

NA60+: plan of the measurements

- ❑ Install Monday morning → **DONE**
- ❑ Set-up of ALPIDE with Pb beam → **DONE**
- ❑ Study of beam optics w/o microcollimator (with H8 people) → **~DONE**
- ❑ Wed → installation of microcollimator on the beam line → **DONE**
- ❑ Further studies with microcollimator in (with H8 people) → **DONE**
- ❑ Measurement of the charged multiplicity in Pb-Pb collisions at 150 GeV/c (no B-field) → **DONE**
- ❑ Include dipole magnet in the set-up → **DONE**

See last week report

Pb beam profiles - focused optics vs microcollimator

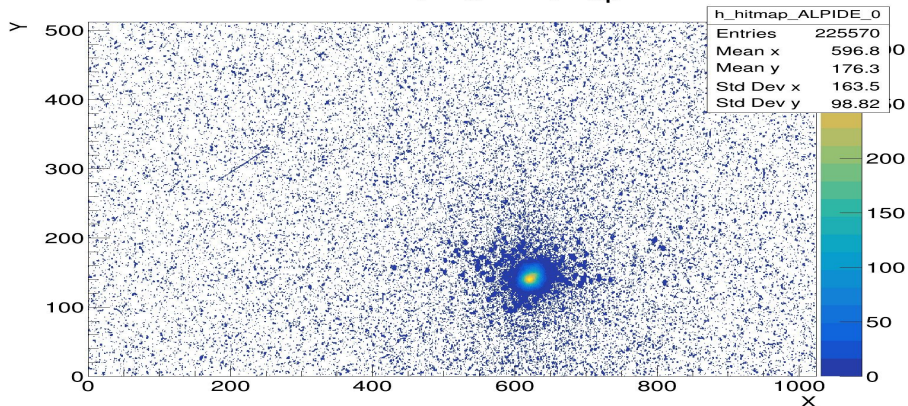
Focused optics

Max beam intensity
~ $2 \cdot 10^5$ /spill

Microcollimator

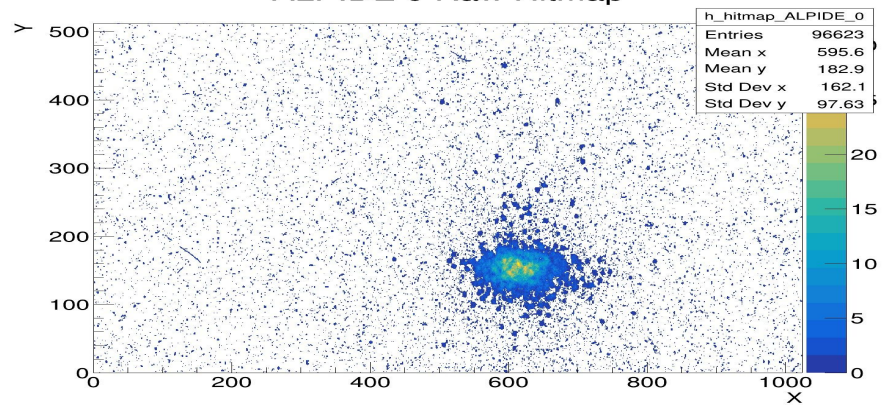
24/11 5:20 pm

ALPIDE 0 Raw Hitmap

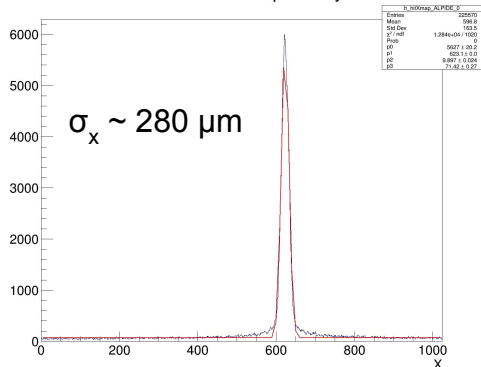


23/11 8:55 pm

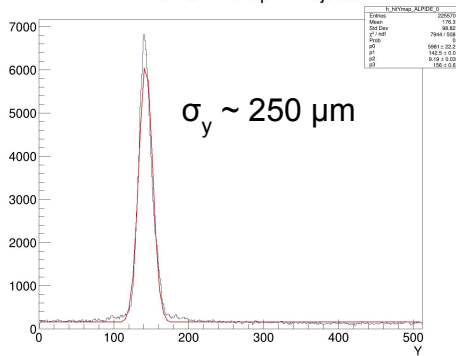
ALPIDE 0 Raw Hitmap



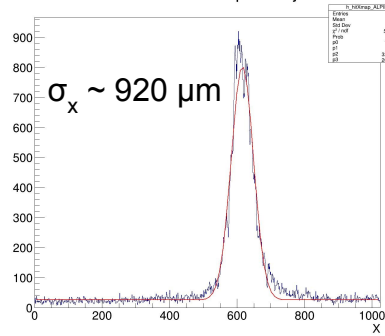
ALPIDE 0 Raw Hitmap X-Projection



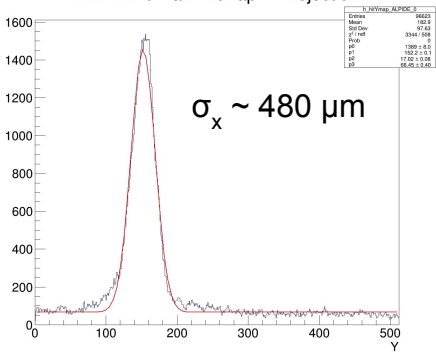
ALPIDE 0 Raw Hitmap Y-Projection



ALPIDE 0 Raw Hitmap X-Projection

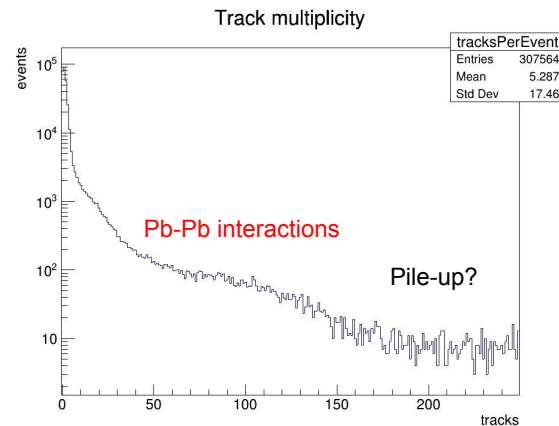
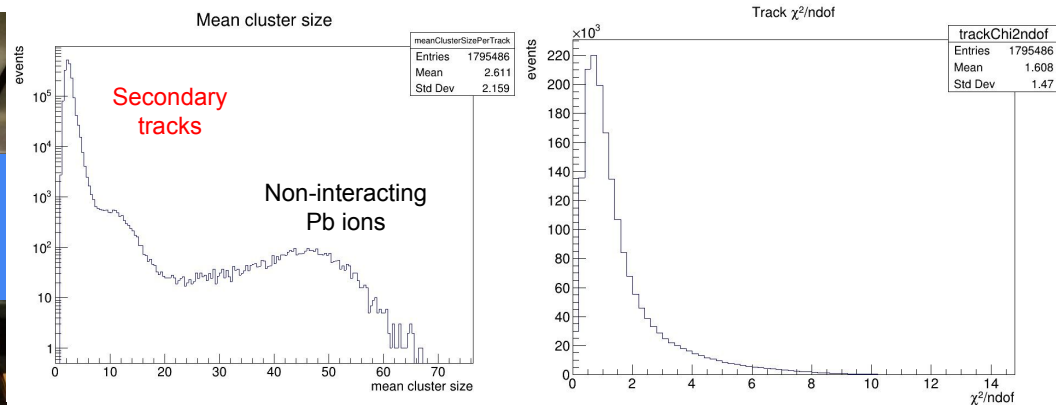
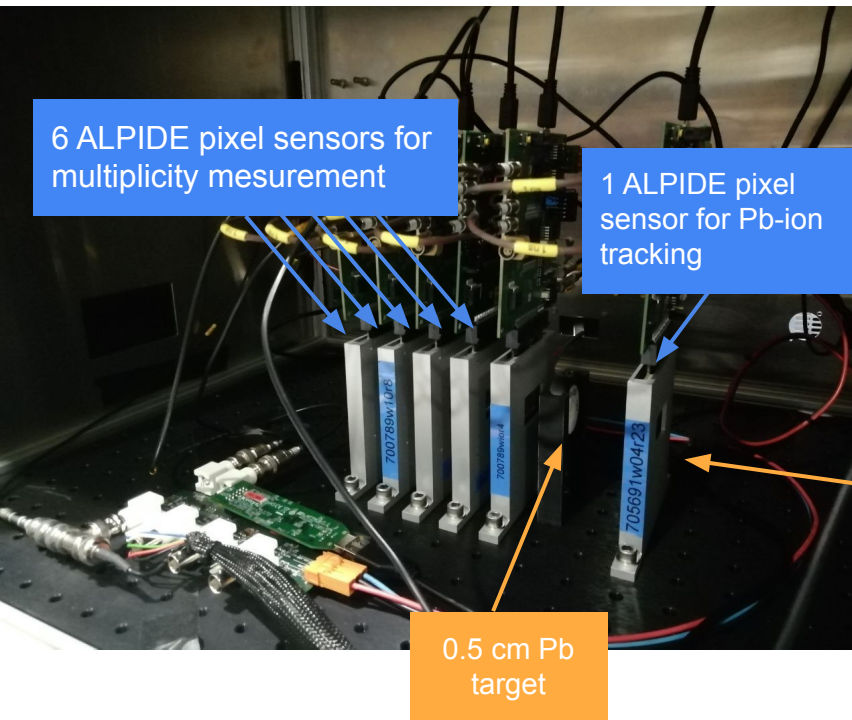


ALPIDE 0 Raw Hitmap Y-Projection



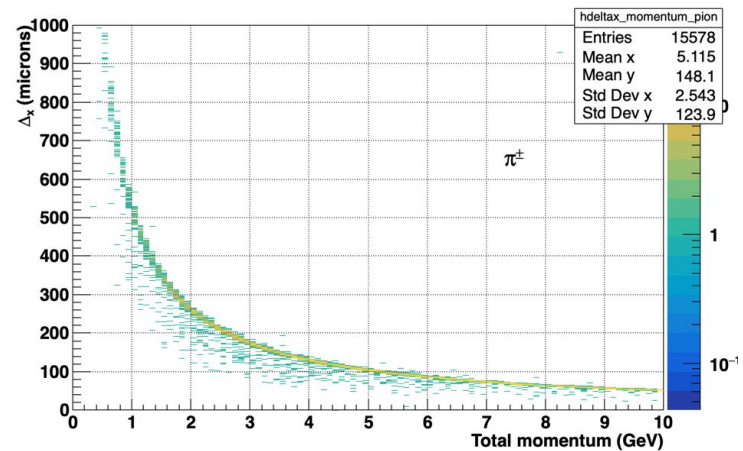
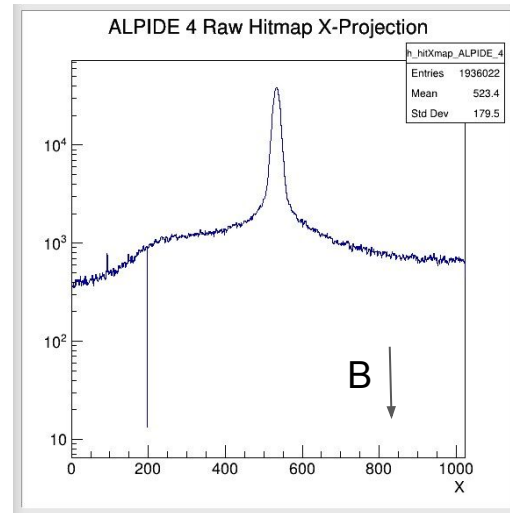
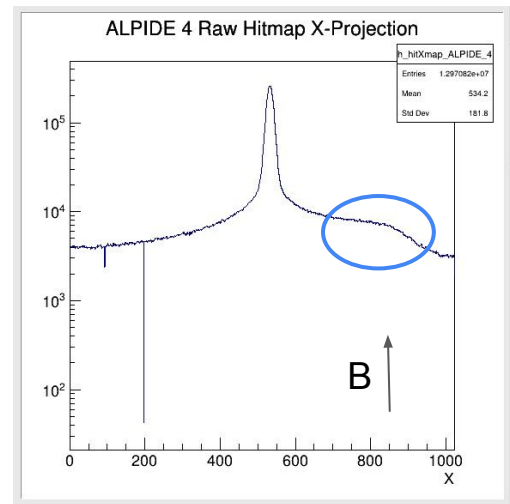
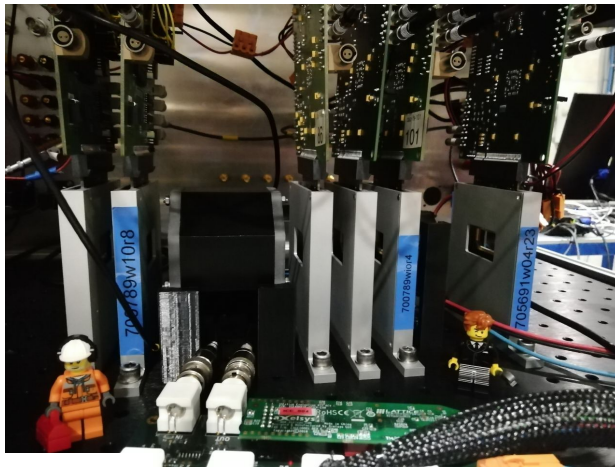
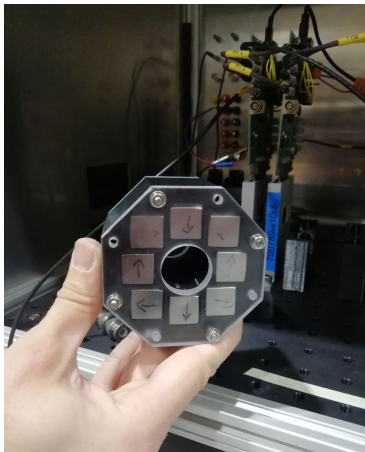
Measurement of charged hadron multiplicity (Pb-Pb)

Beam intensity $> 10^4$ /spill



Preliminary tracking carried out \rightarrow up to $>10^2$ tracks/event

Test with magnetic field



$B = 0.7 \text{ T}$ over 5 cm
 $\Delta x \sim 0.5 \text{ mm} @ 1 \text{ GeV} \rightarrow \sim 20 \text{ columns}$

Effect on soft(er) particles clearly visible

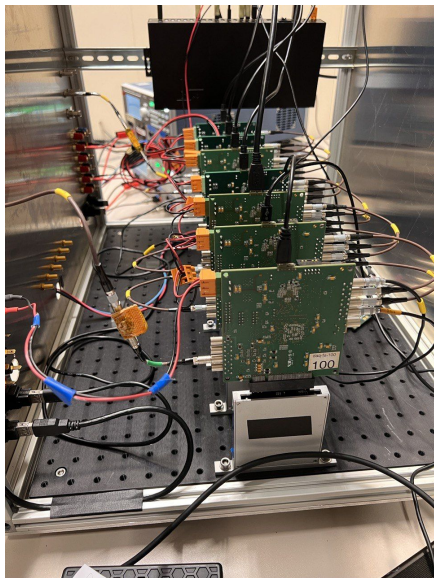
Summary

- ❑ Foreseen program was carried out
- ❑ Beam studies: great help by Anna, Maarten, Dipanwita and Johannes (**thanks!**)
 - ❑ With the extracted primary beam, focussed optics seems promising in view of the $\sim 10^7$ Pb/spill needed by NA60+
 - ❑ Maximum beam intensity tested still a factor ~ 50 below
- ❑ ALPIDE sensor characterized for the first time with Pb ions
- ❑ Performance not affected up to few 10^4 Pb/spill, cluster size ~ 50 , studied carried out as a function of threshold current and back bias voltage
- ❑ Pb-Pb interactions
- ❑ Up to several hundred hits per sensor, potentially interesting measurement (forward y)
- ❑ Further studies of the beam optics (to be discussed with H8 people)
- ❑ Would be extremely interesting to have a low(er) energy beam
- ❑ Characterization of first prototypes of stitched MAPS sensors

} 2023

Backup

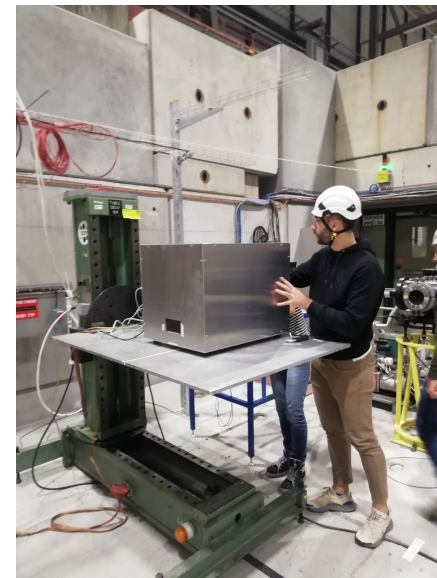
Installed set-up in PPE138 (Mon)



Box with 7 ALPIDE planes and trigger scintillator

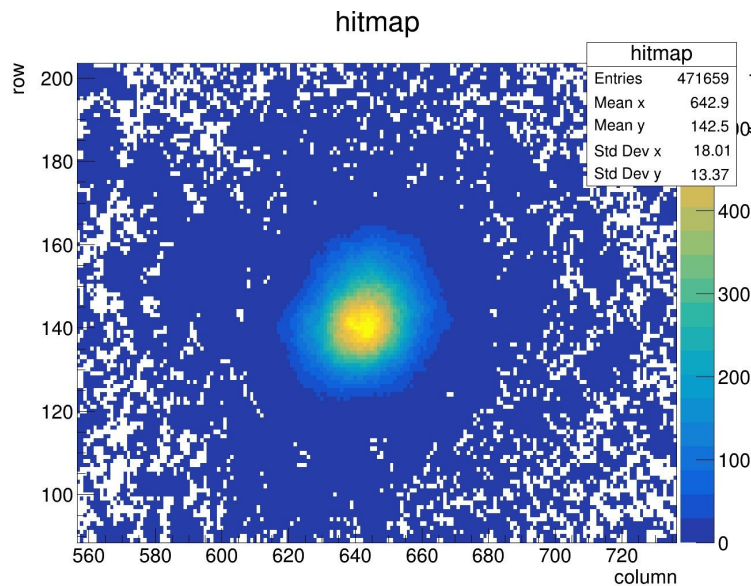


Power supplies



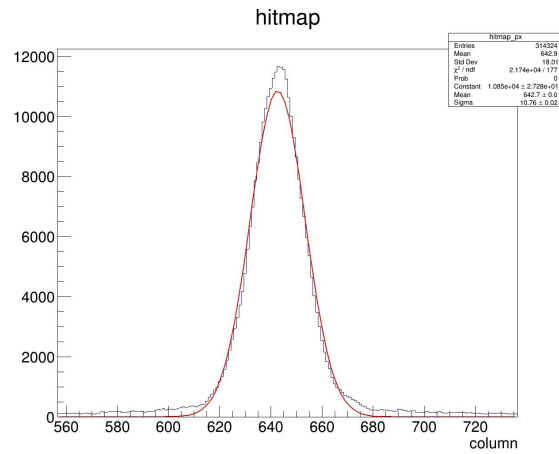
Box on DESY table

Measurement of Pb beam profiles in PPE138 (Tue)

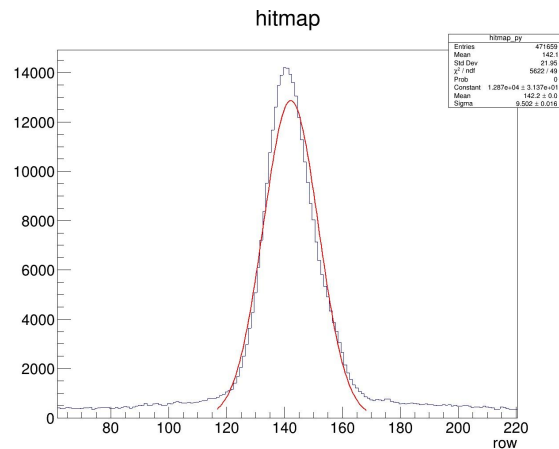


Pixel size: 28 μm

Spill up to $\sim 5 \cdot 10^4$ Pb ions
Good SPS efficiency!



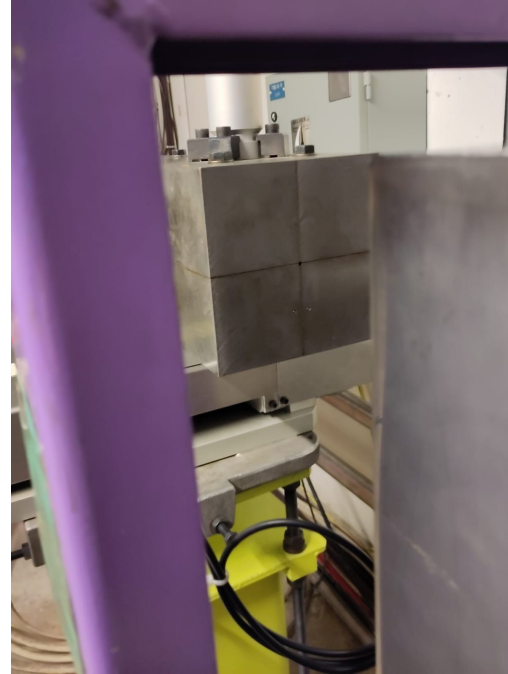
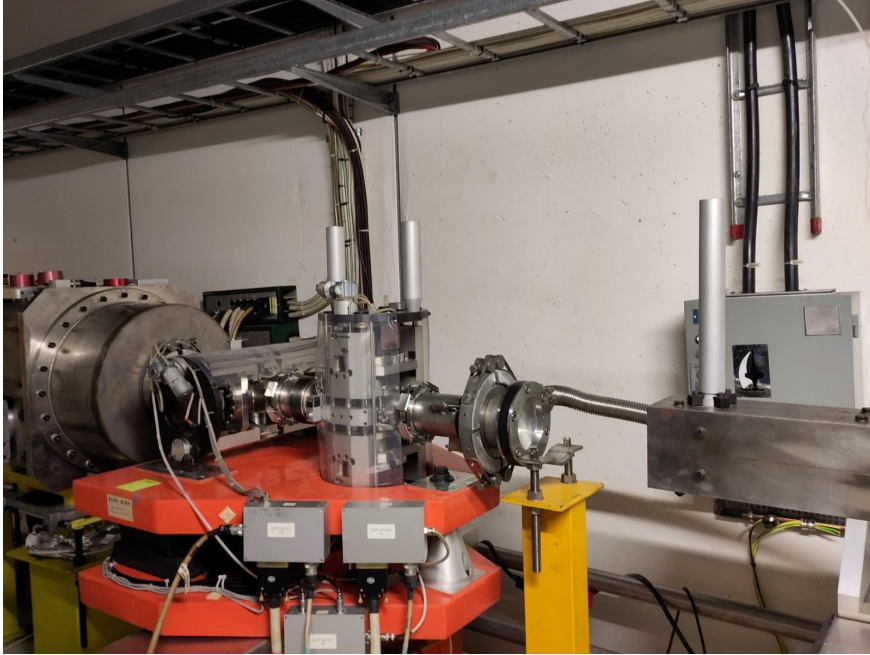
$\sigma_x \sim 300 \mu\text{m}$



$\sigma_y \sim 270 \mu\text{m}$

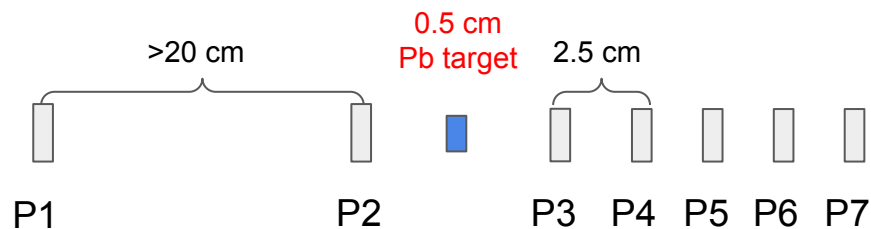
Thanks to Anna, Maarten, Johannes, Dipanwita and Alex!

Installation of microcollimator (Wed)

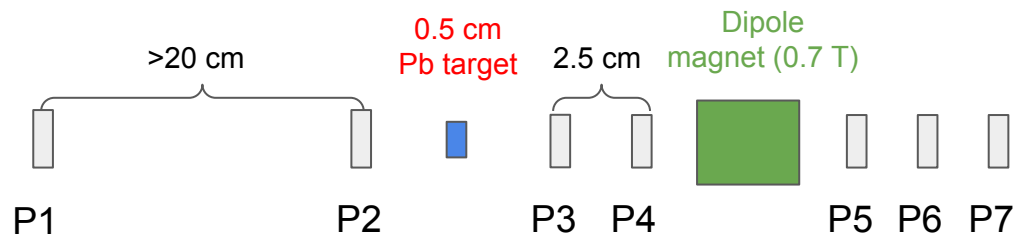


Studies with microcollimator optics started, beam unstable

Measurement of charged hadron multiplicity



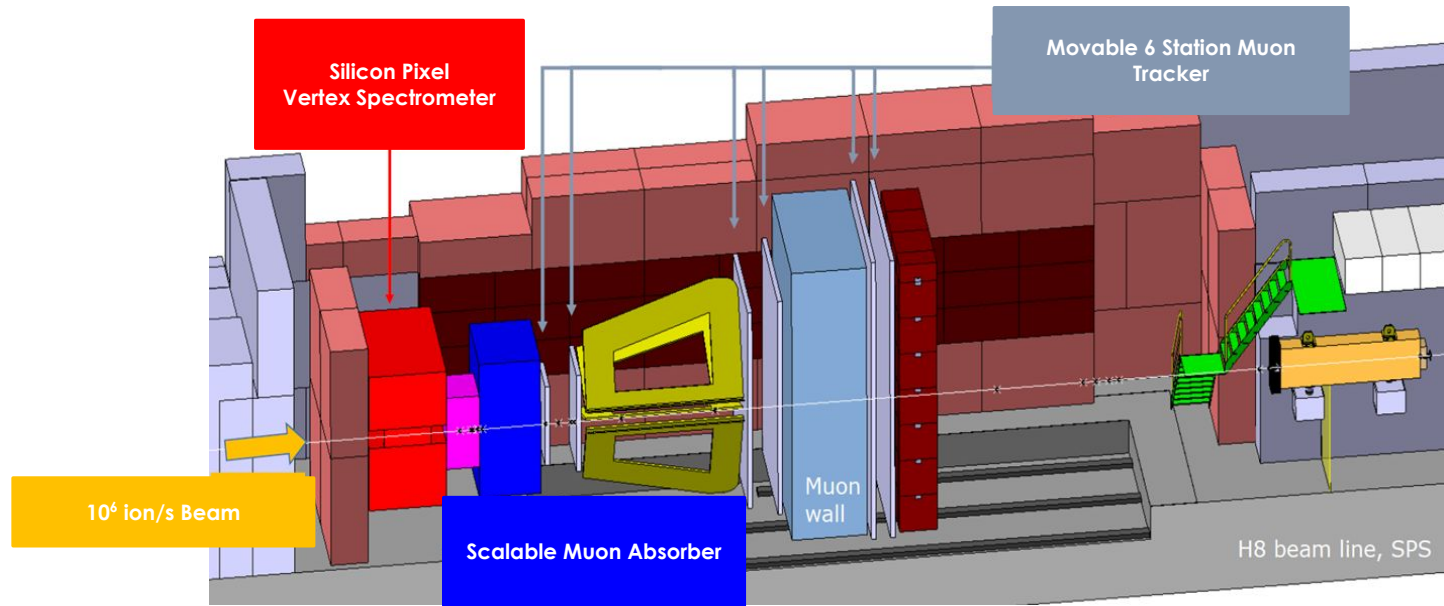
Set-up 1
No magnetic field



Set-up 1
With magnetic field

Start when done with beam optics test, until the end of the period

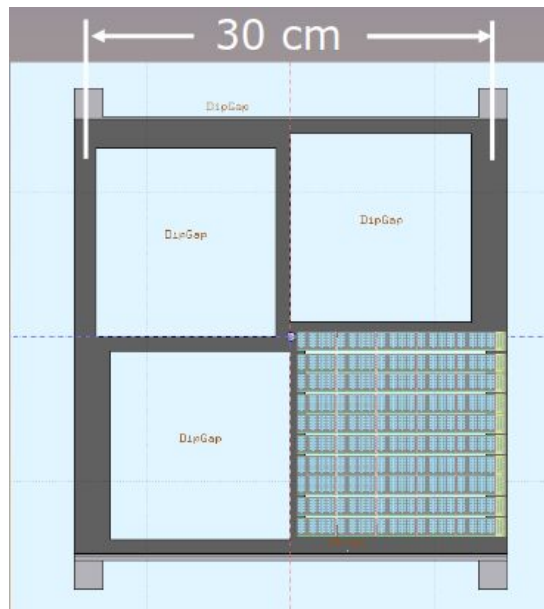
The NA60+ project



- ❑ New SPS experiment studying e.m. and hard processes in Pb-Pb and p-A collisions with an energy scan
- ❑ Letter of Intent will be submitted to SPSC by the end of the year
- ❑ Project followed by PBC → integration and beam studies performed for installation in PPE138 (H8)

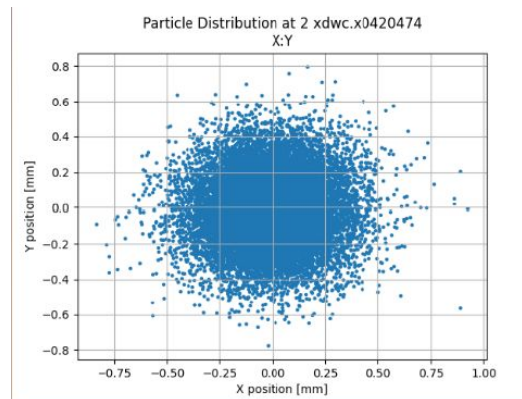
Aim of the test beam in week 47

Vertex spectrometer → 5 planes of large MAPS detectors
Each plane has a central square hole $6 \times 6 \text{ mm}^2$
→ Need a sub-mm ion beam

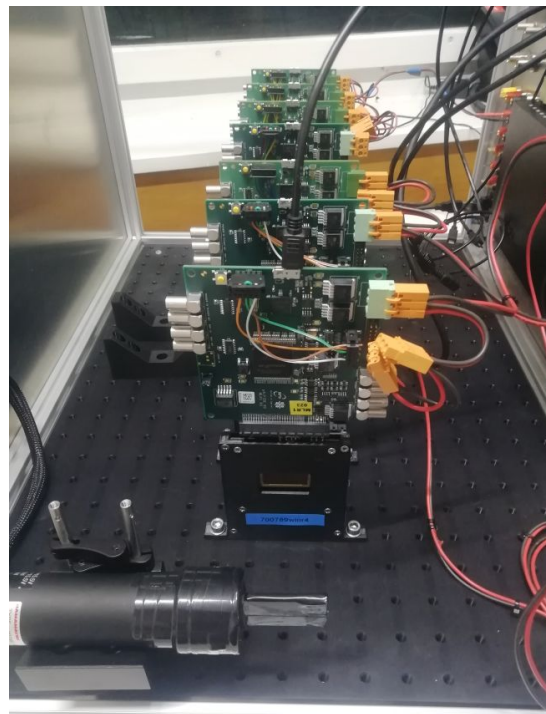
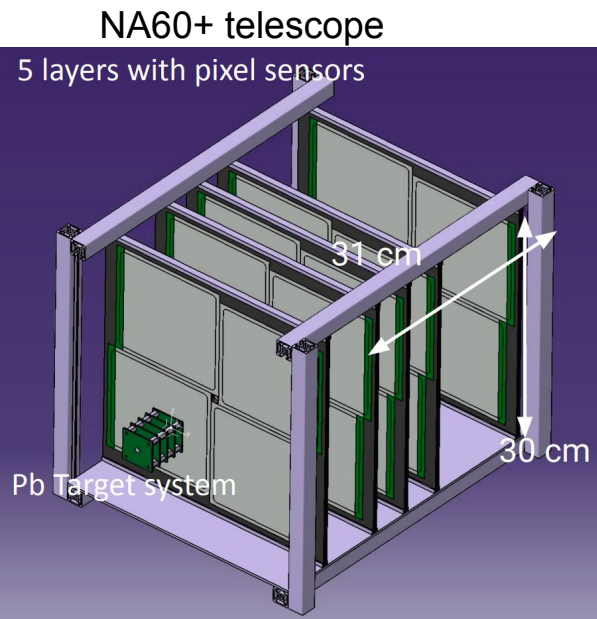


Perform a first test of beam optics that were prepared in 2021 (A. Gerbershagen)

Parameter in zone 138	160 GeV/c	30 GeV/c
σ_x (mm)	0.19	0.33
σ_y (mm)	0.19	0.36
Transmission from T4 (%)	32.43	23.5



Layout for the test (being prepared)



Box 45x60x45 cm³, containing
7 planes of ALPIDE Si sensors 3x1.5 cm²
1 plastic scintillator for triggering

Eventually
1 Pb target 0.5 cm thick
1 small dipole magnet
for a measurement of the charged multiplicity in Pb-Pb

