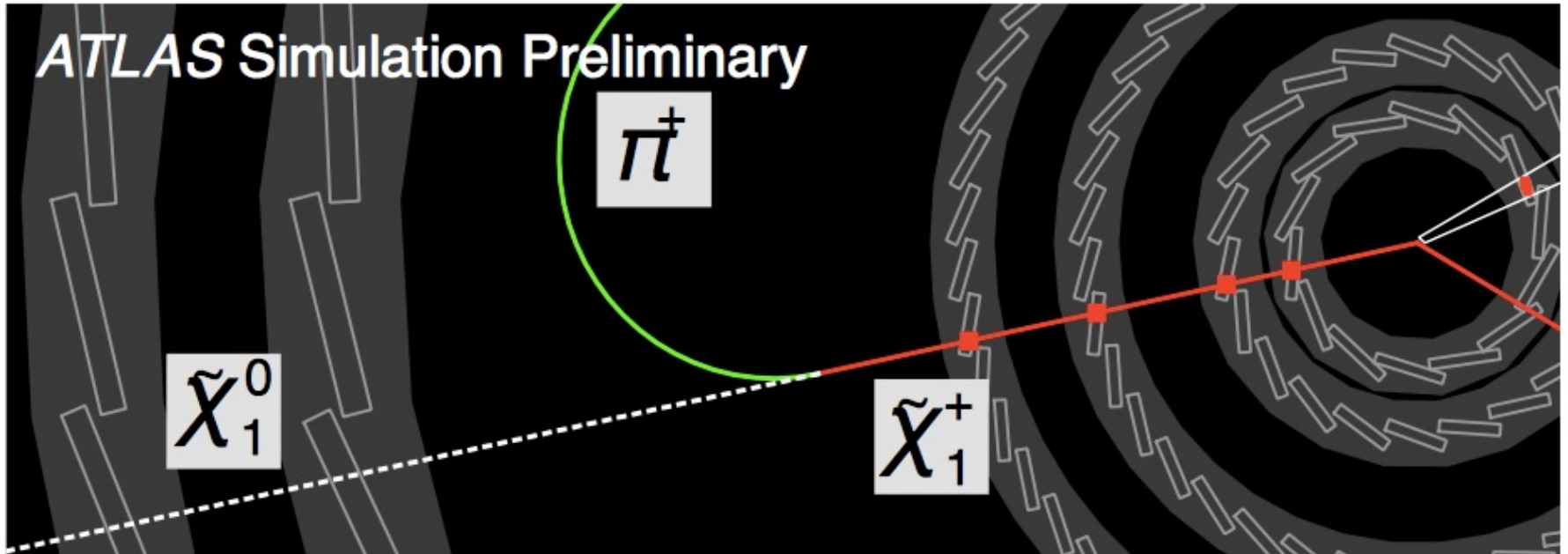


# Track Triggering at High Rates



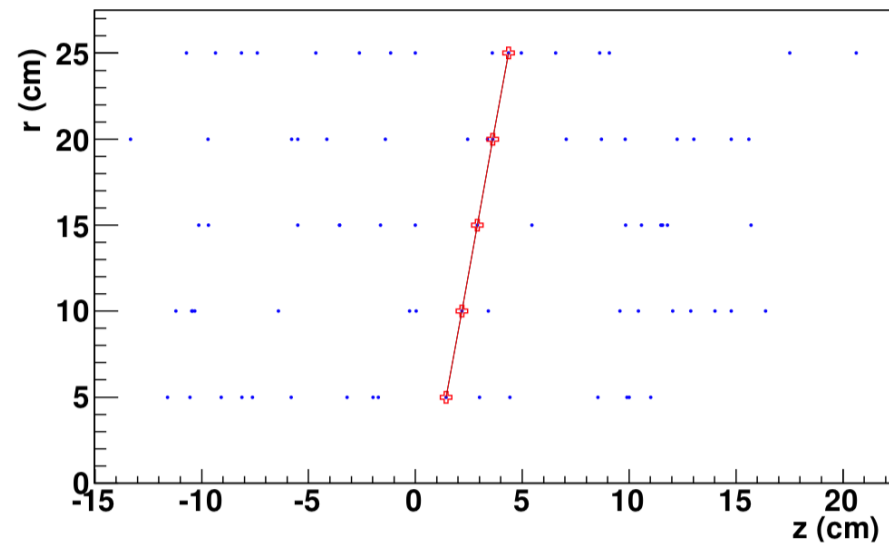
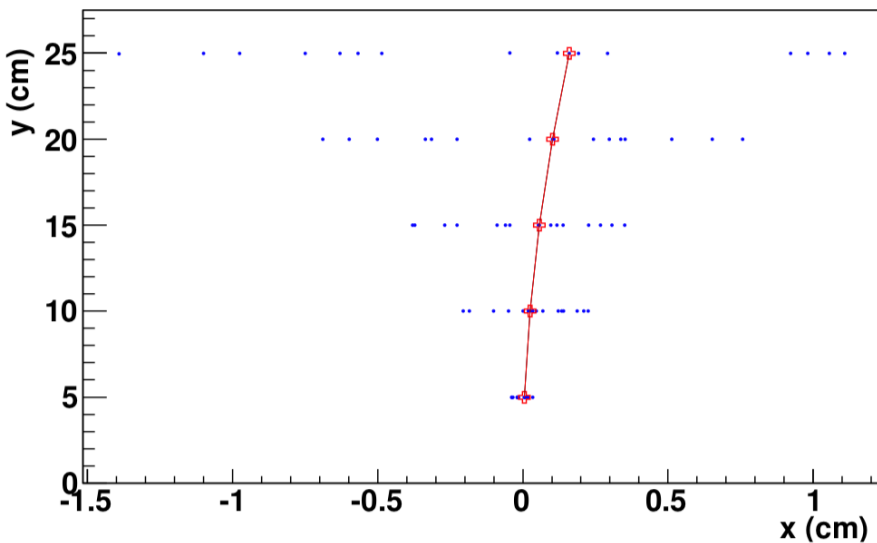
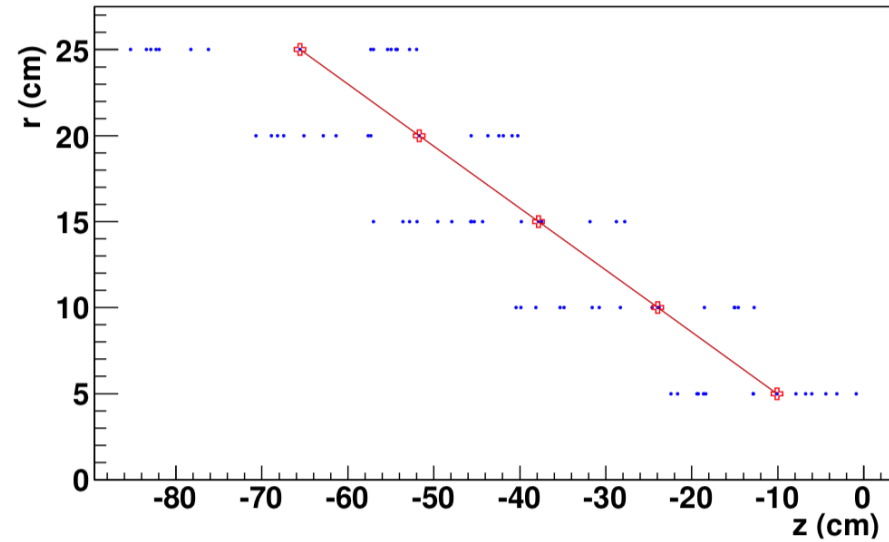
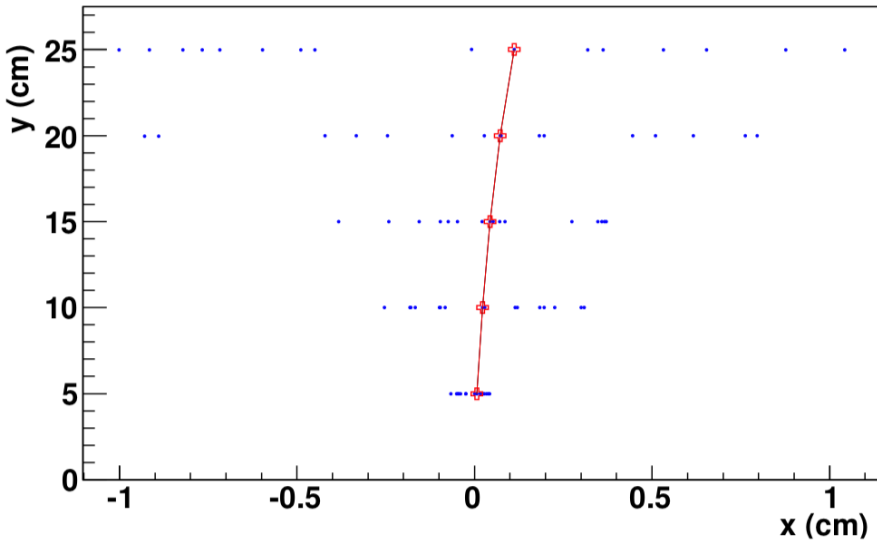
Ashutosh V. Kotwal

Duke University

16 June 2023

ACE Workshop, Fermilab

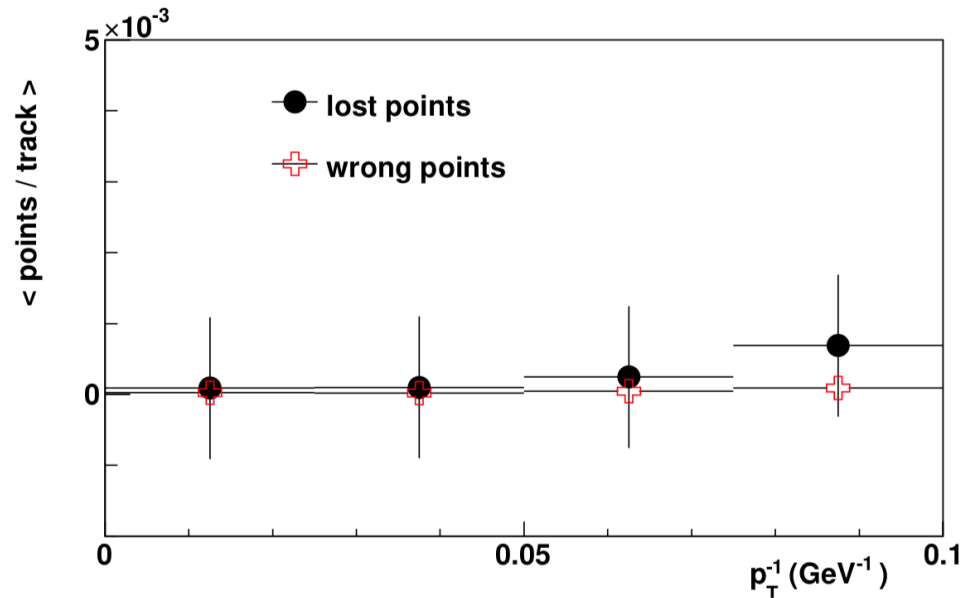
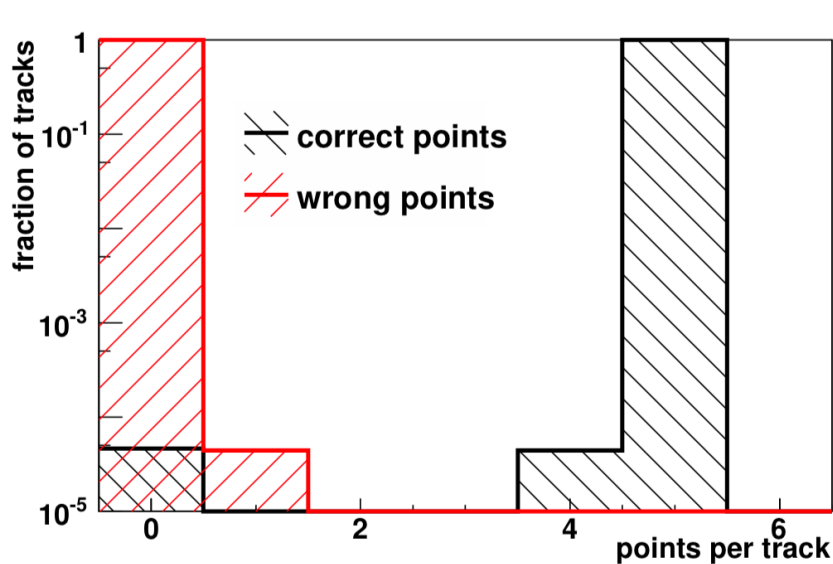
# High $p_T$ Trigger



Trigger particle with  $p_T > 10$  GeV embedded amongst low  $p_T$  pileup tracks

# Results of emulation in software

- Assume 5 pixel sensor layers spaced 5 cm apart, 5...25 cm radii
- Efficiency of finding high- $p_T$  track in 200 pileup events > 99.9%
- Tracks found are robust, very small rate for wrongly-assigned hits
- Published in AVK, Scientific Reports **11**, 18543 (2021)



Next steps: study FPGA implementation

# Synergy with Luminosity Frontier Experiments?

- High-rate experiments at PIP-II / ACE may be able to use track triggers
  - Signal identification
  - Background rejection
  - Sub-optimal beam timing structure
- Need sufficiently fast and granular tracking detectors
- Would track triggers increase the physics capability of such experiments sufficiently?
  - Which signatures would benefit the most?
  - REDTOP
  - others?