

# ACTS @ FASER

Florian Bernlochner, Tobias Böckh, Jochen Dingfelder, Markus Prim

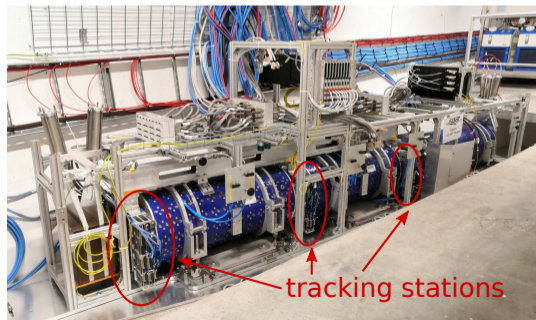
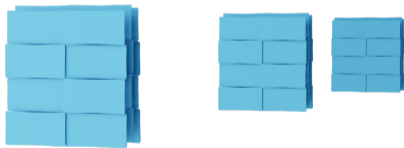
ErUM Collaboration Meeting

11 May 2021



# Tracking Detector

- 3 tracking stations, each containing 3 layers
- each layer uses 8 spare ATLAS semiconductor strip tracker (SCT) modules  
Thanks to the ATLAS Collaboration!
- back-to-back sensor pair with 40 mrad stereo angle, 80  $\mu\text{m}$  strip-pitch,  
→ 17  $\mu\text{m}$  / 580  $\mu\text{m}$  track resolution

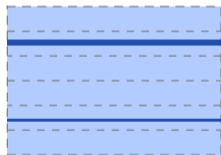


# Track Reconstruction

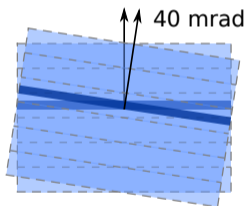


- use ATLAS Offline Software Framework "Athena" and ACTS: A Common Tracking Software for track reconstruction

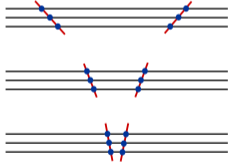
Cluster → Space points → Track Seeds → Tracks



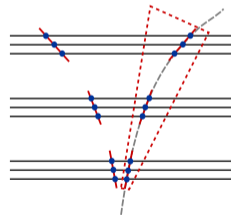
create clusters from semiconductor strips



combine clusters from front and back to a space point



create track seeds from linear  $\chi^2$  fit

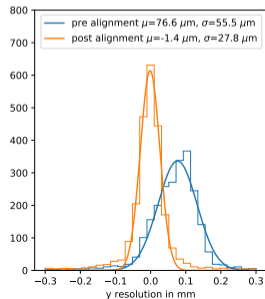
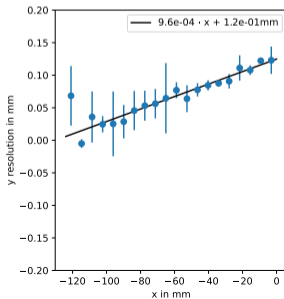
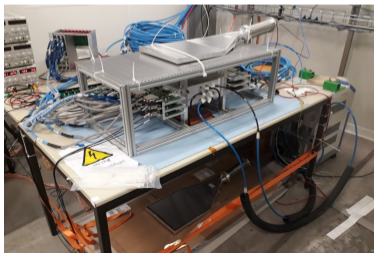


use combinatorial Kalman filter for track finding and fitting

# Space Points

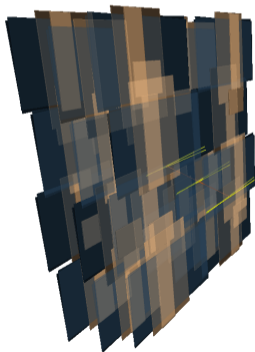
- combine clusters from front and back to a space point
- test space point resolution with cosmic data from TI12 and EHN1
- simple alignment correction

	pre alignment		post alignment	
	Mean in $\mu\text{m}$	Sigma in $\mu\text{m}$	Mean in $\mu\text{m}$	Sigma in $\mu\text{m}$
MC			-1.20	24.80
EHN1	$-32.71 \pm 36.72$	$35.52 \pm 7.47$	$-1.40 \pm 2.05$	$27.95 \pm 2.56$
TI12	$-33.95 \pm 35.20$	$27.56 \pm 7.00$	$-2.27 \pm 5.82$	$26.31 \pm 5.38$



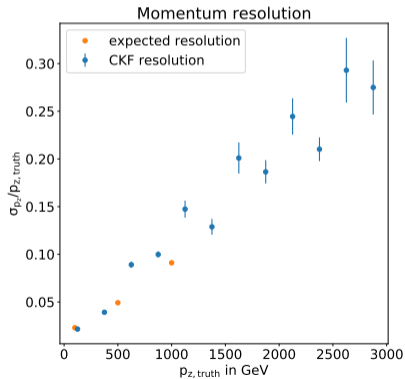
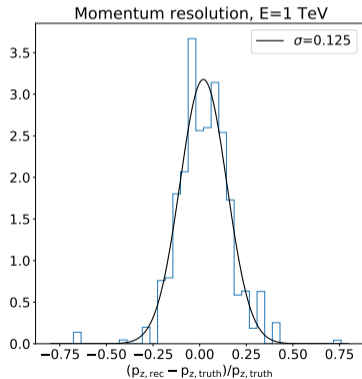
# Track Seeds

- implemented linear  $\chi^2$  cluster fitter
- Next steps:
  - get position and direction from fit
  - combine fits from multiple stations to get momentum and charge
  - create track using these initial parameters



# Tracks

- deployed ACTS Combinatorial Kalman Filter
- test performance with MC simulated events with a single muon using smeared true initial parameters



# Summary

- good space point resolution for cosmic tracks
- good momentum resolution for tracks using smeared true initial parameters

Next steps:

- finish track seeds and run CKF with them  
→ run CKF on TI12 data
- material mapping
- track event data model
- vertexing