

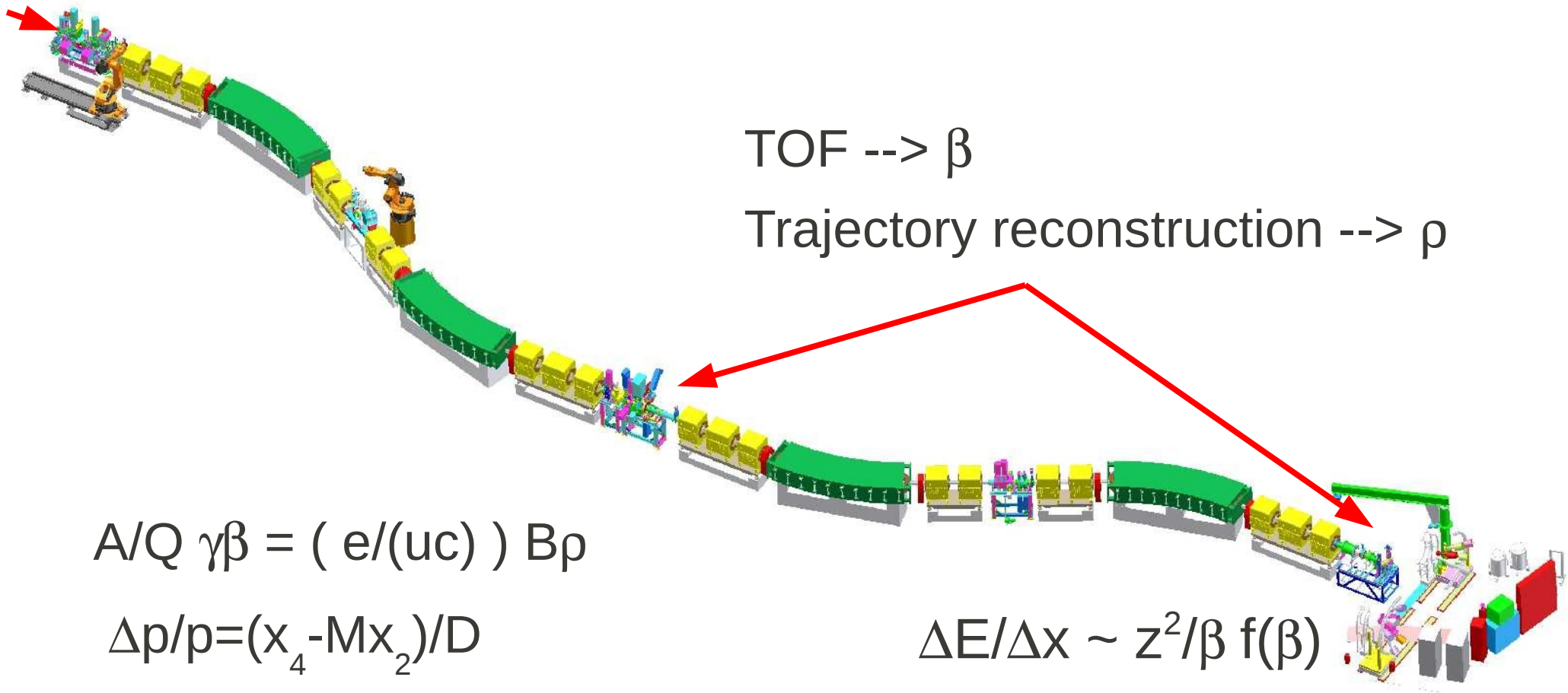
Standard detectors for particle identification at **PRESPEC(2012-2013)**

Plamen Boutachkov
TU Darmstadt, Germany

GSI projectile FRagment Separator (FRS)

$$\frac{TOF \text{ through FRS} \sim 300ns}{L \sim 70m}$$

Beam from SIS

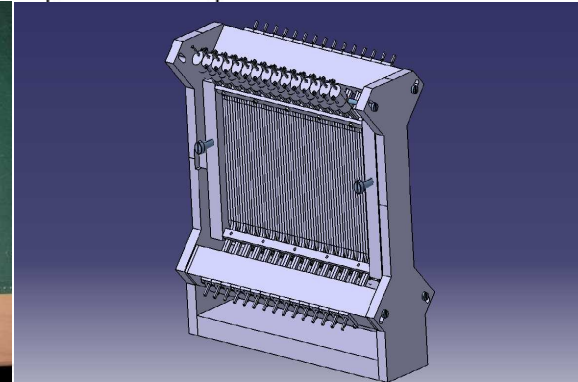


S2-detectors

SCI21

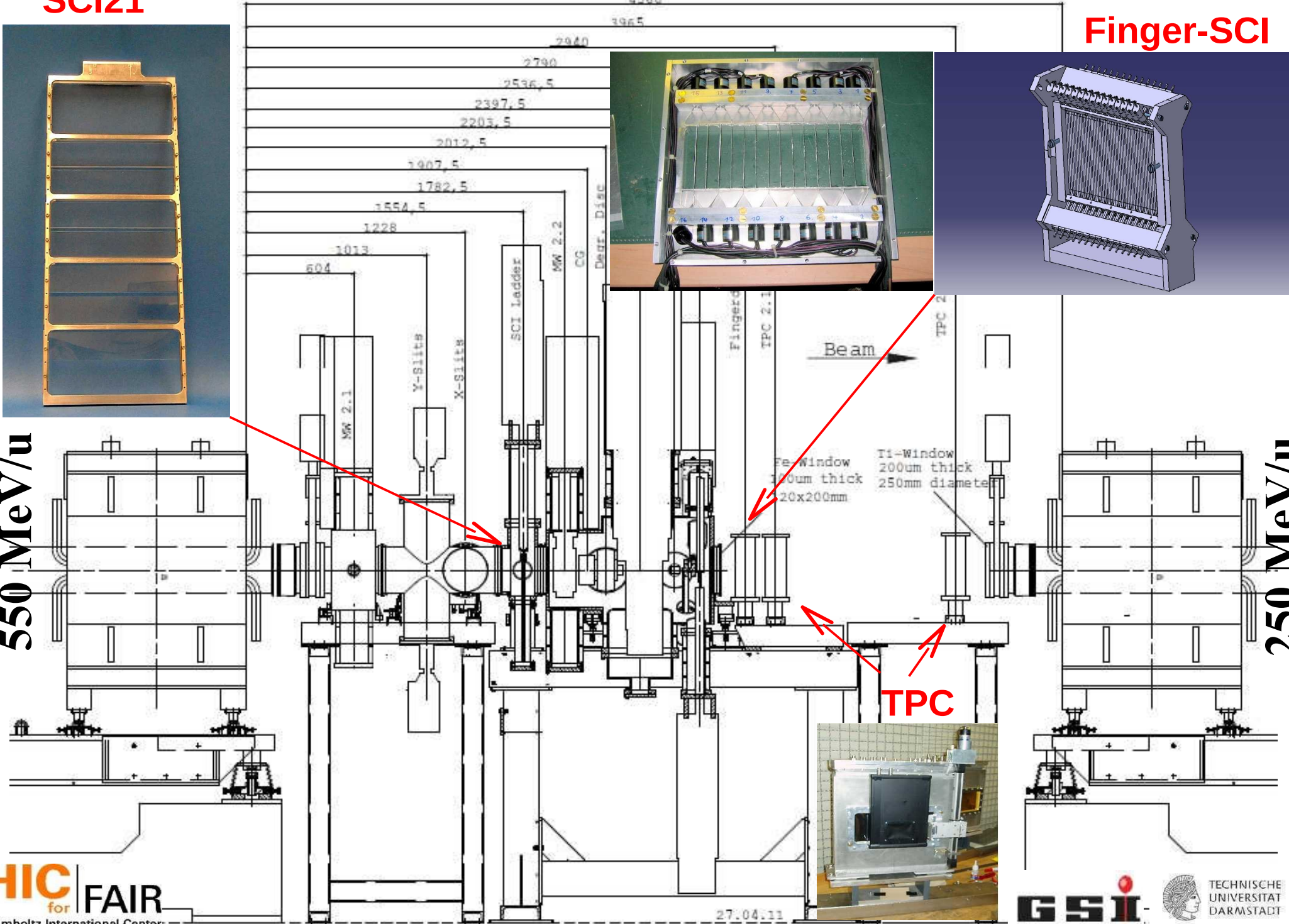


Finger-SCI

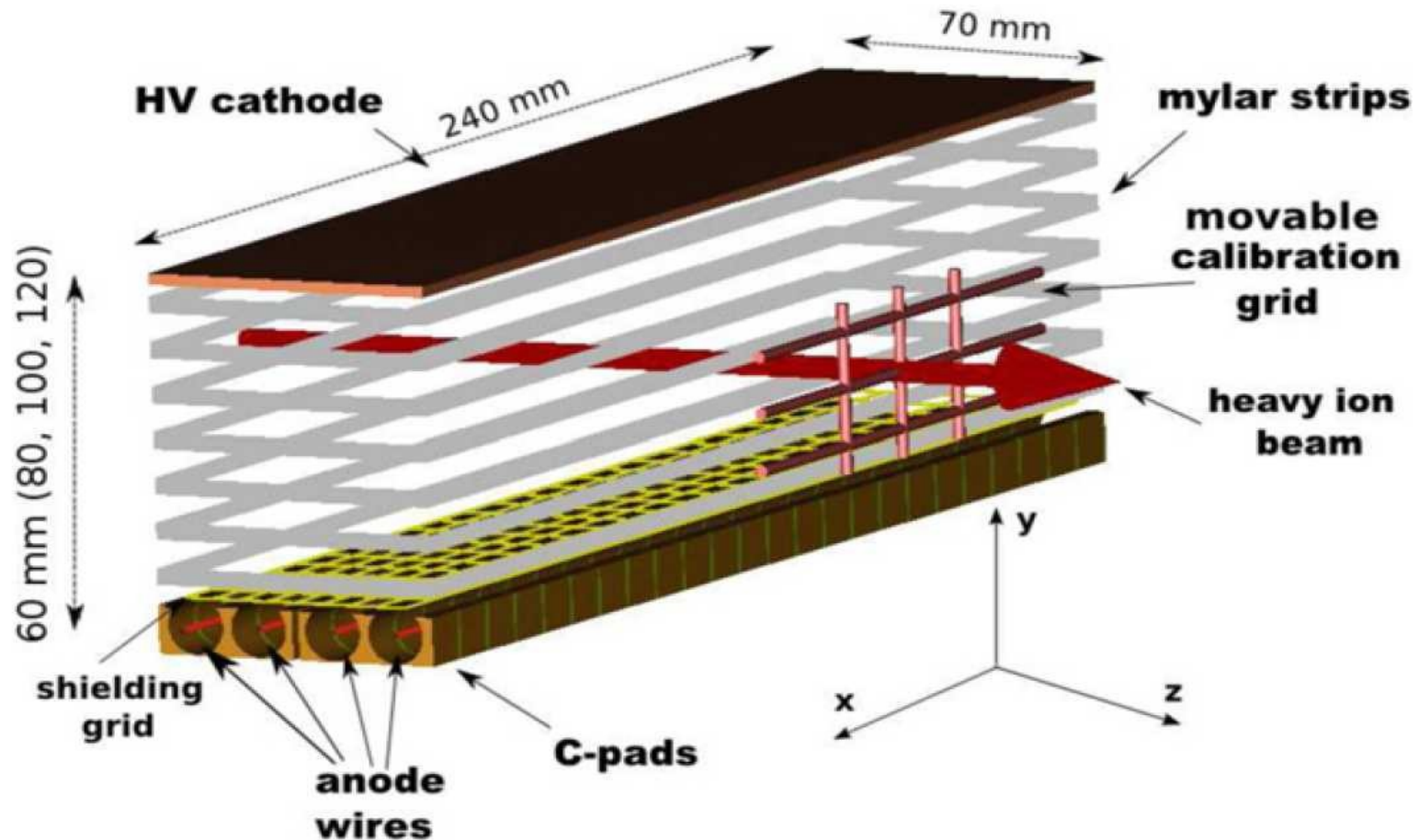


550 MeV/u

250 MeV/u



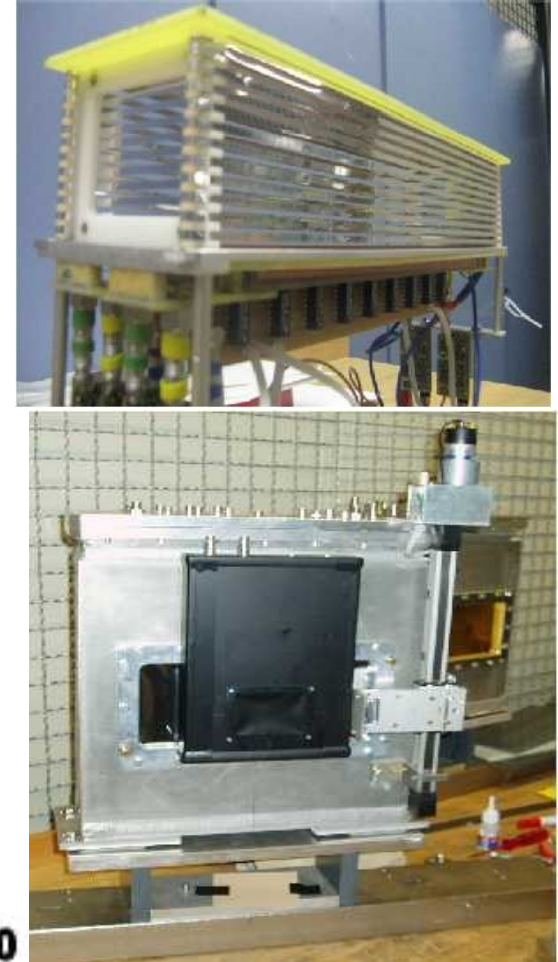
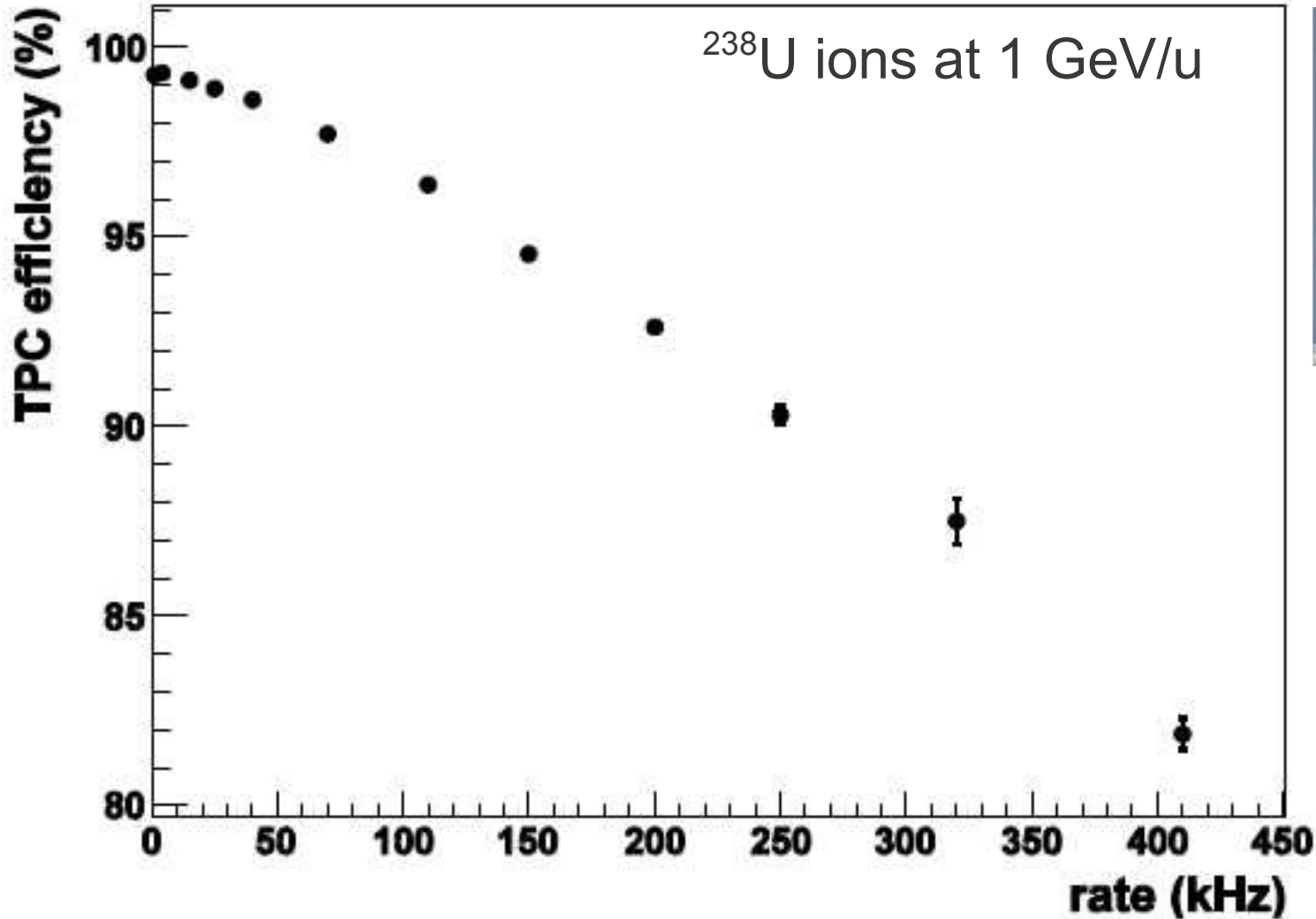
Time Projection Chambers(TPC)



delay line read-out
2 x-position measurements
4 y-position measurements

spatial resolution:
x-direction: ~ 0.18 mm
y-direction: ~ 0.08 mm

TPC Efficiency



Comenius University Bratislava
GSI Darmstadt
Helsinki Institute of Physics

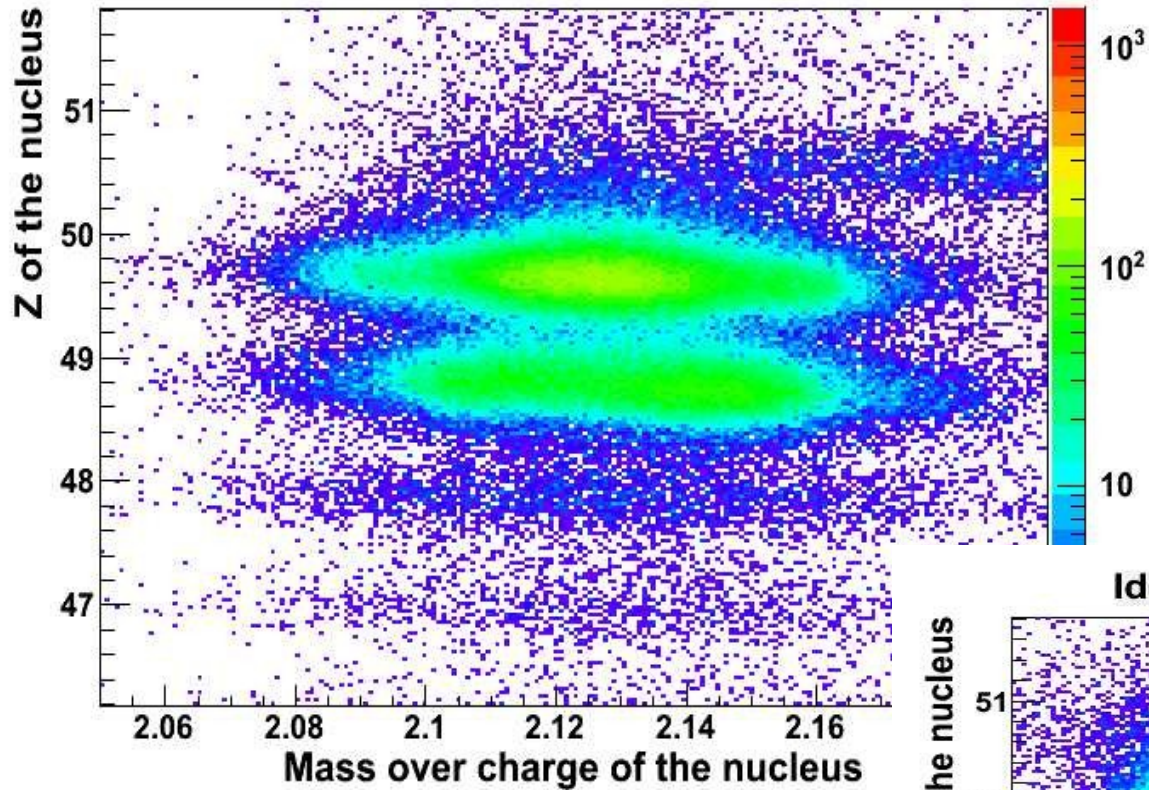
Scintillators



15 strips, 13x80x1 mm³
F. Ameil (GSI),
M. Danchev(Sofia University)

Finger-Scintillators

Identification plot, using plastic at S2



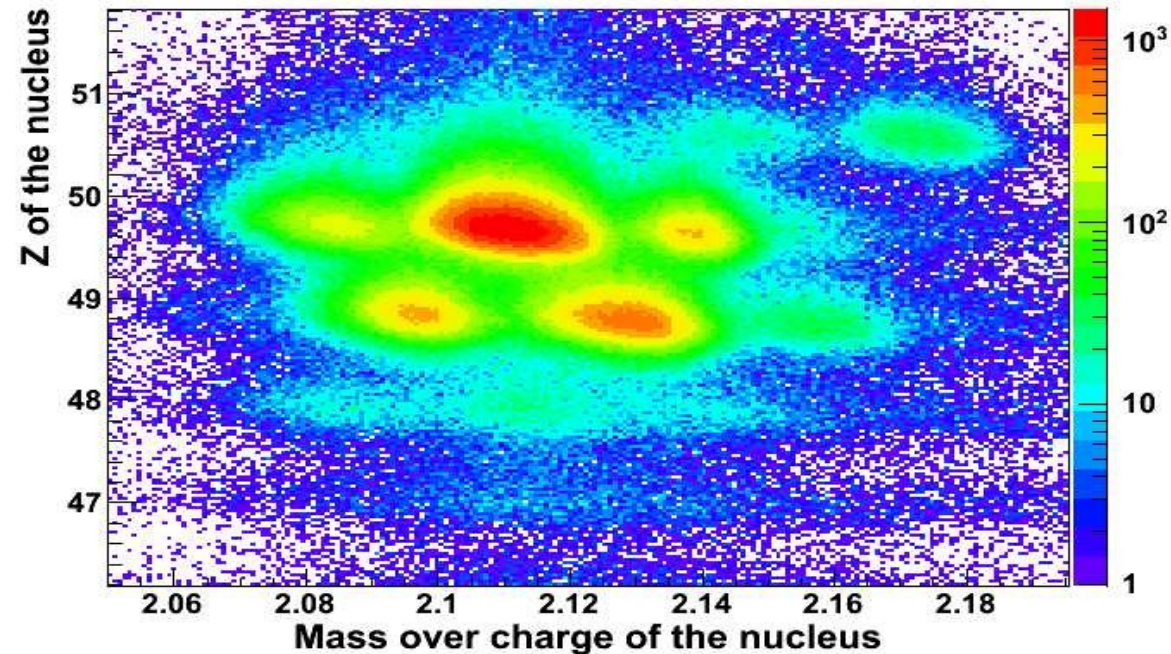
^{104}Sn

Rate(S2) $\sim 10^6$ pps

ID: Finger-SCI

$\epsilon \sim 90\%$

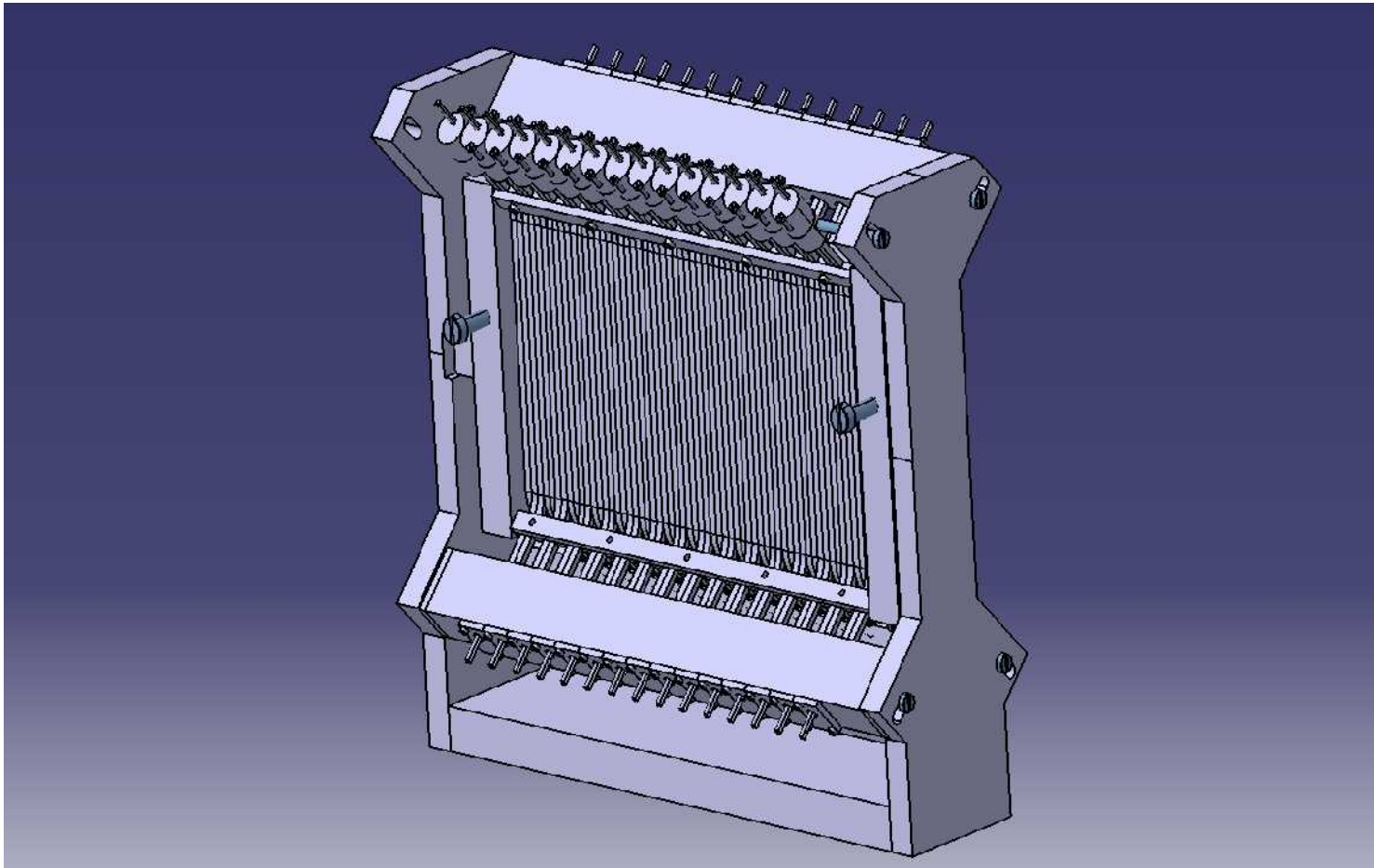
Identification plot using "finger" at S2



ID: TPC(S2)+SCI

$\epsilon \sim 10\%$

New Finger Scintillators

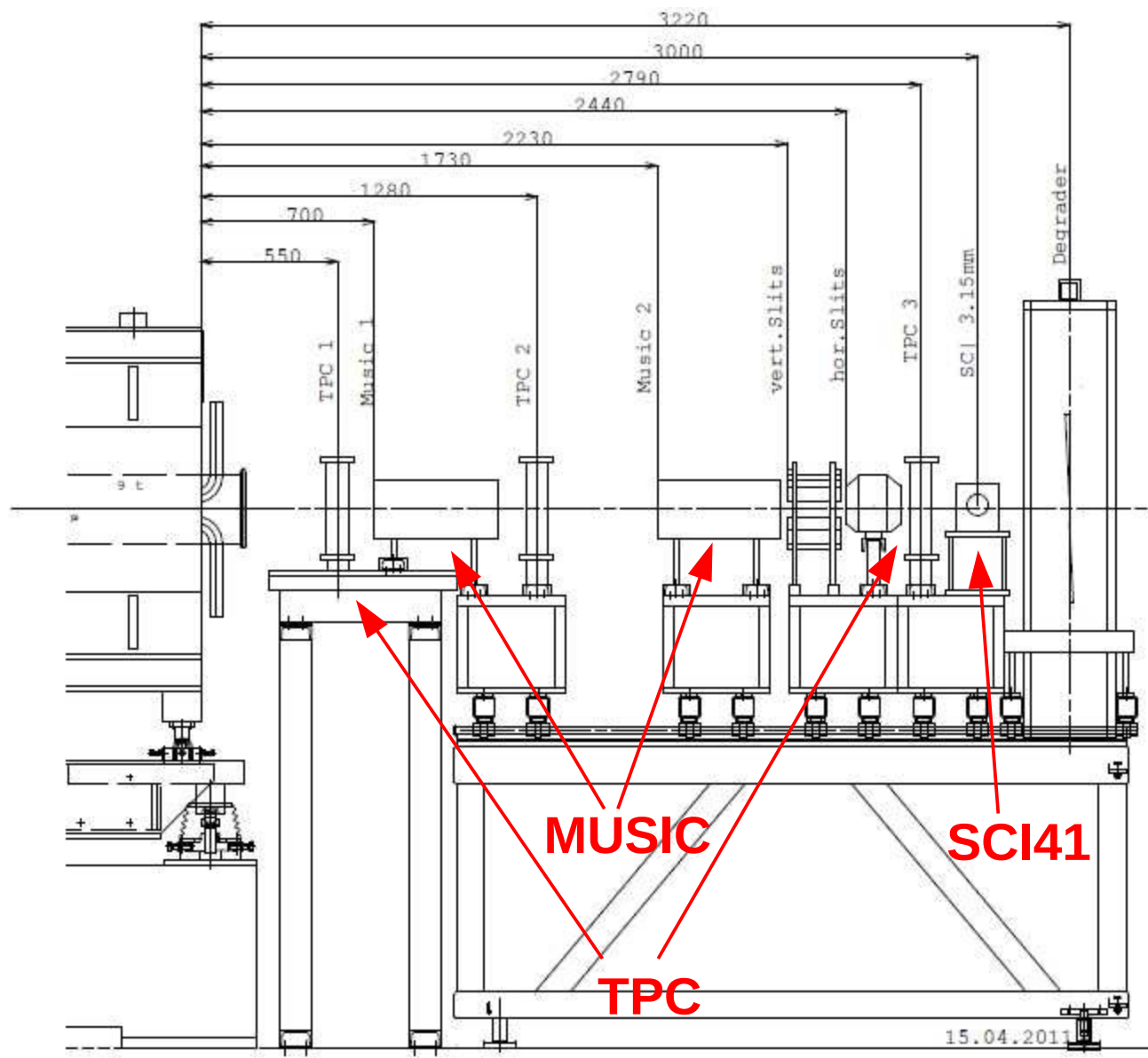


60 strips, 4x80x1 mm³

The Henryk Niewodniczanski Institute of Nuclear Physics, Krakow
GSI Darmstadt

S4-detectors

250 MeV/u



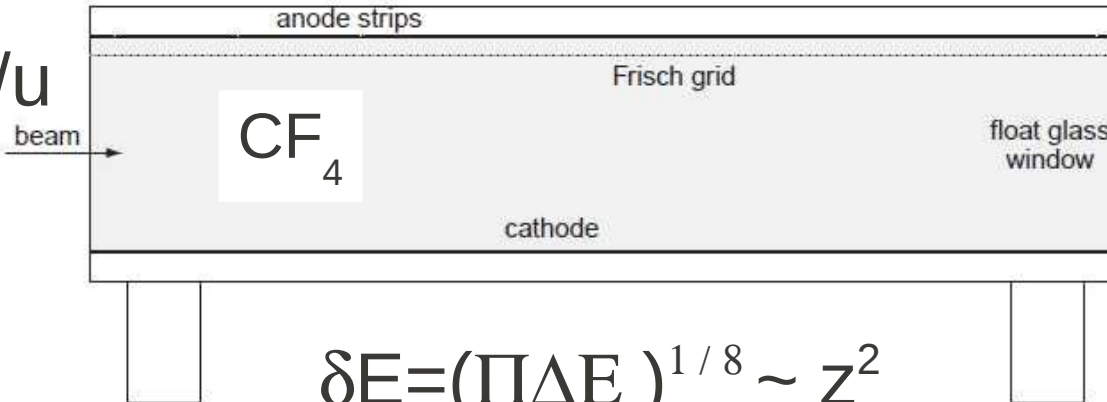
160 MeV/u

Multi Sampling Ionization Chamber



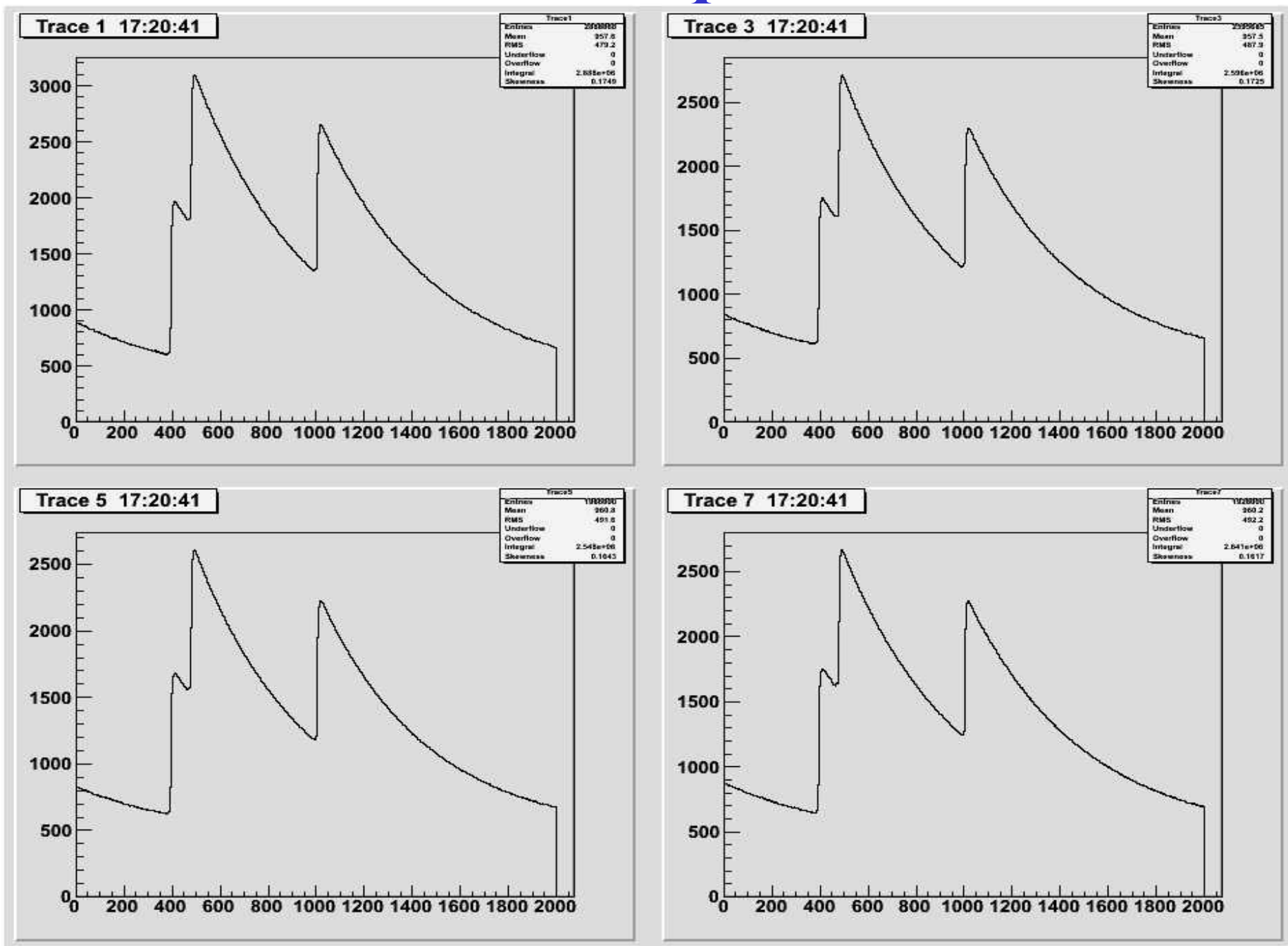
$$\Delta E/\Delta x \sim z^2/\beta f(\beta)$$

$E = 230 \text{ MeV/u}$



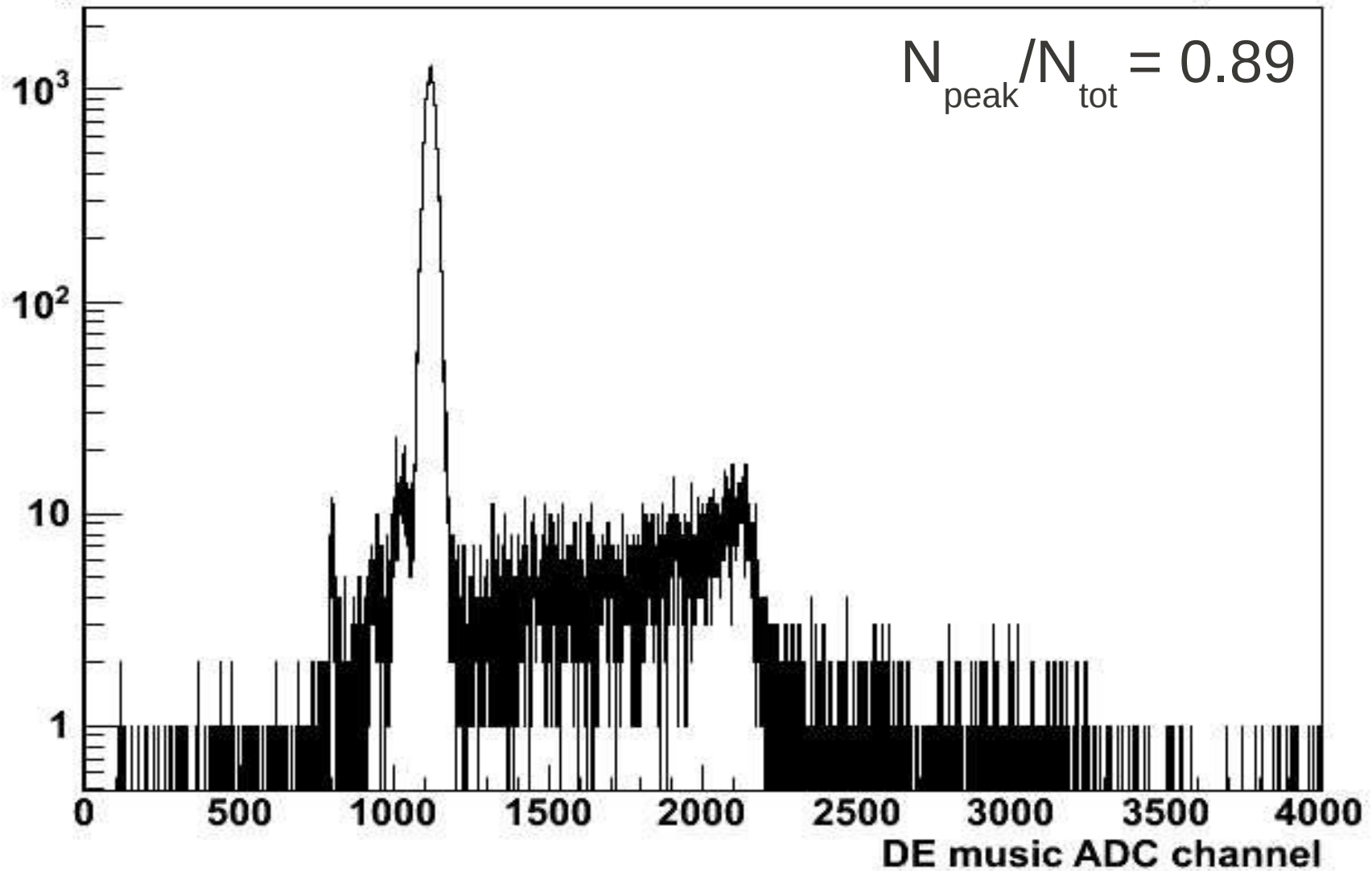
http://www-wnt.gsi.de/frs/technical/FRSsetup/detectors/music80/music80_manual.pdf

Pile-up



Pile-up

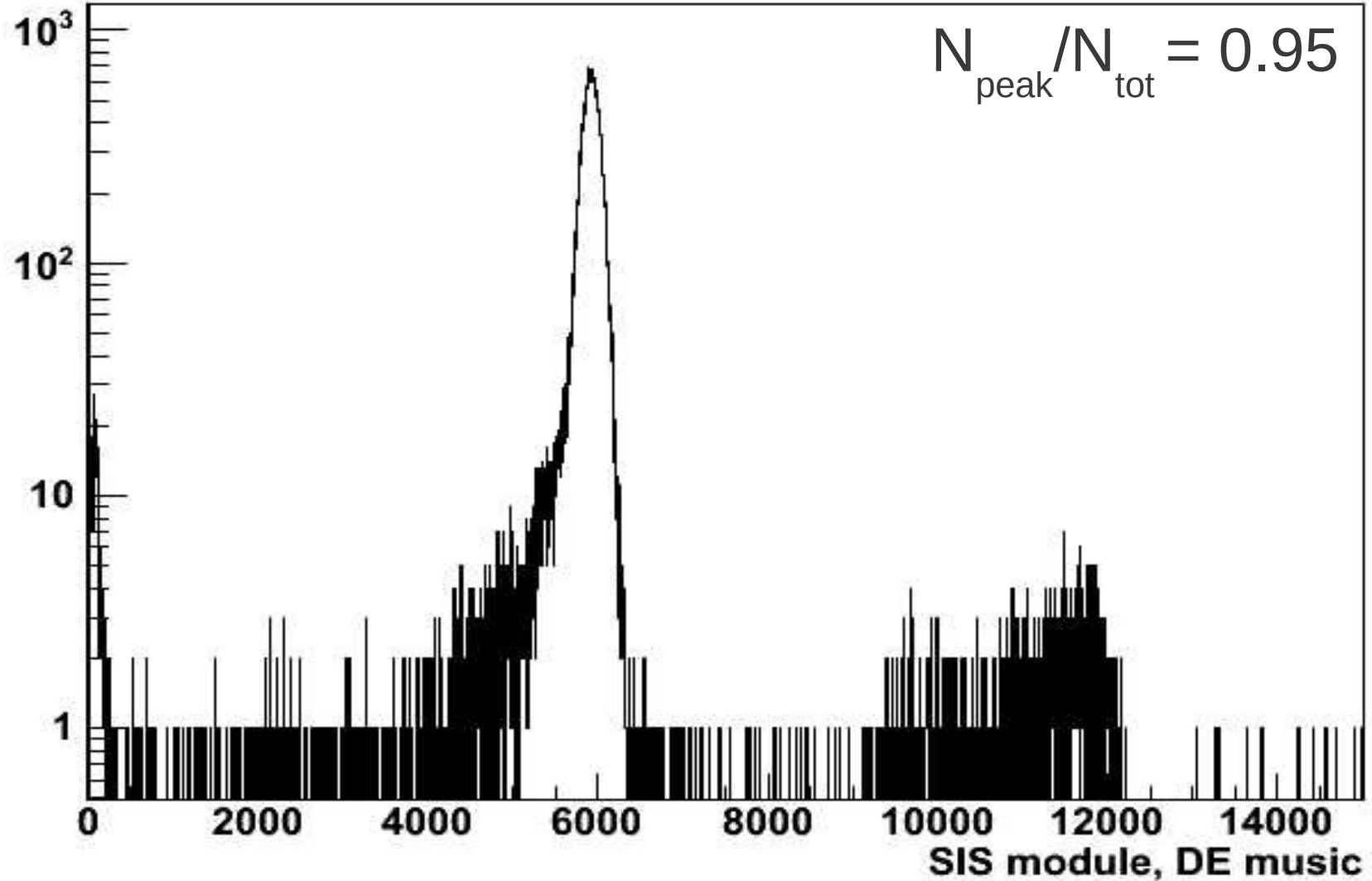
One anode music spectra peak sensing ADC 50 kHz



Pile-up compensation

M. Vencelj et al. NIM A607 (2009) 581

One anode music spectra SIS module 50 kHz



KVI Groningen
GSI Darmstadt

Summary

Operation rates of FRS detectors

Detector	Max. Rate [pps]
X,Y: Multi-wire chambers	$<10^4$
X,Y: Current grids	$>10^8$
X,Y: TPC	$<10^6$
dE: MUSIC detectors	$<2 \times 10^5$
TOF: Scintillators	$<10^6$
Finger Scintillator	a few 10^6

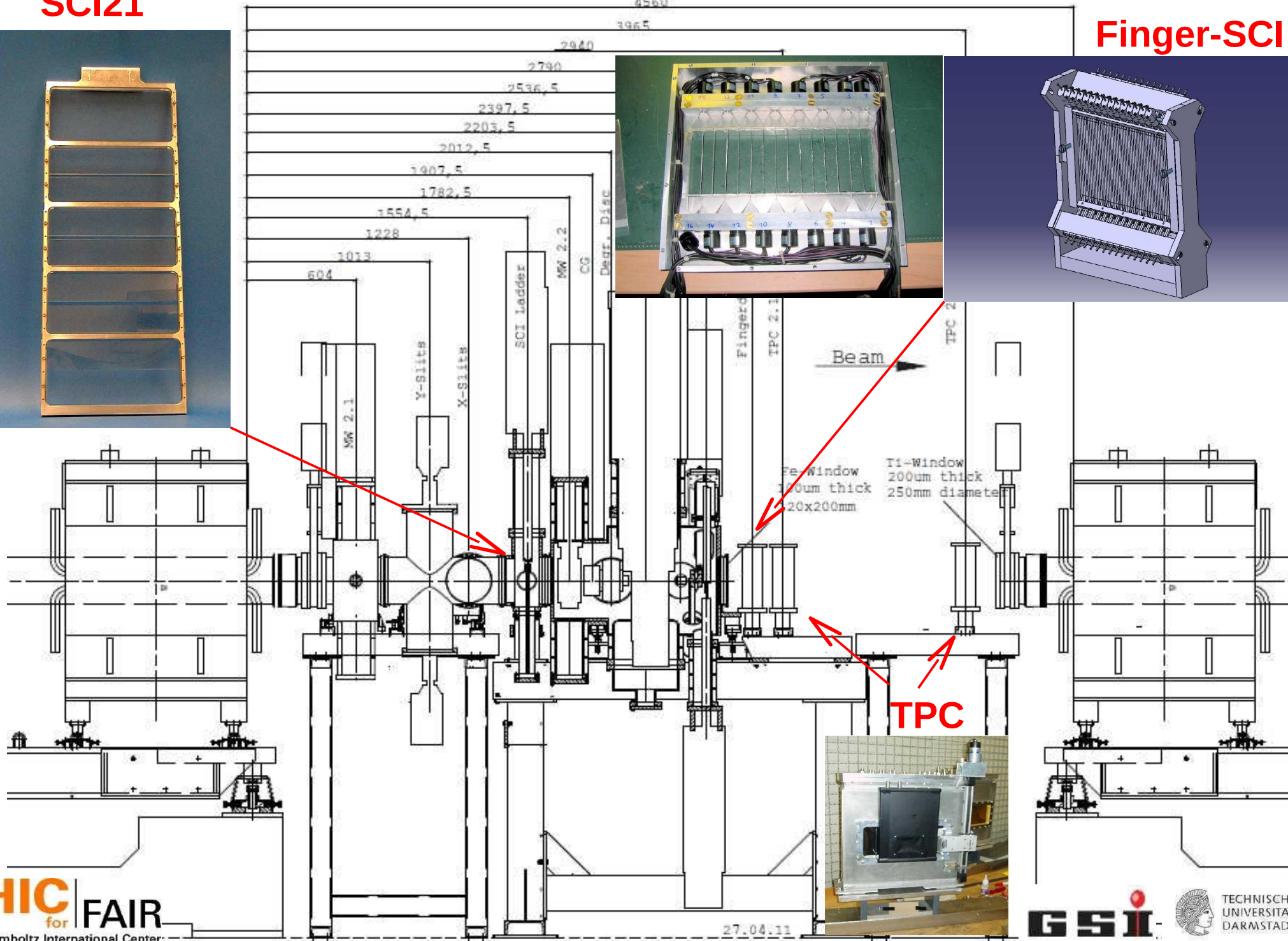
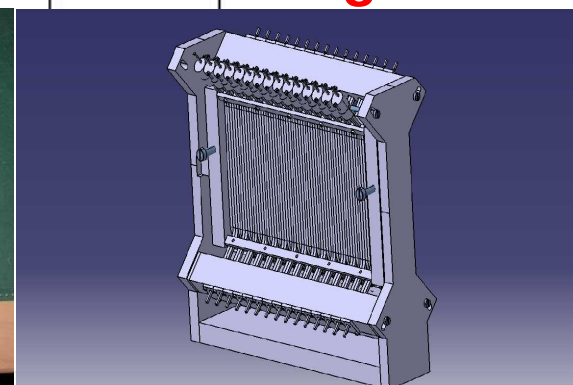
Tracking detector layout PRESPEC(2012-2013)

S2-detectors

SCI21



Finger-SCI



S4-detectors PRESPEC 2012-2013

