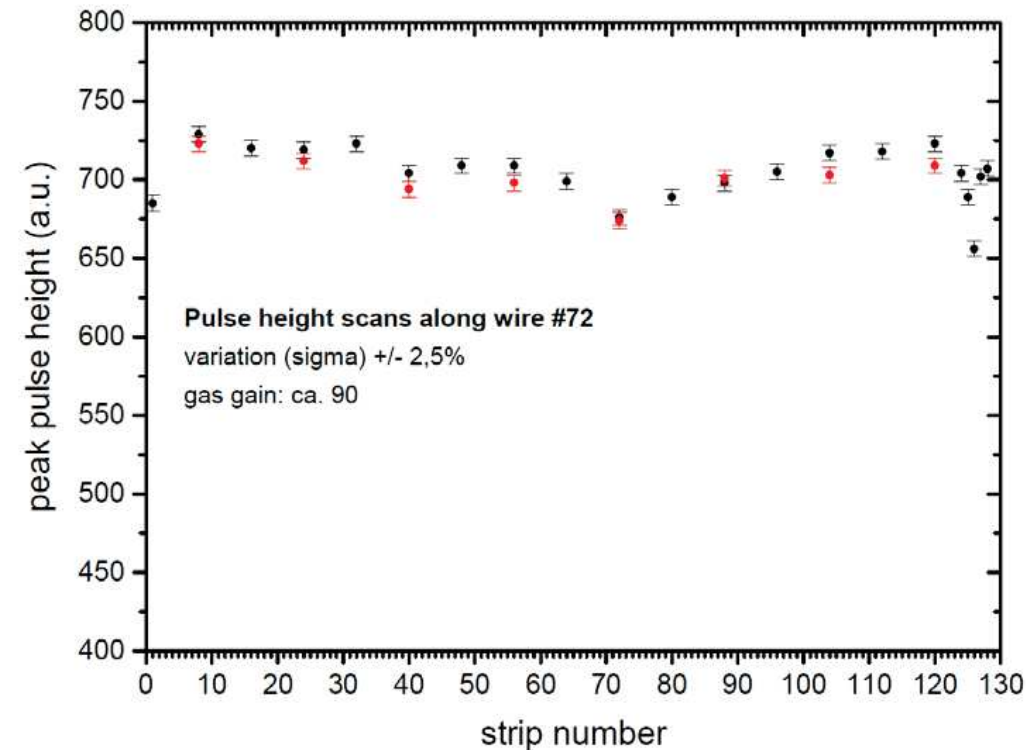
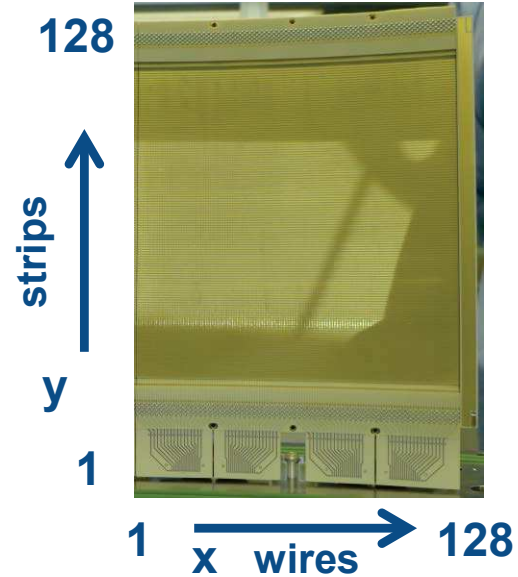
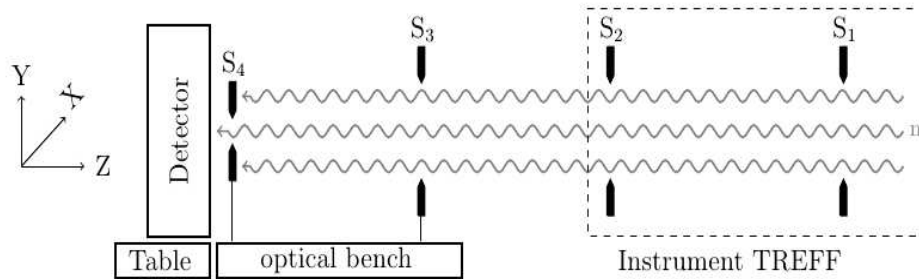


Prototype operated at gain ~ 90 ($U_a = 2100\text{V}$)

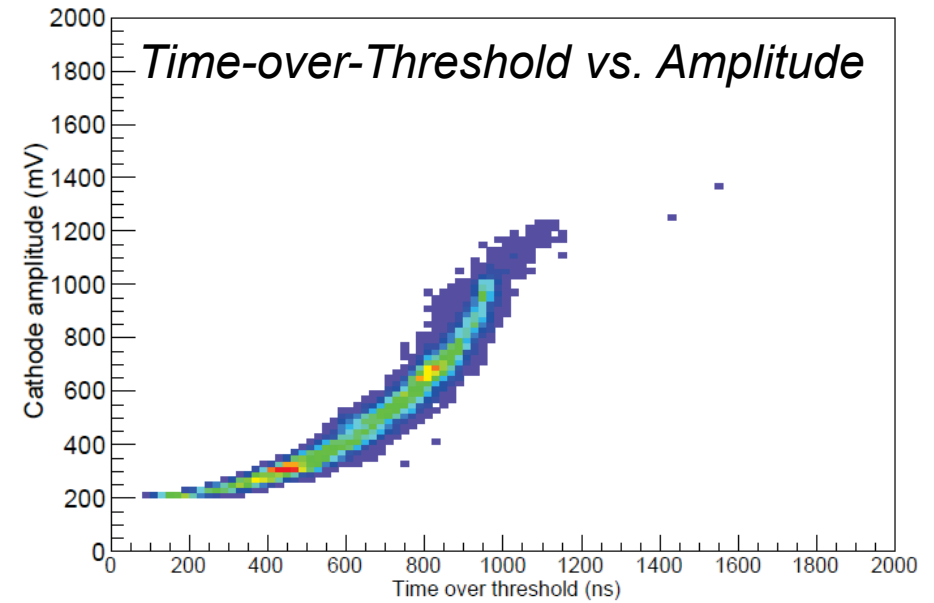


Gas gain homogeneity

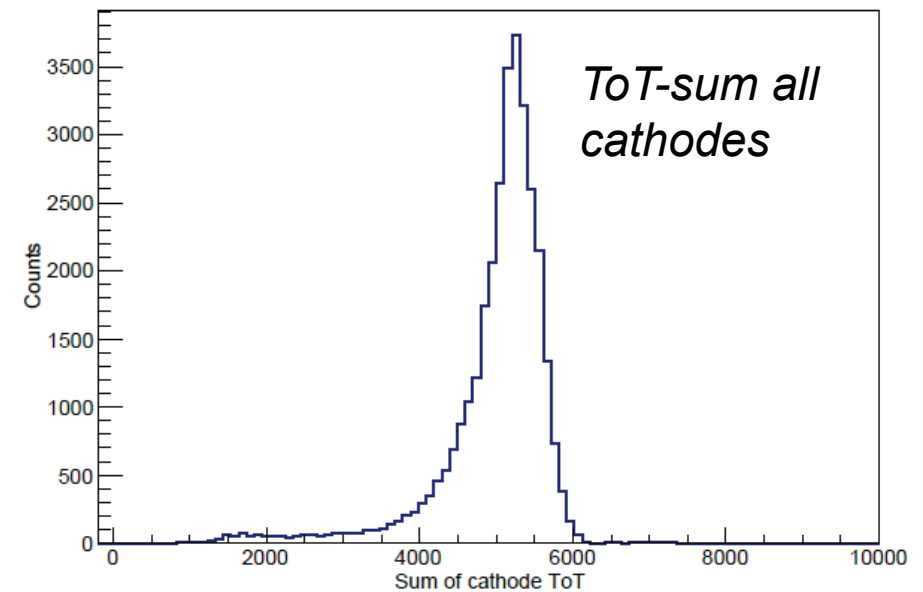
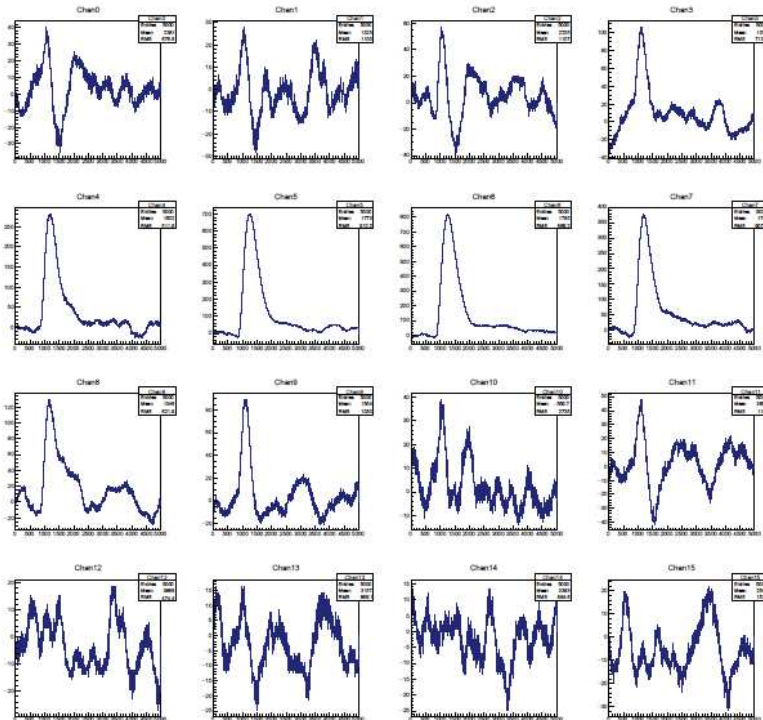
- Collimated beam: size $1.6 \times 3.5 \text{ mm}^2$
- Scans along wire #72 and strip #72



ToT-based FE-Electronics



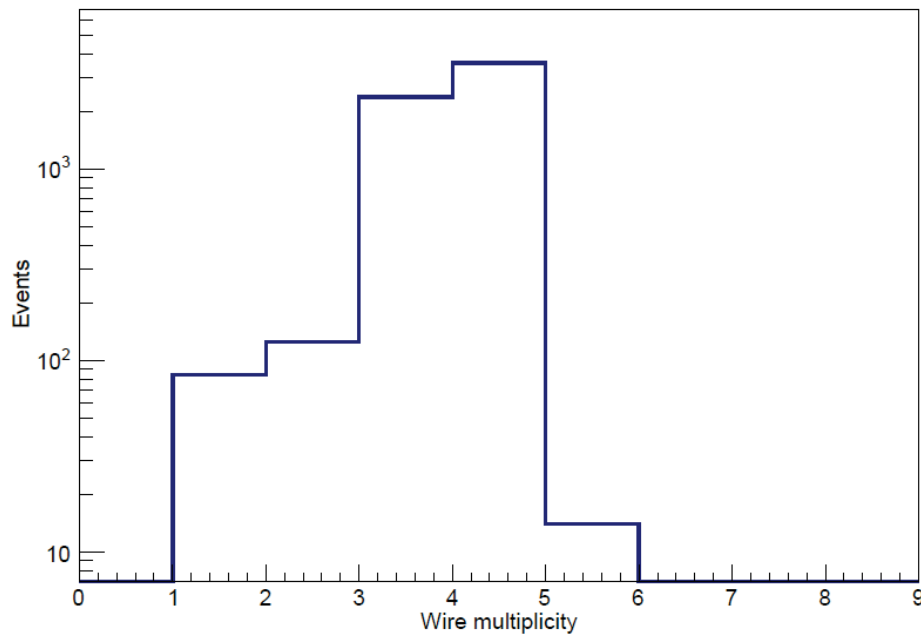
Analog signals single event



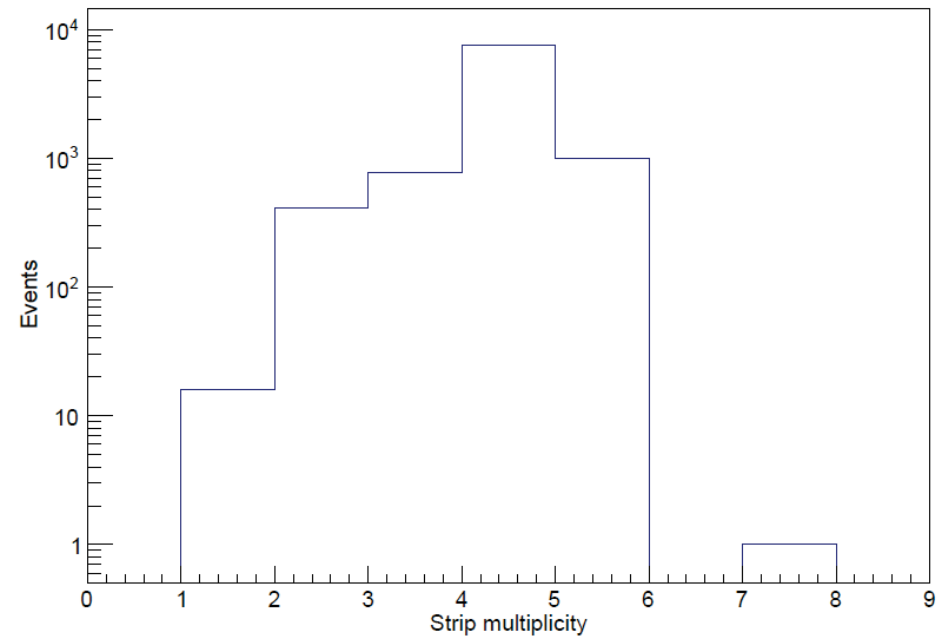
Hit-Multiplicity per neutron event

- *ToT threshold set to 200mV*

Hit multiplicity wires



Hit multiplicity strips



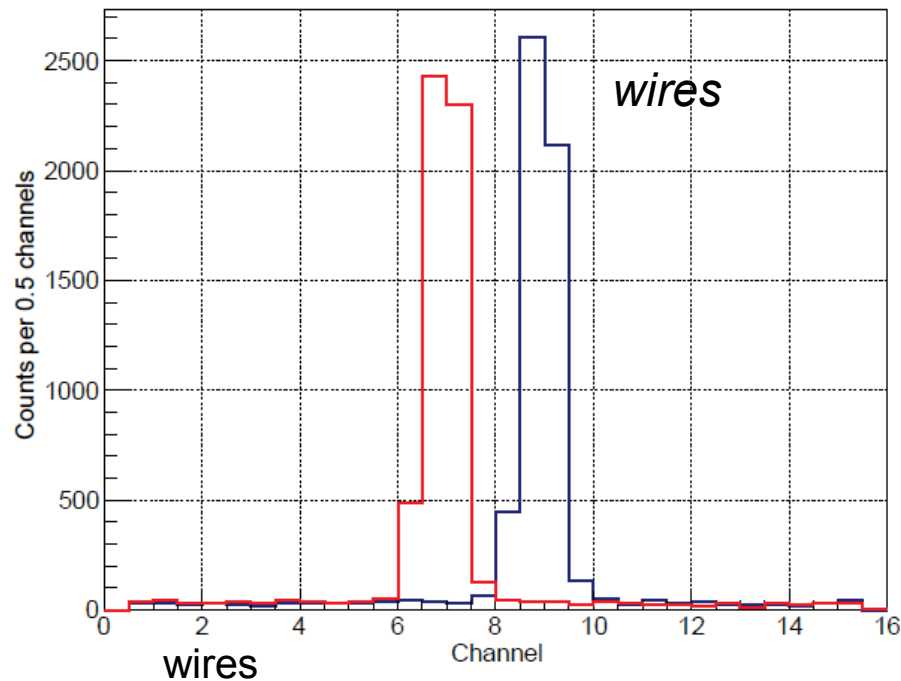
⇒ Average hit multiplicity
wires: 3.5 ; strips: 4

Position resolution

- Scans with a collimated beam
- size $0.25 \times 3.5\text{mm}$, $3.5\text{mm} \times 0.25\text{mm}$ respec.
- Position by ToT-based Centre-of-Gravity algorithm

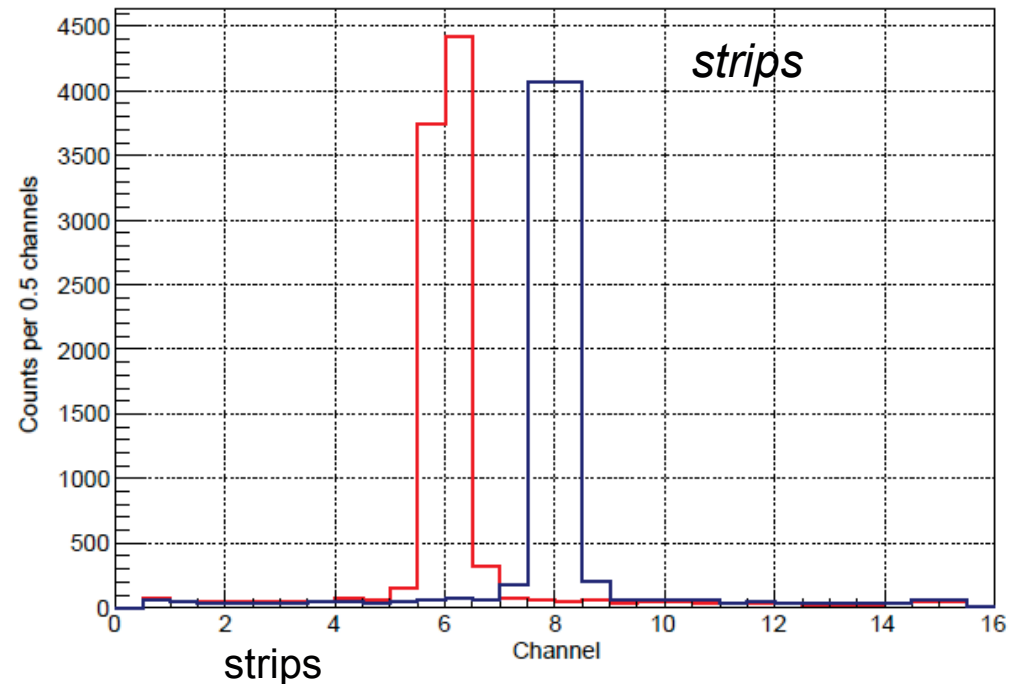
Position spectra for two beam positions

x-coordinate (horizontal)



Position spectra for two beam positions

y-coordinate (vertical)

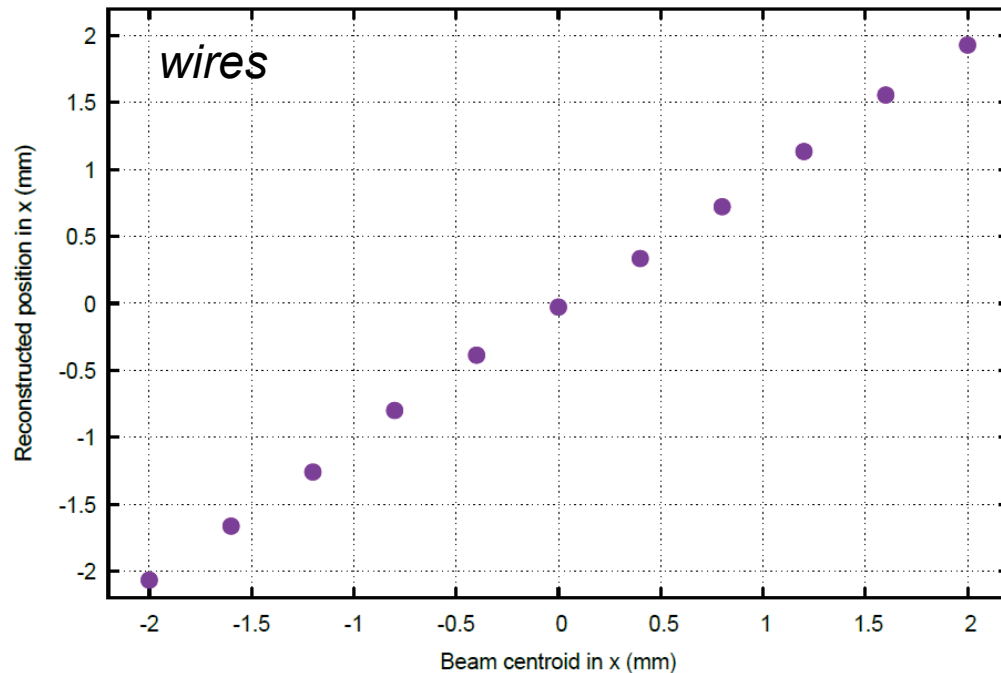


⇒ Position resolution $\leq 1.6\text{mm}$ in both directions

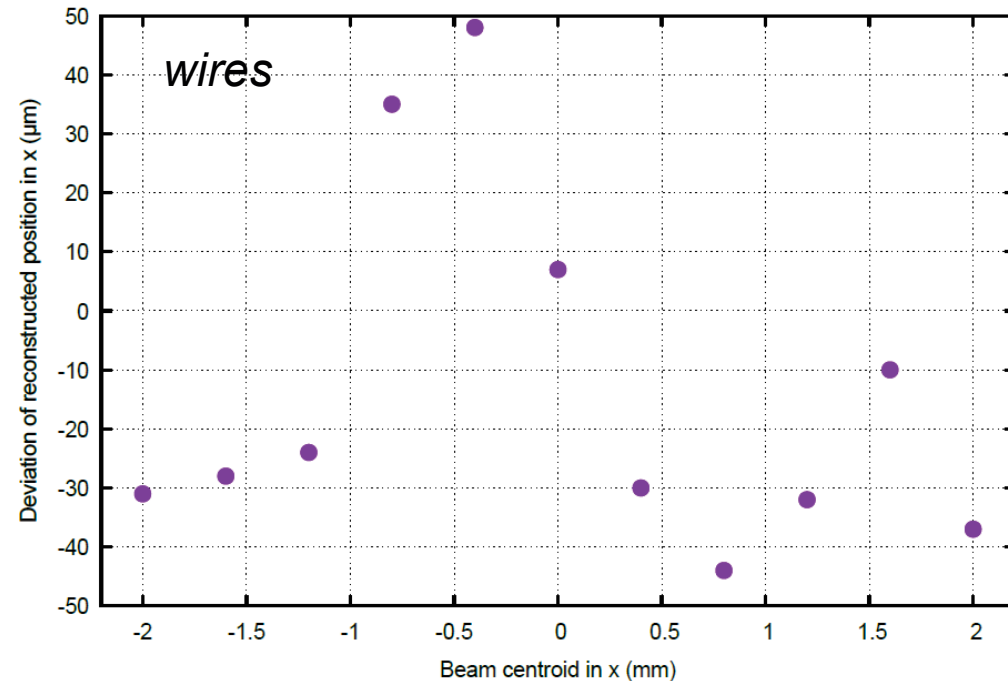
Linearity of position determination

- Scan with a collimated beam in 0.4mm wide steps
- Position by ToT-based Centre-of-Gravity algorithm

Measured vs. true position in x



Deviation from true position in x

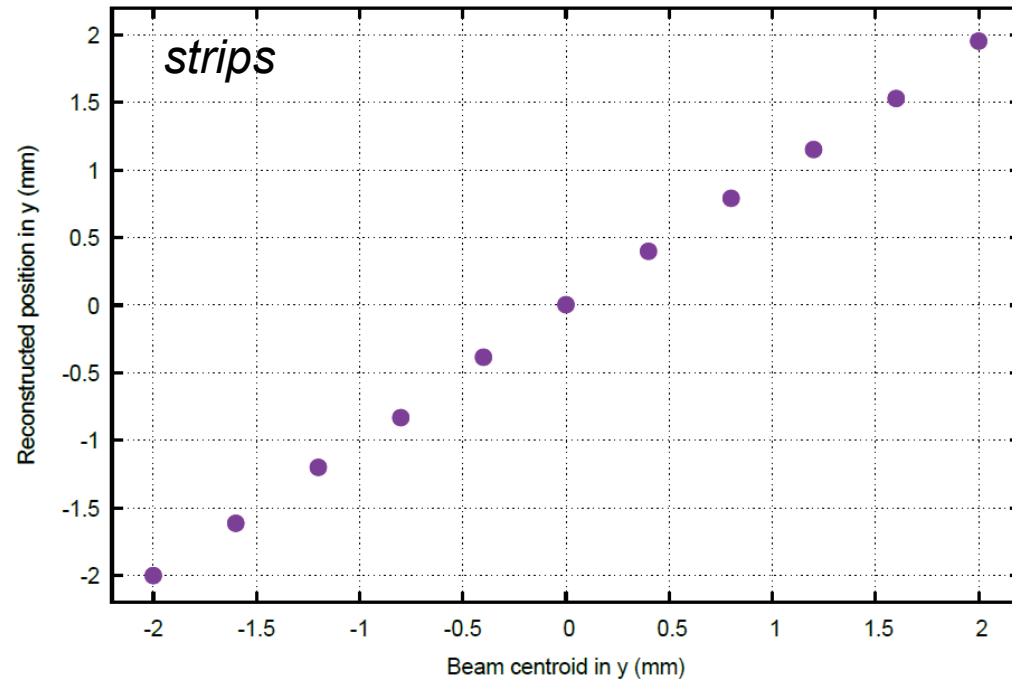


⇒ deviation $\leq \pm 50\mu\text{m}$

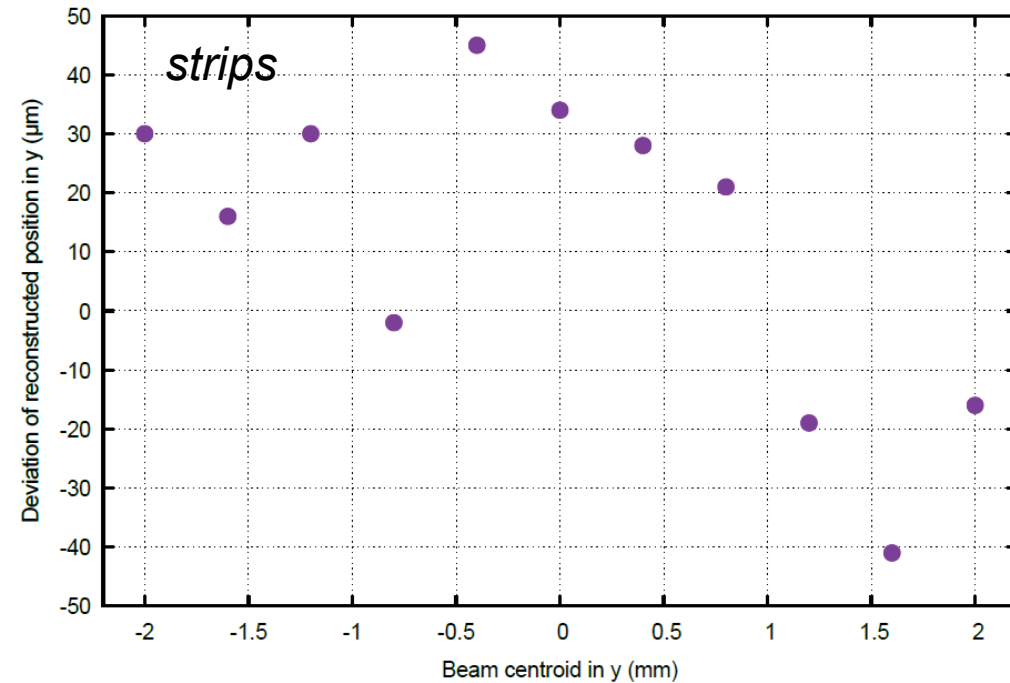
Linearity of position determination

- Scan with a collimated beam in 0.4mm wide steps
- Position by ToT-based Centre-of-Gravity algorithm

Measured vs. true position in y



Deviation from true position in y



⇒ deviation $\leq \pm 50\mu\text{m}$