COSMOGENIC PROTON DECAY BACKGROUND AND LARSOFT ON THE LHC GRID

Matt Robinson
Vitaly Kudryavtsev
Karl Warburton
Elena Korolkova

RECAP (IT'S BEEN A WHILE)

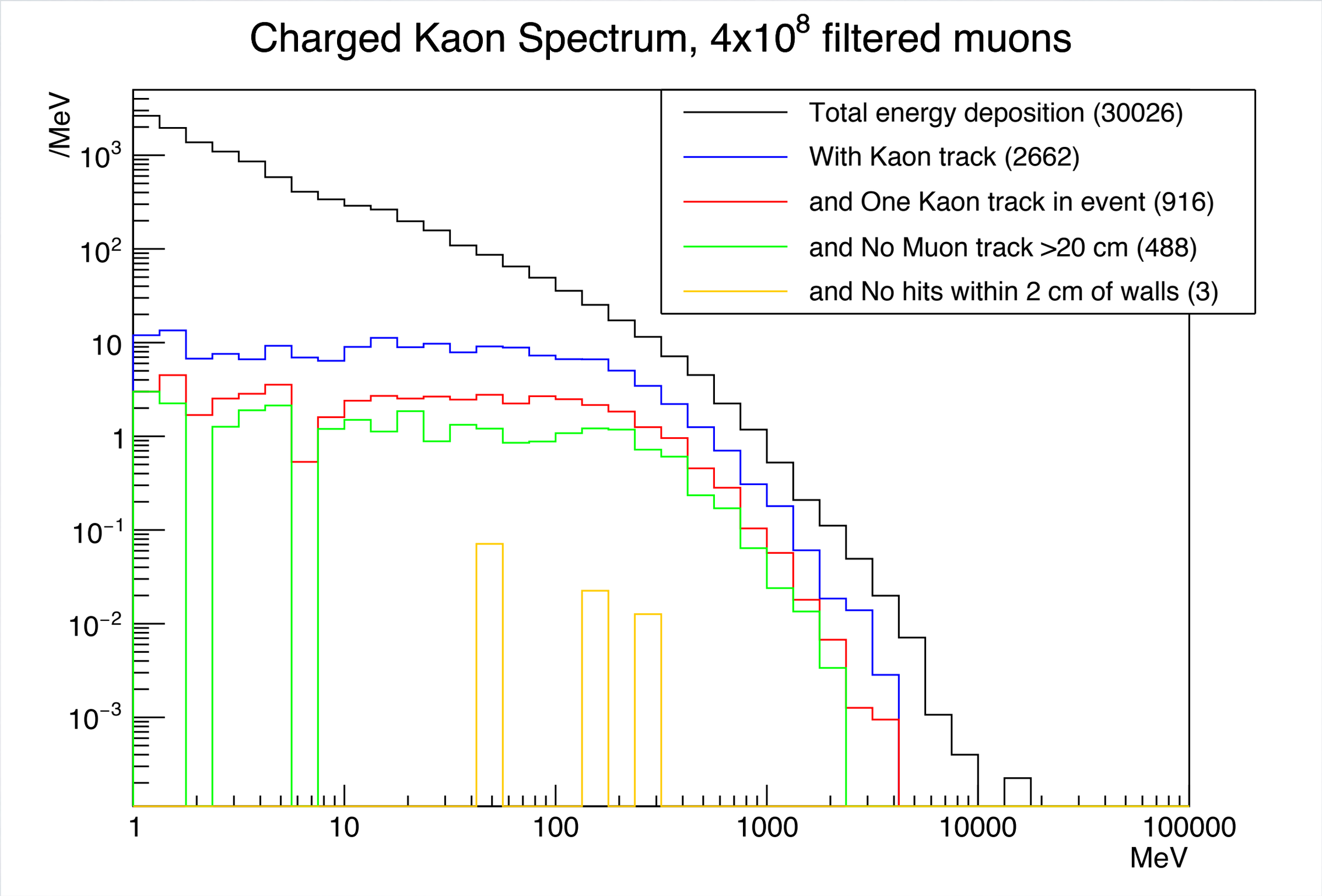
- Simulating muons from the MUSUN generator as far as detector stage (no daq or reconstruction).
- Big, and well understood change with switch to geant4.10.1.
- Target is 10^9 muons simulated (200 years).
- Progressing toward gaining ever greater access to LHC grid resources to make above target more practical.

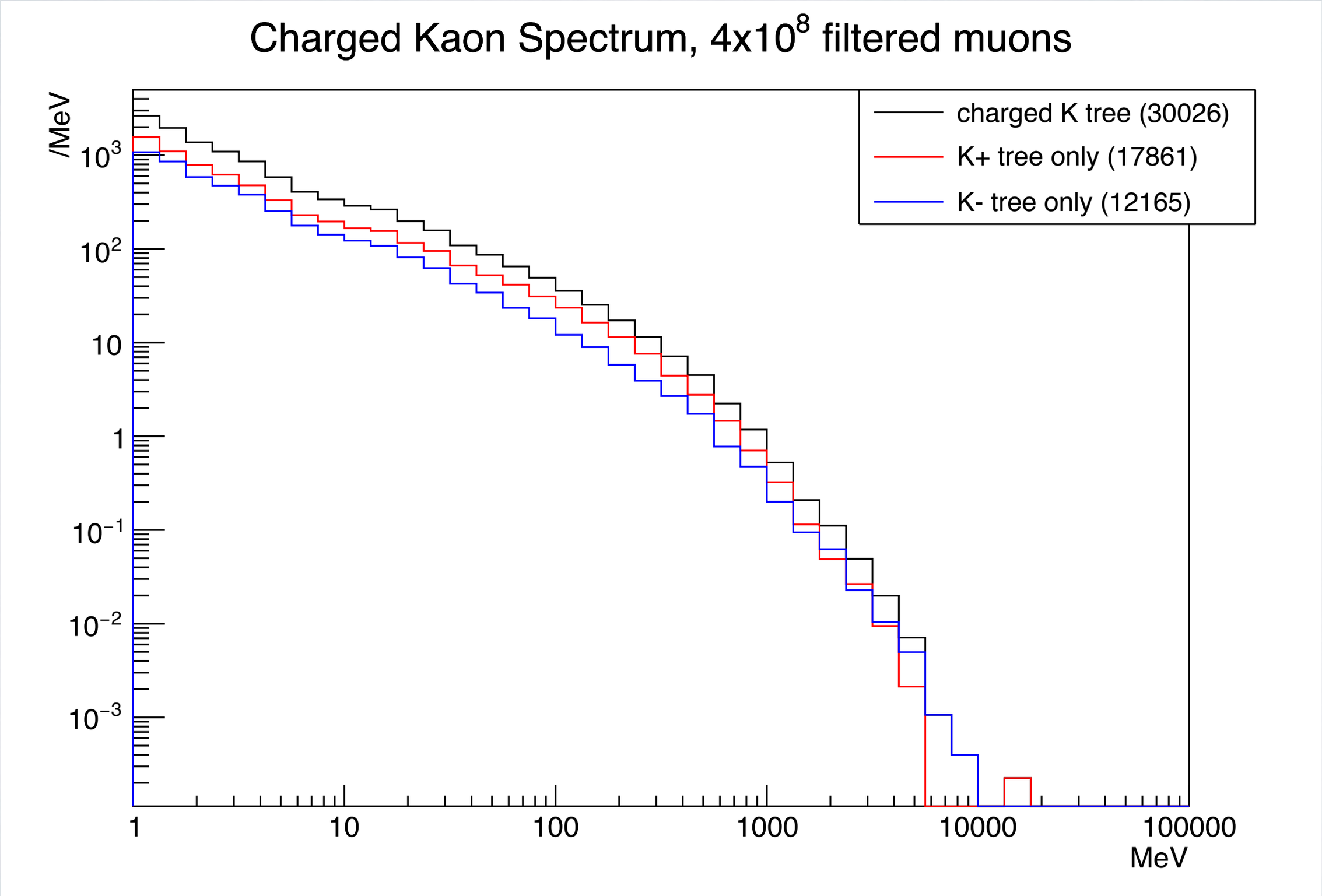
STATUS

- 4×10^8 muons simulated so far. 3/4 of these on the LHC grid. Simulations continuing using "gridpp" VO to run a few hundred parallel jobs at a time. >99% success rate.

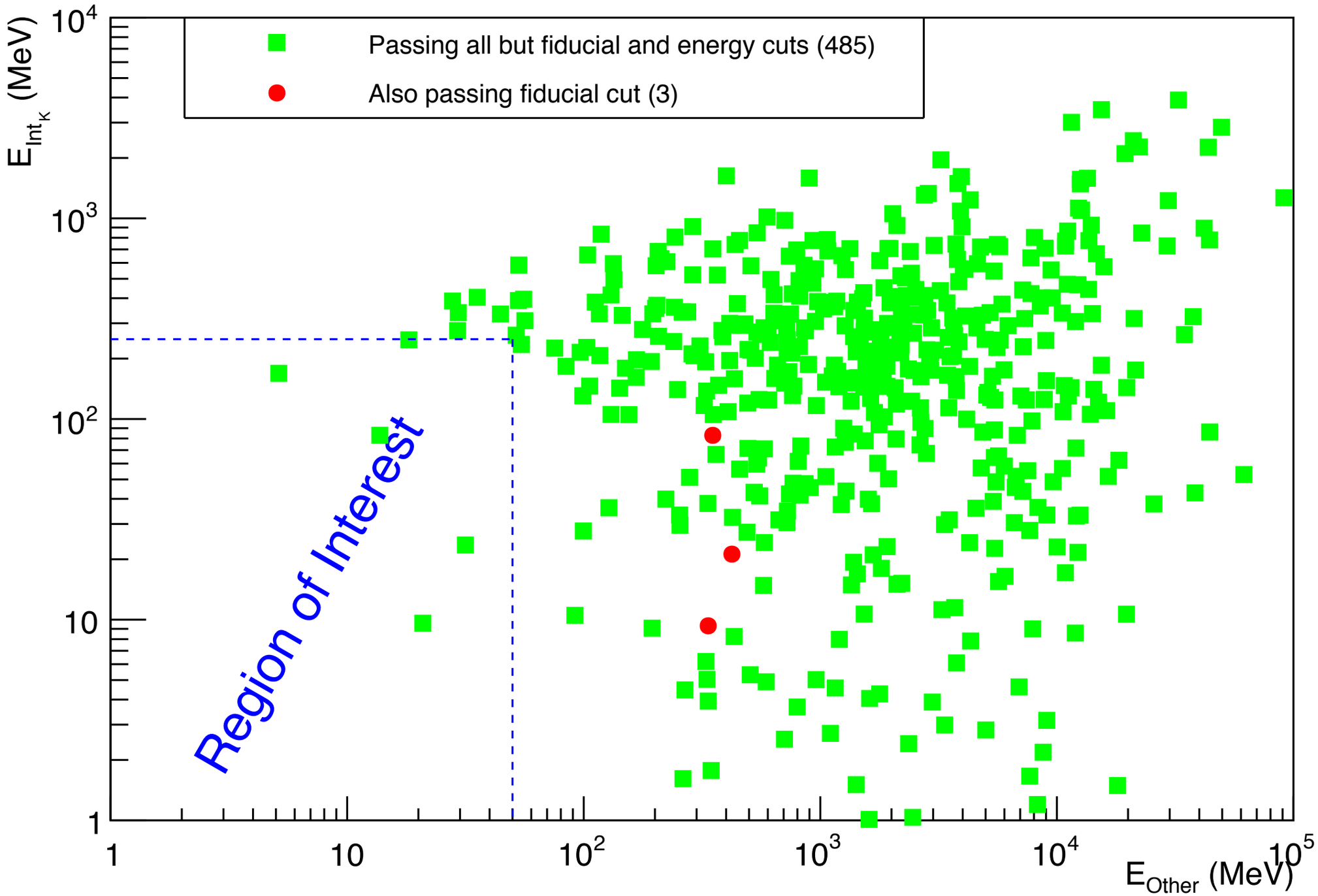
- dune VO now registered on the LHC grid and with IC Dirac system. Tests indicate Dirac working but will not allow data to be passed through output sandbox so temporary storage required. Have requested access through WMS as well (no storage needed).

- Starting to harass other institutions into supporting dune VO on their LHC grid systems.


Charged Kaon Spectrum, 4x10^8 filtered muons
/MeV
10^3
10^2
10
1
10^-1
10^-2
10^-3
1
10
100
1000
10000
100000
MeV
Total energy deposition (30026)
With Kaon track (2662)
and One Kaon track in event (916)
and No Muon track >20 cm (488)
and No hits within 2 cm of walls (3)


Charged Kaon Spectrum, 4x10^8 filtered muons
/MeV
10^3
10^2
10
1
10^-1
10^-2
10^-3
1
10
100
1000
10000
100000
MeV
charged K tree (30026)
K+ tree only (17861)
K- tree only (12165)

Background Candidates



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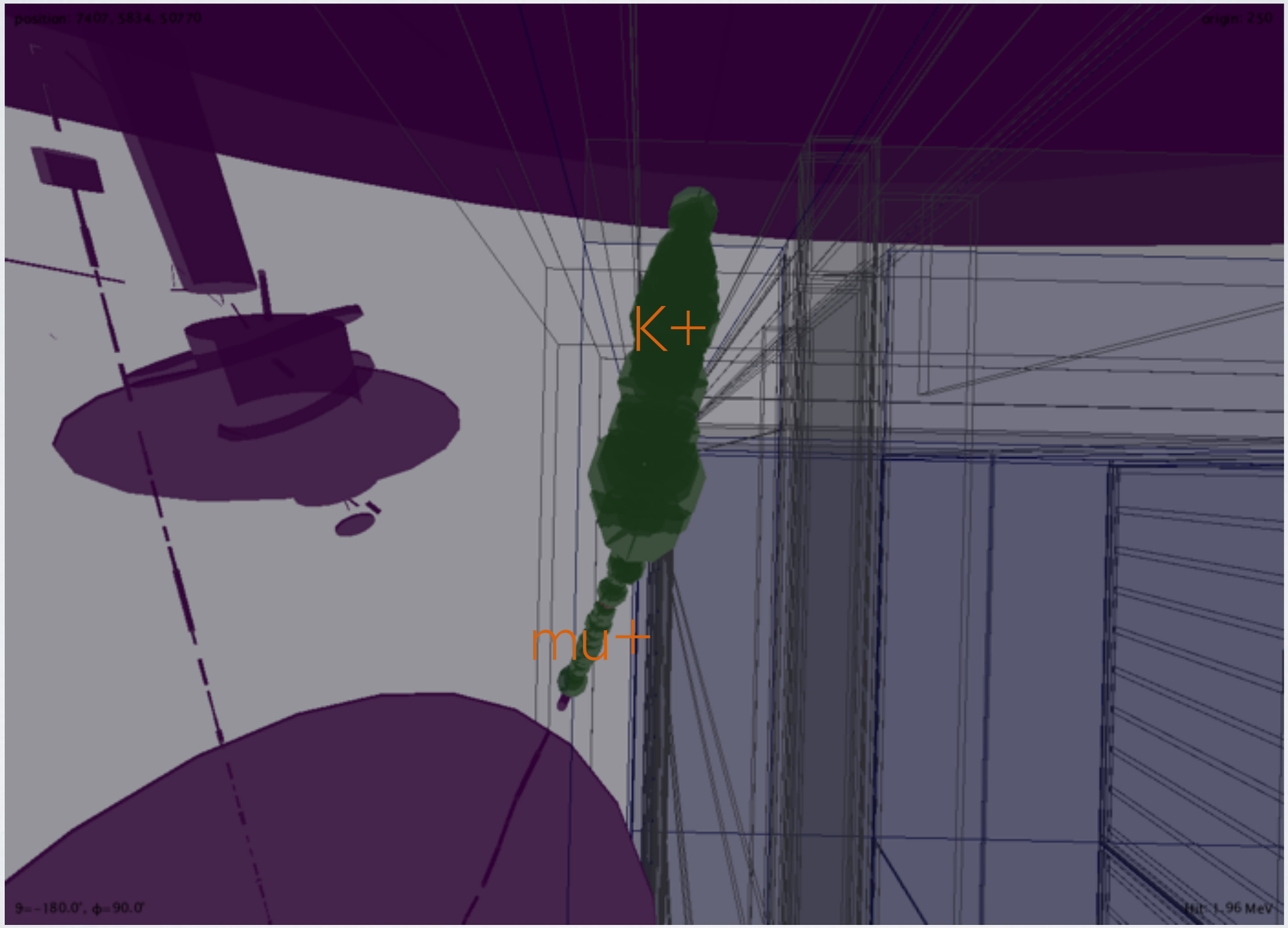
INSIDE ROI



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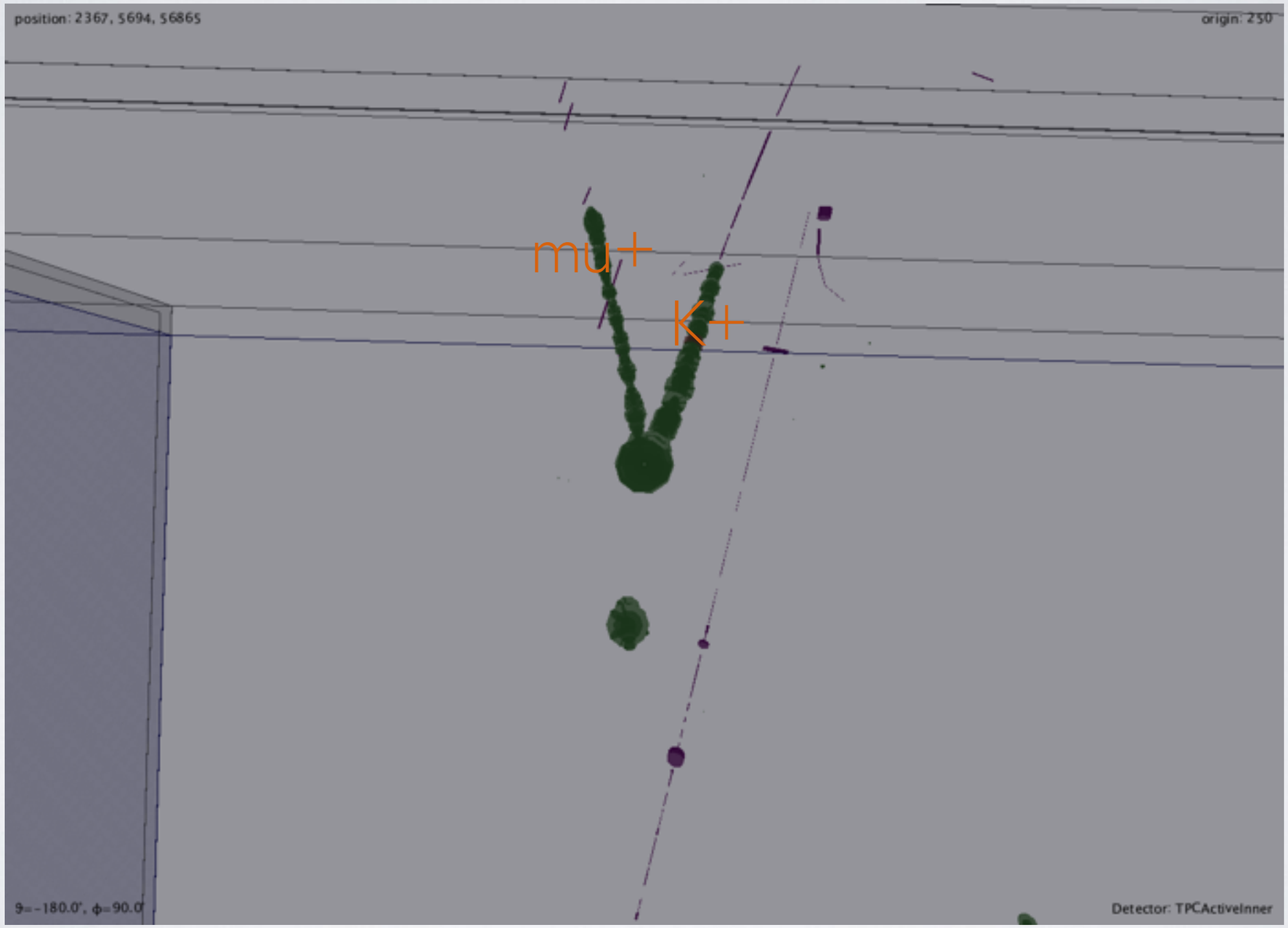
INSIDE ROI



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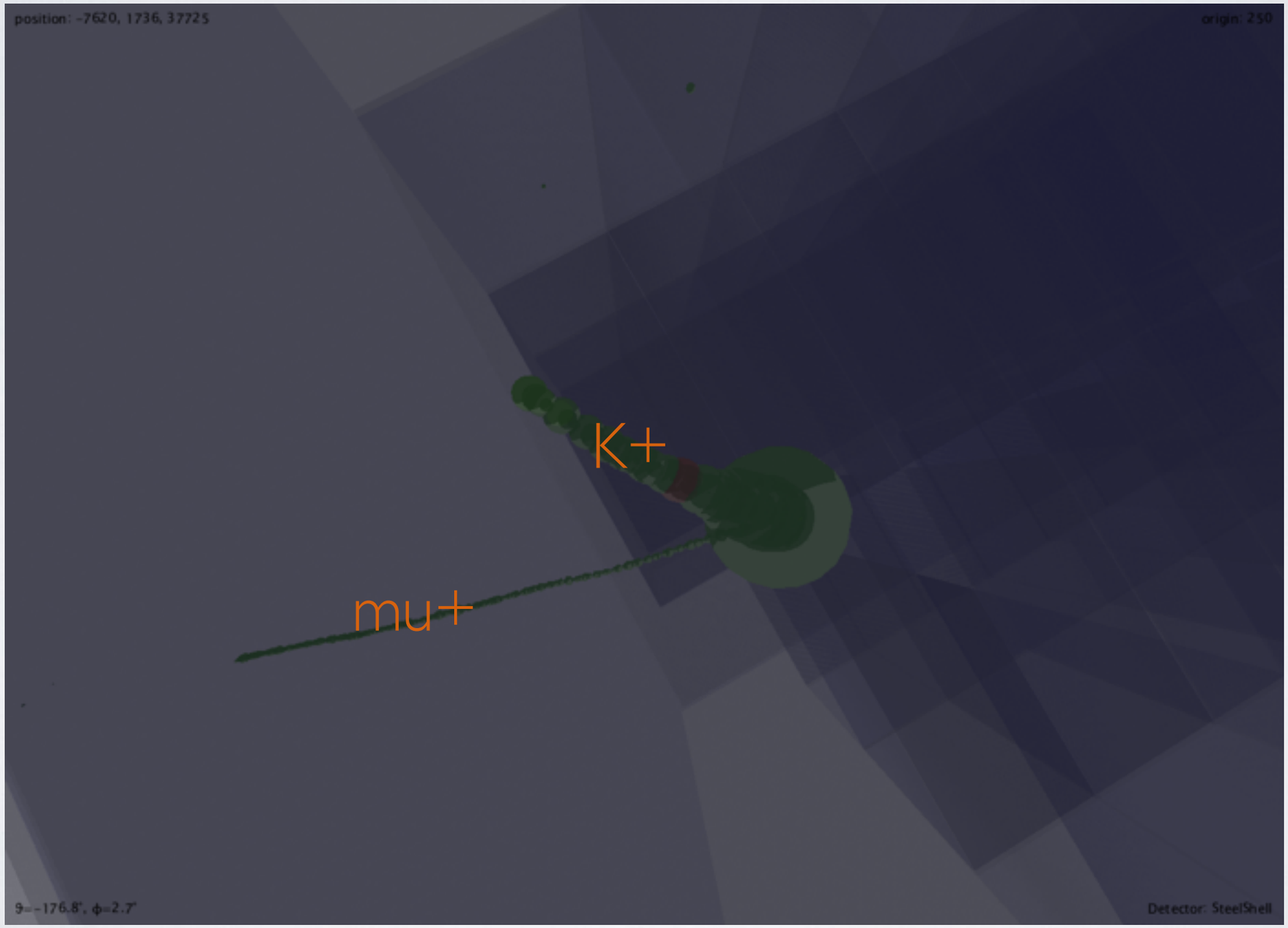
INSIDE ROI



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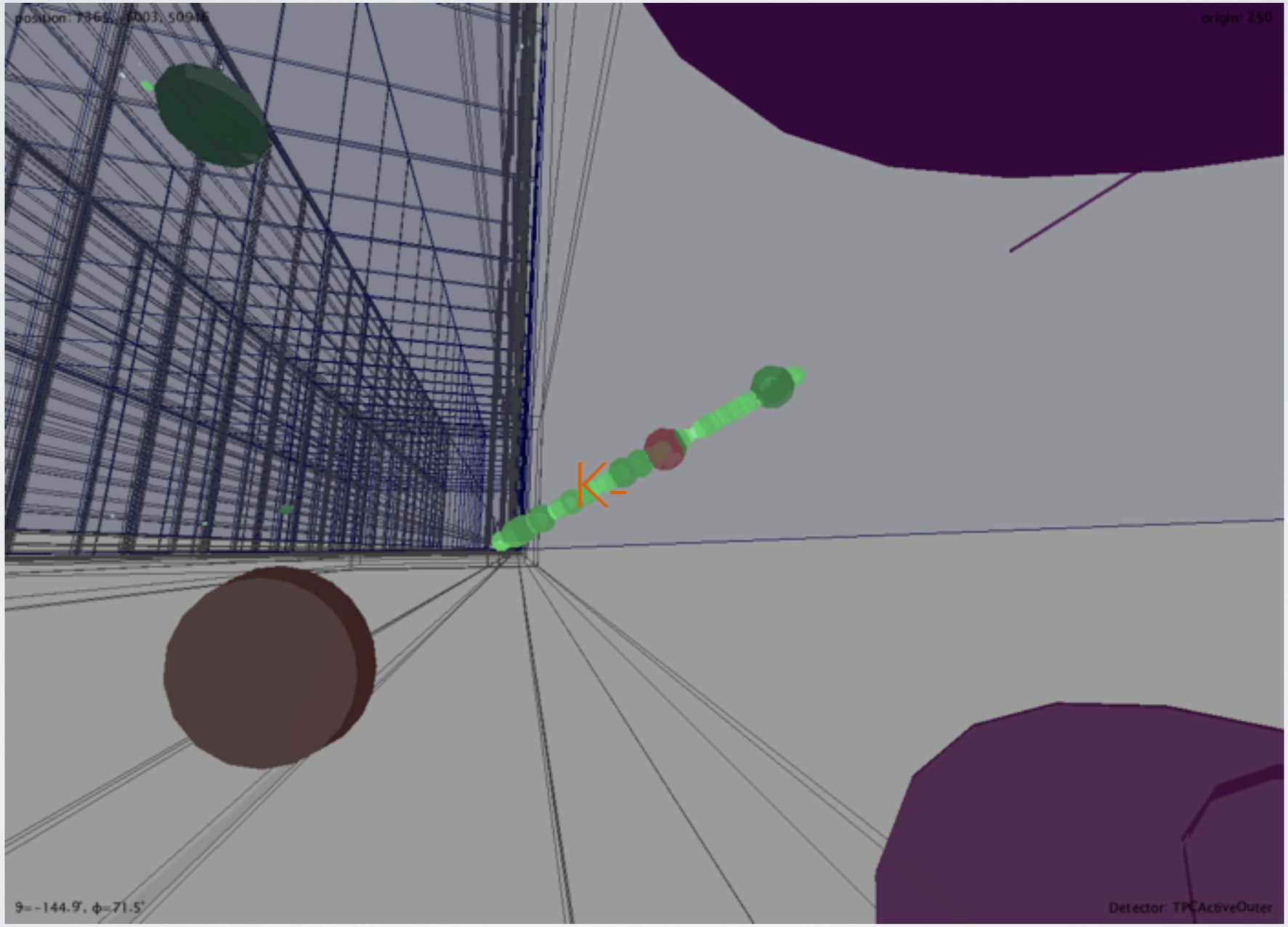
INSIDE ROI



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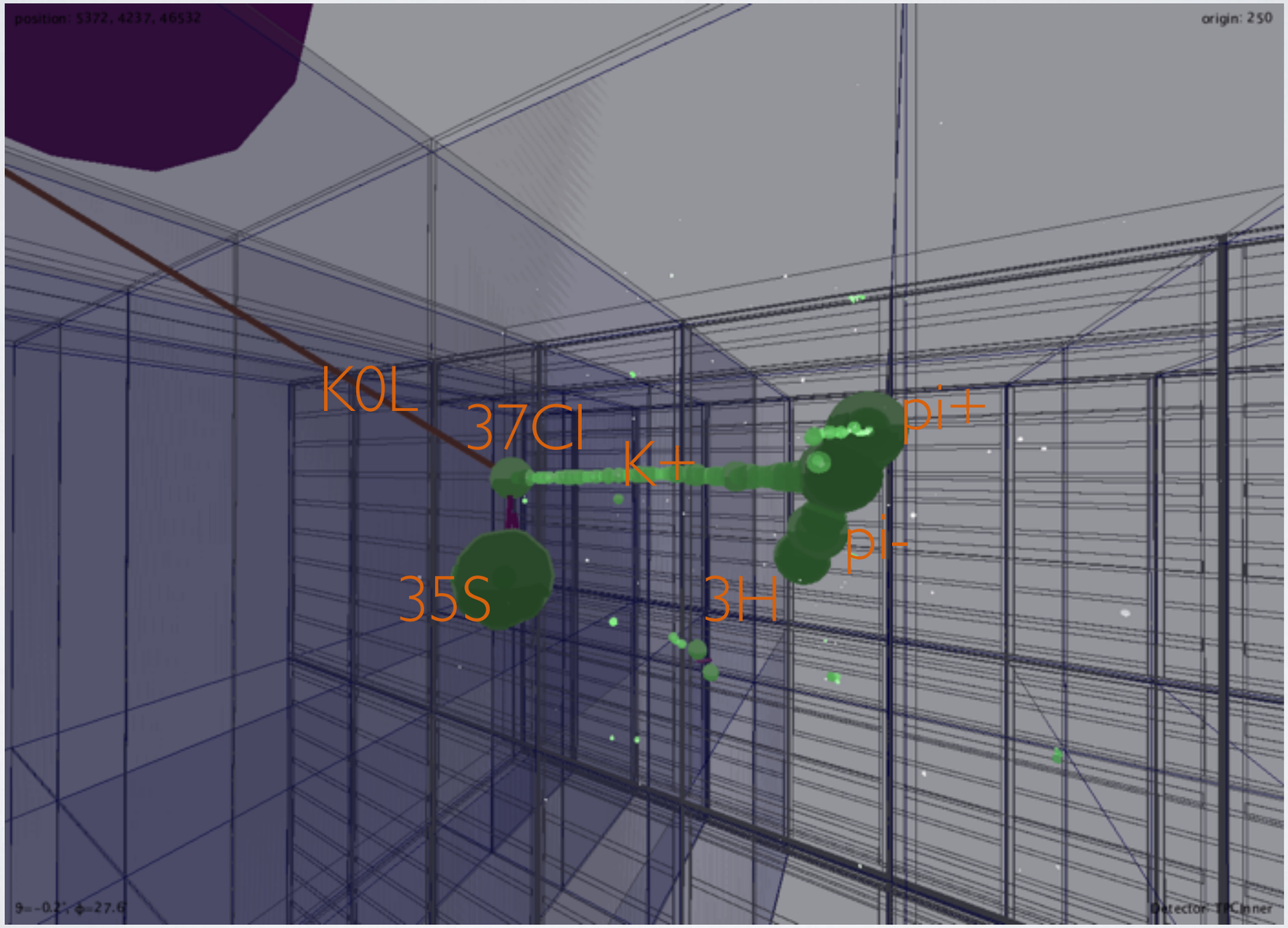
PASSING FIDUCIAL CUT



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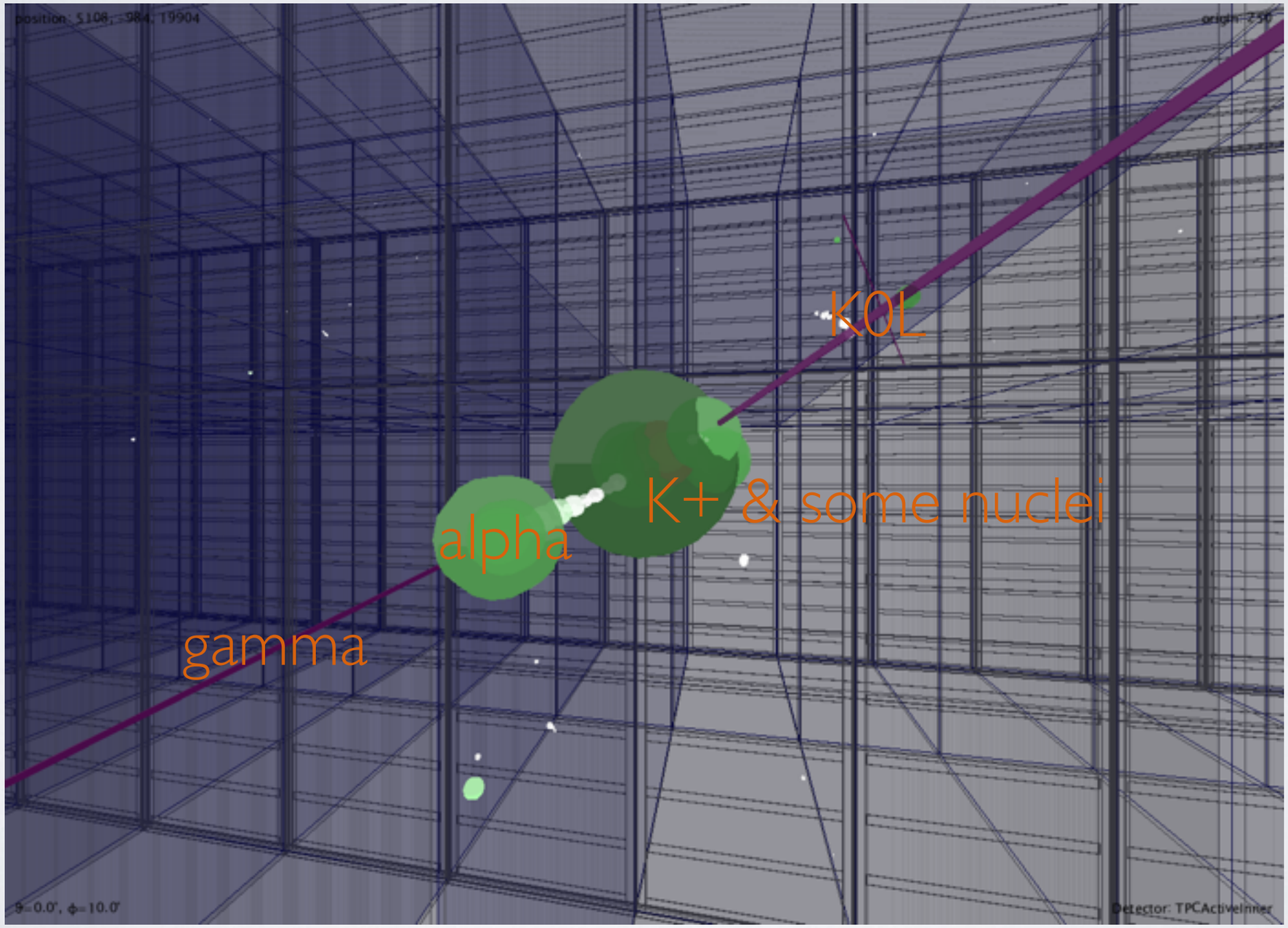
PASSING FIDUCIAL CUT



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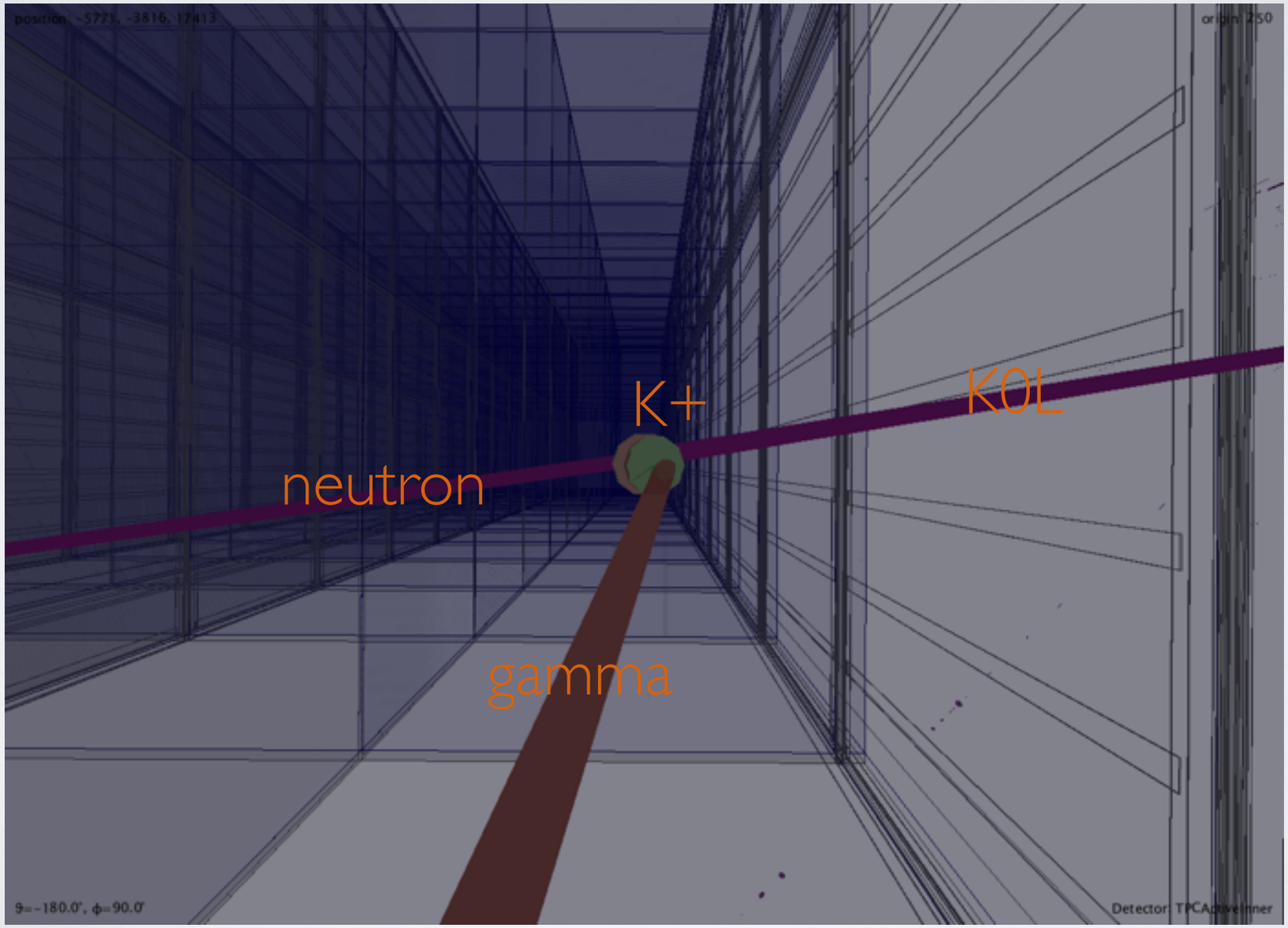

WHAT'S NEXT

- Still pushing toward target of 10^9
- Trying to get more access to LHC grid resources to speed things up (and because it will be useful for future work)
- Reconstruction still being looked at. Need realistic evaluation of capability of rejecting events such as those shown today.