# MC and data, production and reconstruction

Sho Uemura

SLAC

# Summary

- Simulation needs and simulation chain
- Offline computing model

# Simulation samples

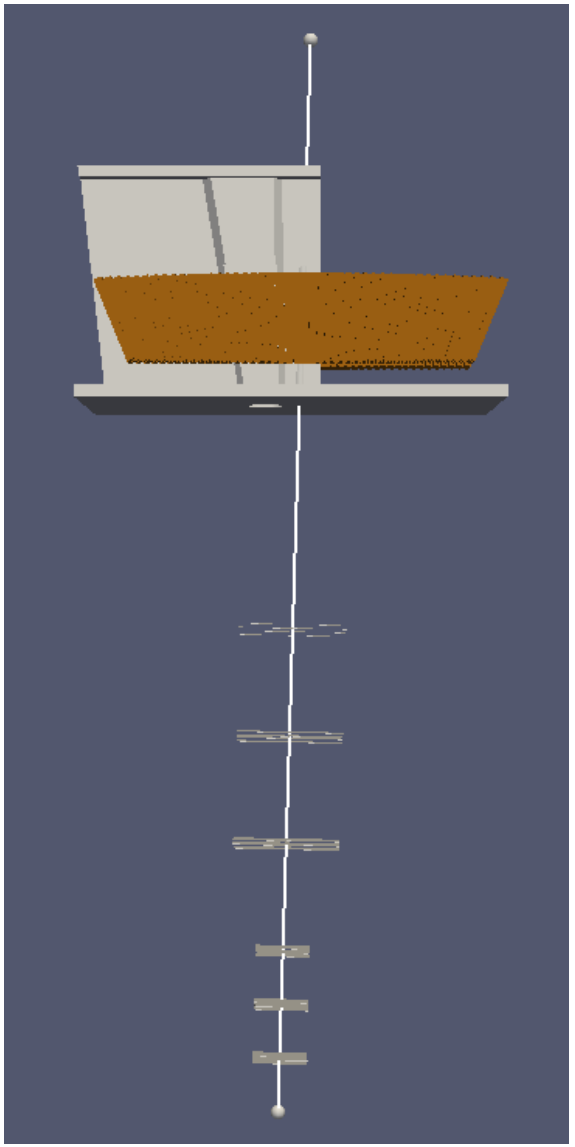
- Beam background for trigger and filtering studies
  - 1 million triggers ($\approx$1 minute of beam) per beam energy
  - We currently have 0.1 s ($\approx$2000) of beam per beam energy
- A' with background pileup
  - 100 million triggers per mass ($\approx$10 masses) and beam energy; also some detached-vertex
  - We currently have up to $\approx$20000 ($1 \times 10^5$ unfiltered candidates)
- Tridents with background pileup
  - 10% of the number of trident triggers we expect in data? 100 million triggers?
  - This is the only sample that doesn't actually exist yet

# Event generation

- StdHep files for particles coming out of the target:
  - Beam background
    - ★ EGS5 for multiple scattering, EM interactions
    - ★ MadGraph tridents
  - Trigger candidates
    - ★ A' tridents from MadGraph
    - ★ Trigger-enhanced background tridents from MadGraph
- C++ scripts to merge files into beam bunches

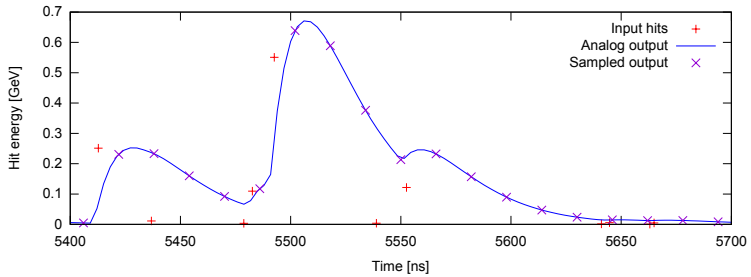
# Detector simulation

- SLIC (Geant4) simulates each beam bunch in the detector
- Geant4 v9.3p02, QGSP_BERT physics list
- Detector geometry contains everything from the target to the ECal; no muon detector yet
- Hits saved to LCIO file



# Readout and trigger simulation

- Simulate pulse shapes and readout pipelines for ECal preamp/FADC and SVT APV25
- Associate SVT readout hits with MC primary particles
- FADC, CTP, SSP simulated as part of trigger decision
- Detector pipelines read out after trigger; digitized hits saved to LCIO file
- Data quality: quick summary of hit rates
- LCIO file can be converted to EVIO and vice versa



# Reconstruction

- Apply gains to ECal hits; make clusters
- Fit SVT samples to get times and amplitudes; make clusters
- Drop out-of-time SVT hits and make tracks
- Save reconstructed objects to LCIO file; make data quality summary
- Summary ROOT tree (DST) generated from LCIO file

# Production

- So far everything has been done at SLAC
  - Simulation and test run recon available on web
- For full-scale production, all at JLab
- Roughly a million CPU hours and 500 TB for the commissioning run
- Transfer only DSTs to SLAC: roughly 50 TB