Single Particle MC Samples

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HPS Analysis Meeting

August 15, 2023

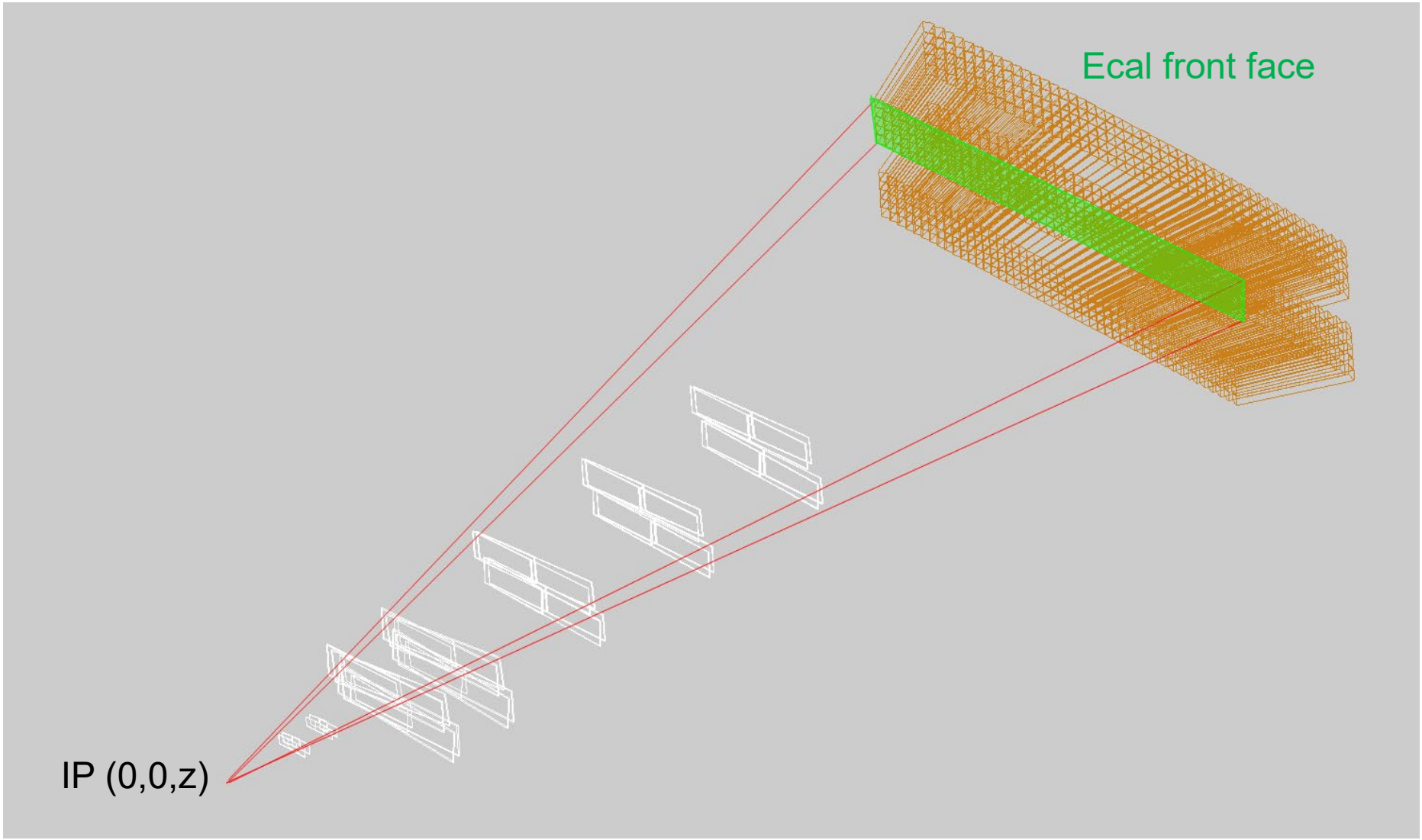
Single Particle MC

- It is often very useful to have samples of MC events containing well-defined distributions of single particles.
- Such samples have been used to calibrate and provide position and energy corrections for the Ecal
- Have also been used to study SVT response and track reconstruction

Single Particle MC

- Existing samples of e+, e- and photons are available which evenly illuminate the face of the Ecal
- Generate at estimated IP z location
  - 2016 z = -4.2
  - 2019 z = -7.5
  - 2021 z = 0.0
- Evenly populate x-y rectangle bounded by Ecal top/bottom front face
- Write out in stdhep format

Single Particle MC

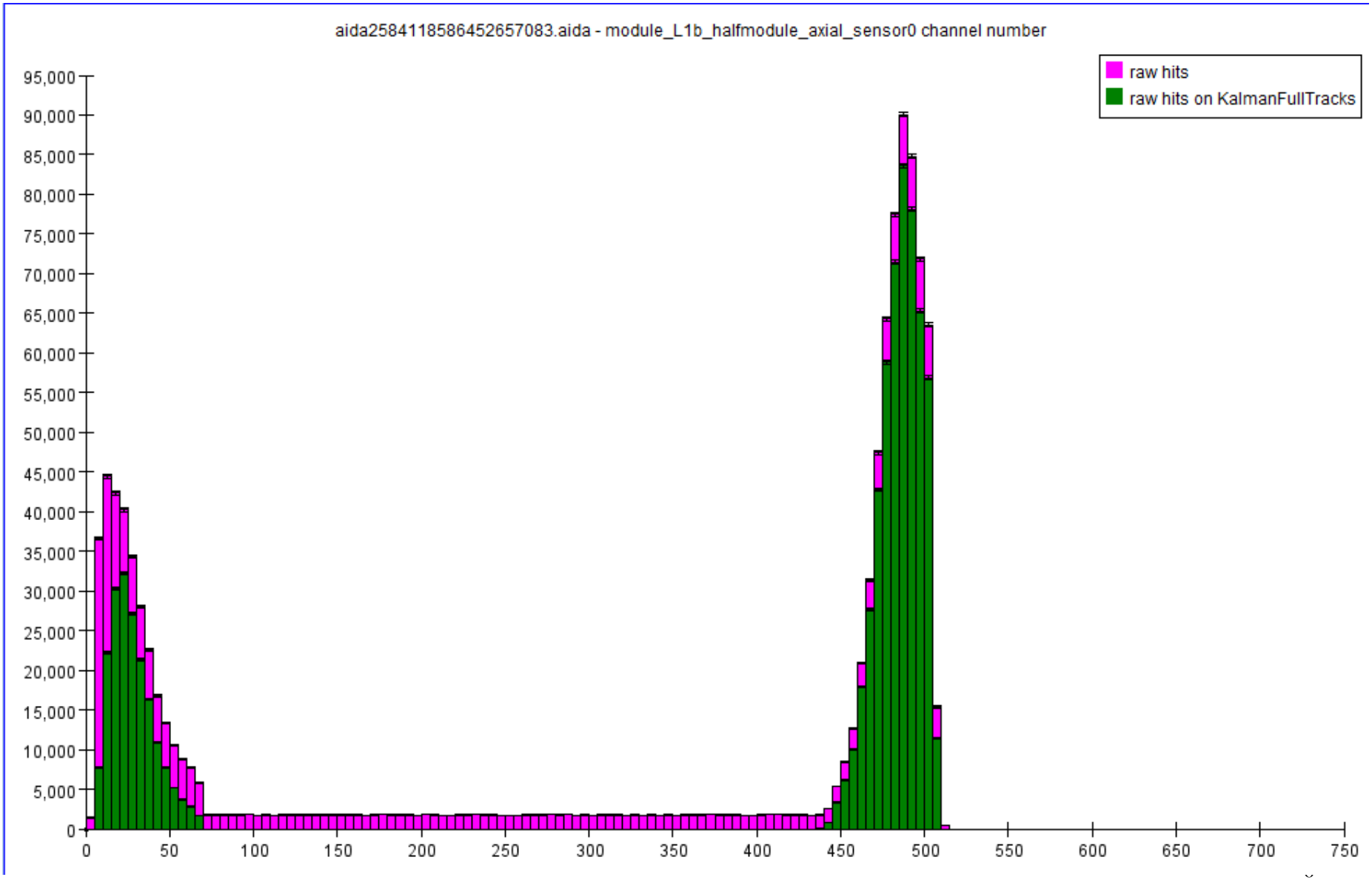


Existing Samples for SVT analyses

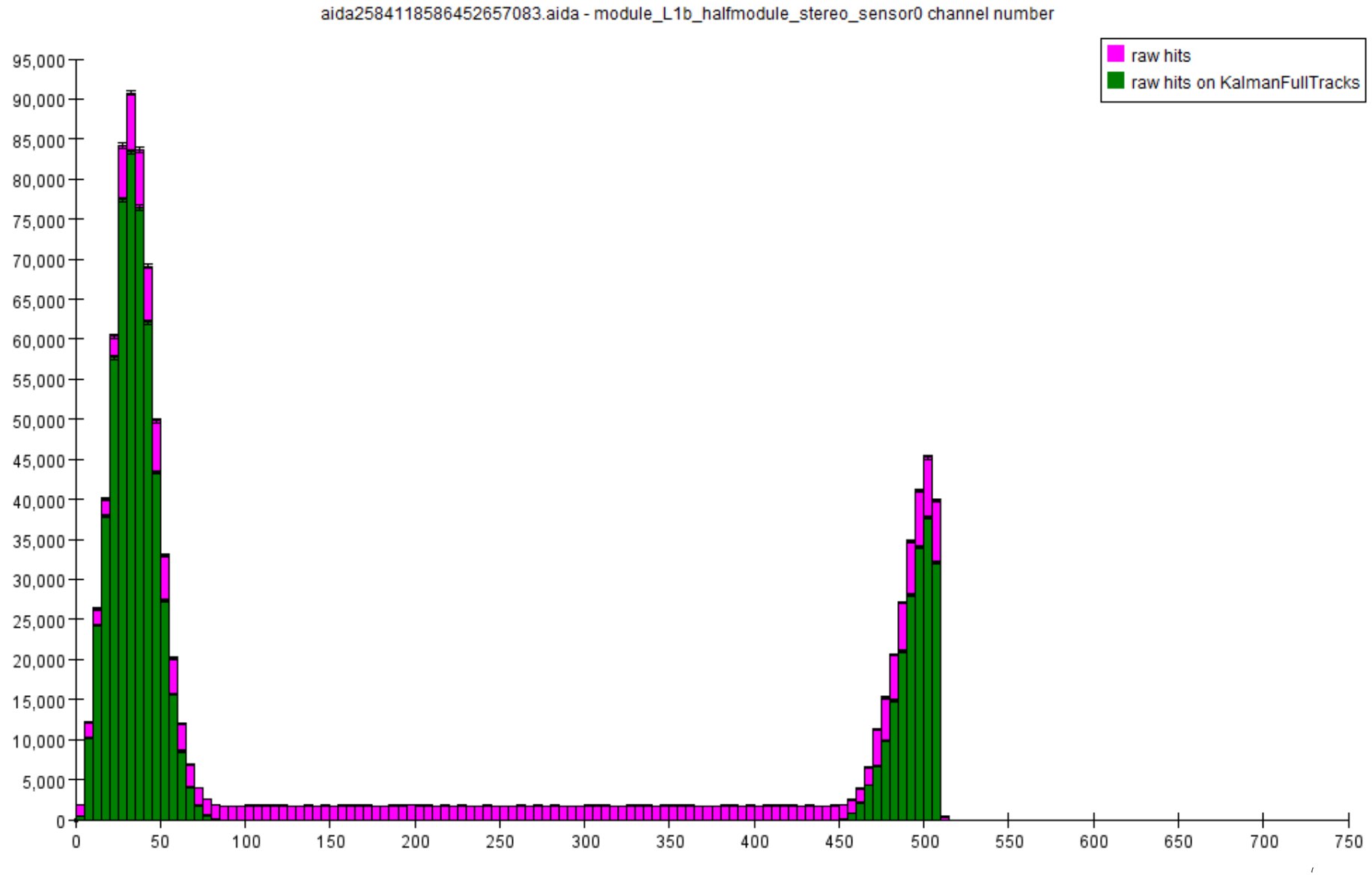
- Output of the full reconstruction chain at JLab:

- /work/hallb/hps/maurik/sim_2021/hpsForward_e-*.slcio
- /work/hallb/hps/maurik/sim_2021/hpsForward_e+*.slcio

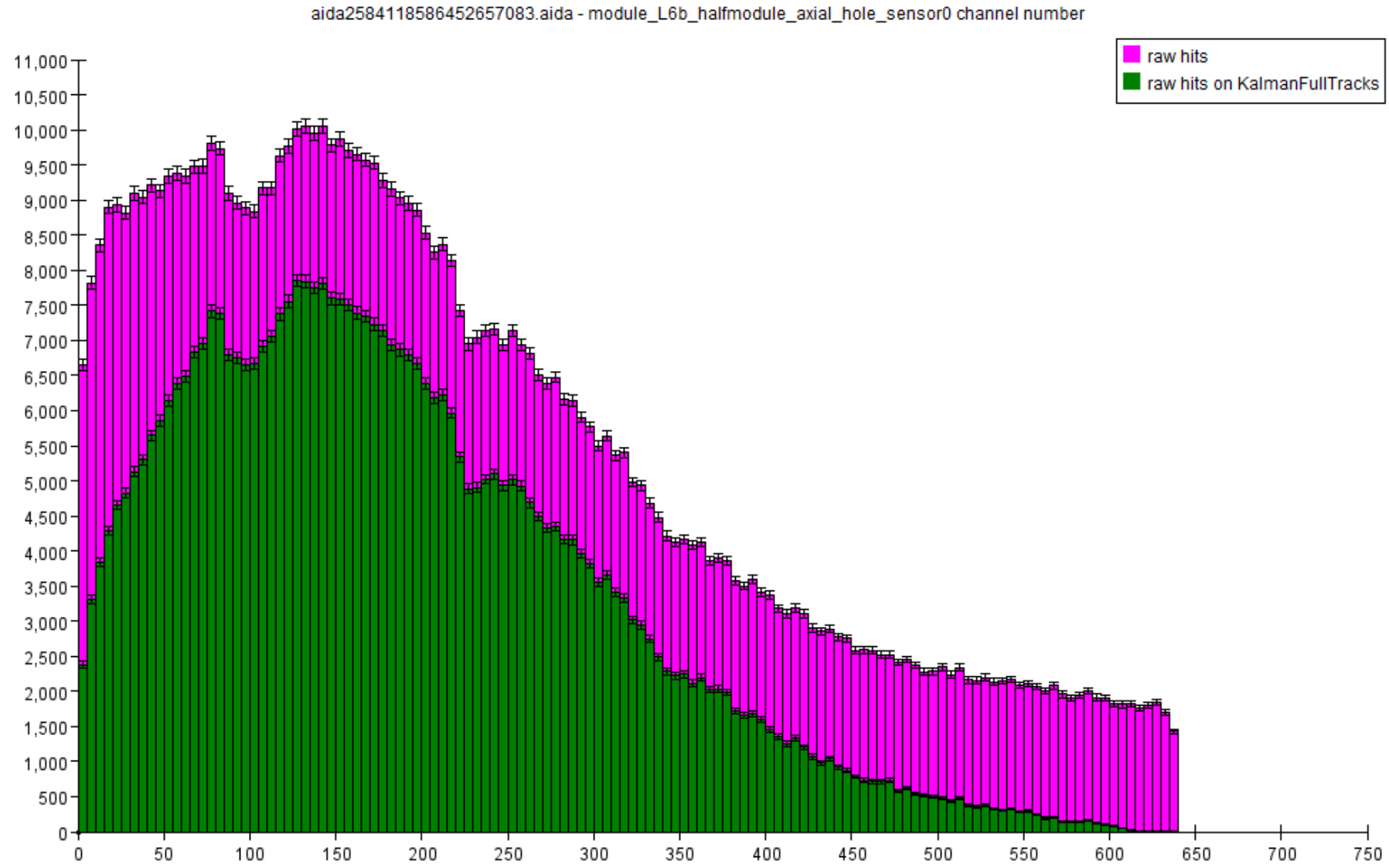
SVT RawTrackerHit Coverage



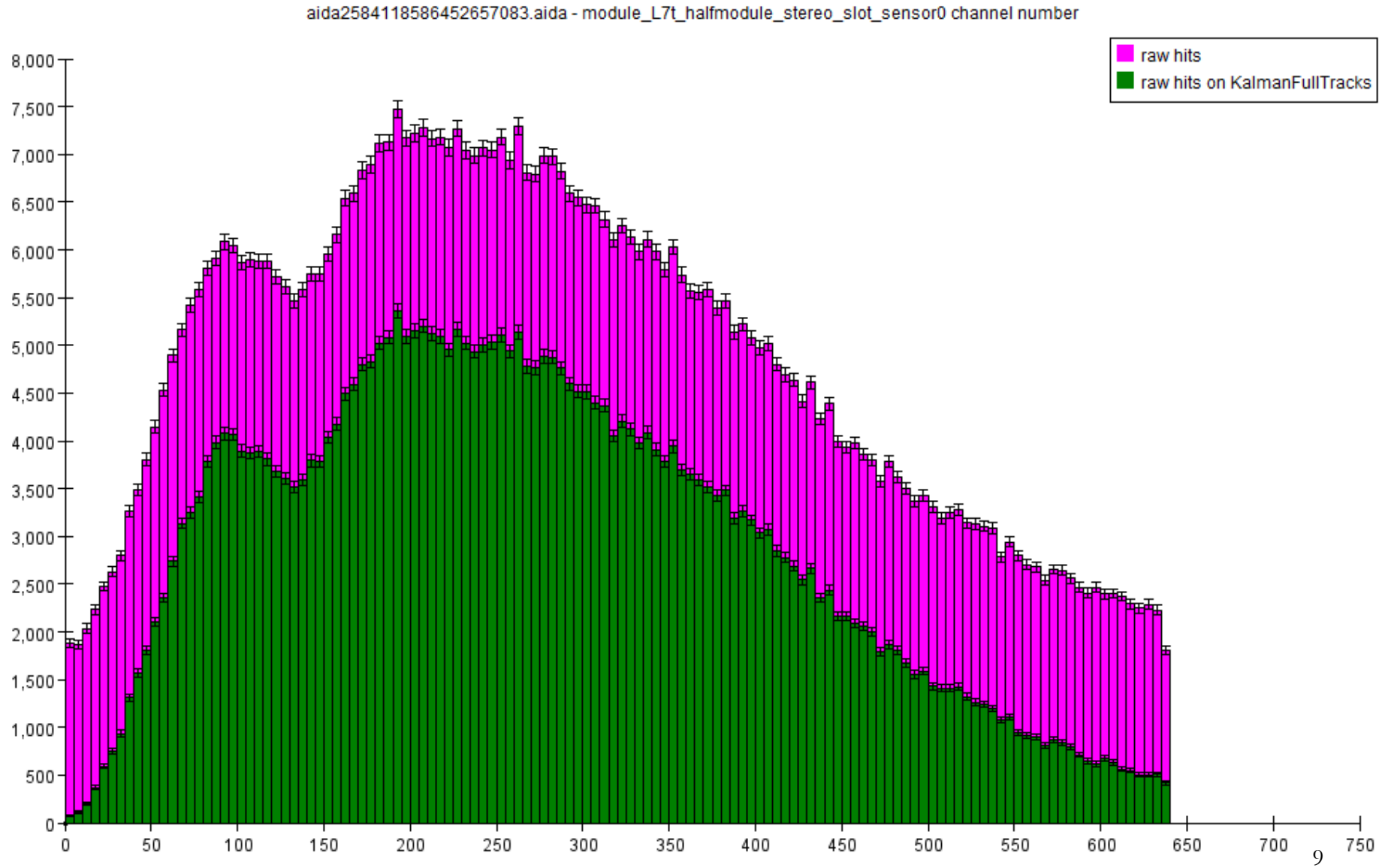
SVT RawTrackerHit Coverage



SVT RawTrackerHit Coverage



SVT RawTrackerHit Coverage



Additional Samples

- Input stdhep files are available for all the samples, allowing for re-simulation and/or re-reconstruction of the same events if needed
- at SLAC in eponymous sub-directories :
  - /sdf/group/hps/users/ngraf/mc/samplingFractionSet/2021/

Additional Samples

- Additional samples can be generated quite simply with the following command:

java -cp hps-distribution-5.2-SNAPSHOT-bin.jar org.hps.analysis.MC.GenerateSingleParticleStdhepEvents

GenerateSingleParticleStdhepEvents:
an application to generate single particle events in stdhep format.

Usage:

>> java GenerateSingleParticleStdhepEvents particleType conjugate energy(GeV) targetZposition(mm) nEvents

e.g. >> java GenerateSingleParticleStdhepEvents 11 false 4.55 -7.5 10000

will generate 10k single full energy (4.55GeV) electrons evenly spread over the face of the ECal starting at z=-7.5mm

n.b. Please let me know if you would like additional functionality. There's no need to rewrite this in python or C++.