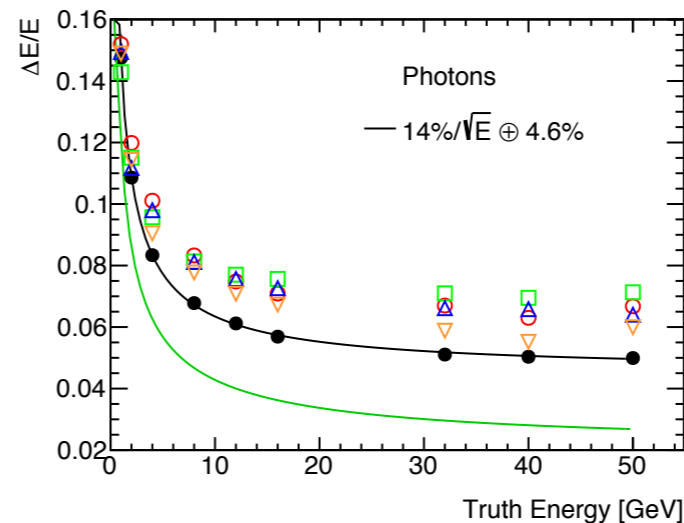
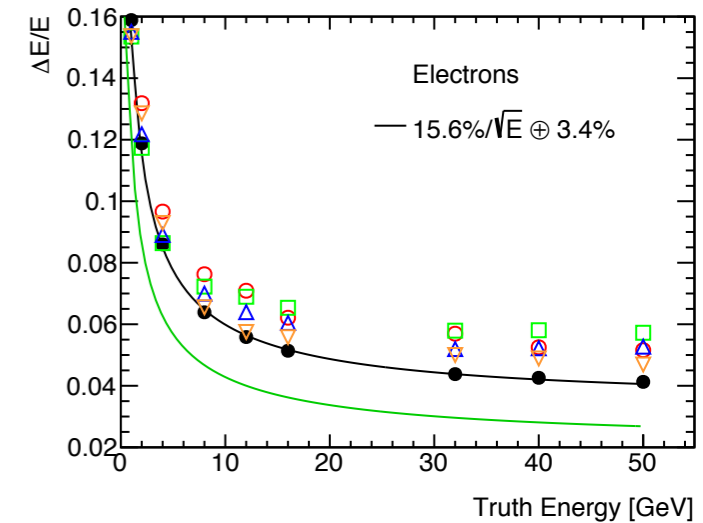
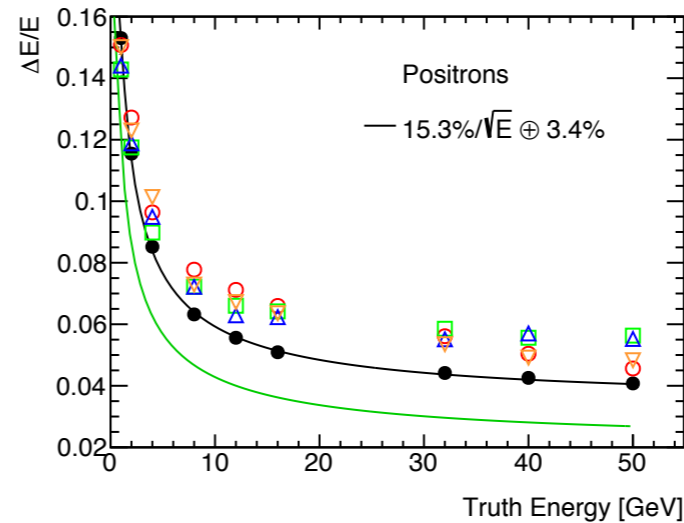


# EMCal Simulations for CDR

Joe Osborn  
4/20/18

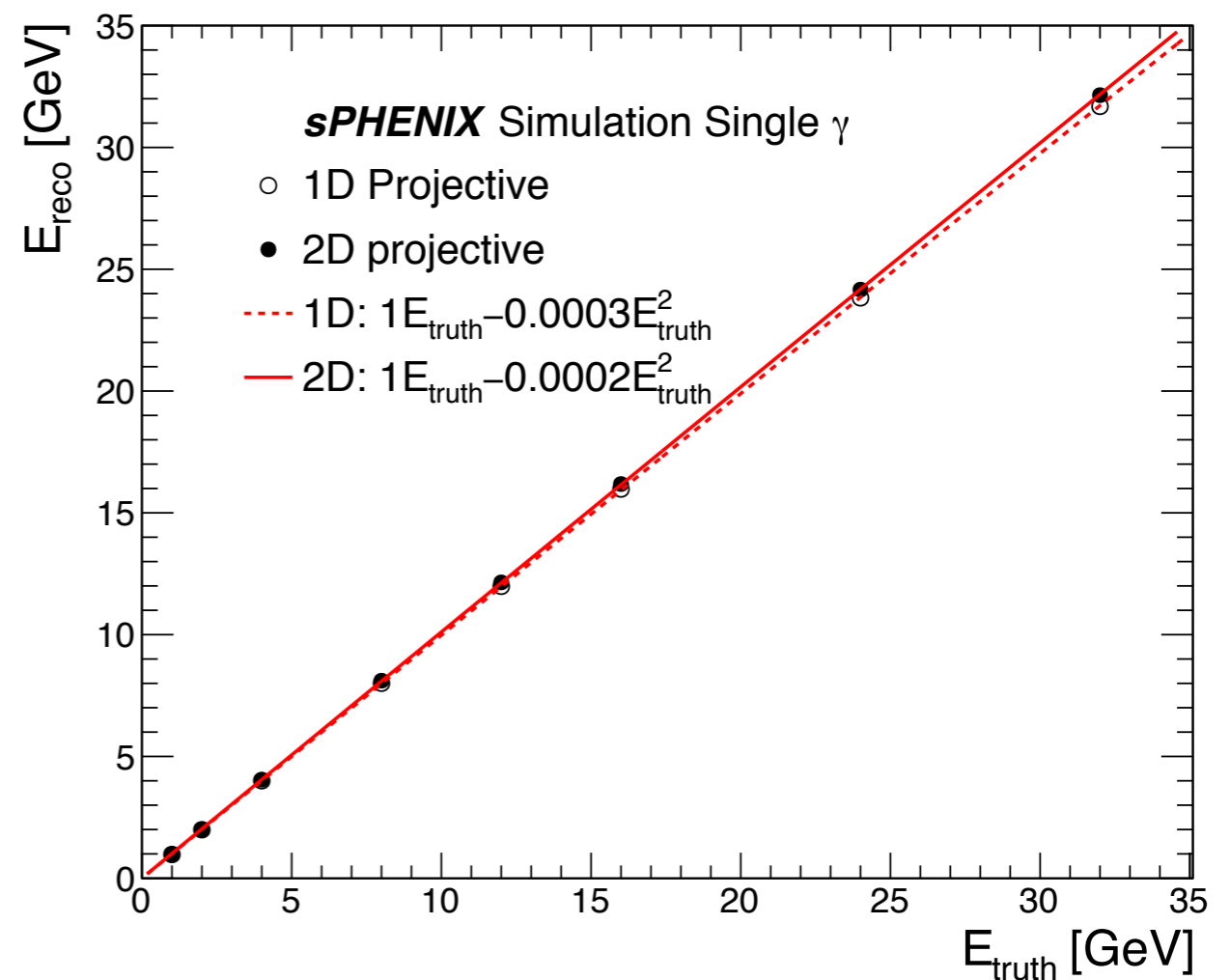
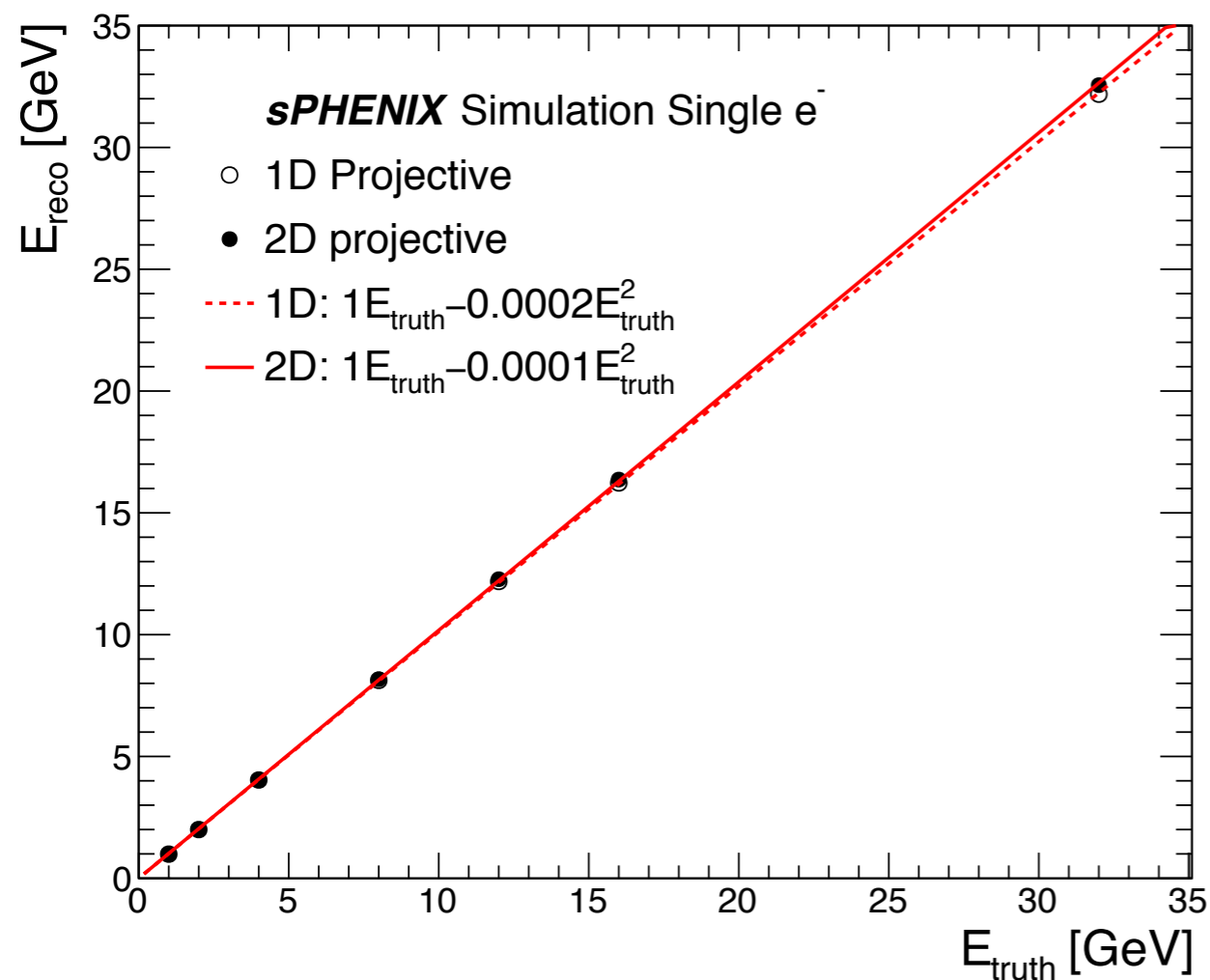
# Reminder

- As a reminder, this plot was produced in July of 2017
- Therefore it definitely has the tilted geometry and can be compared to the current simulations
- The most significant changes since July 2017 have been to the clusterizer (thanks to Sasha)
- The new clusterizer does not change the single particle resolution
- However, it significantly improves the single particle resolution and energy scale in HIJING background



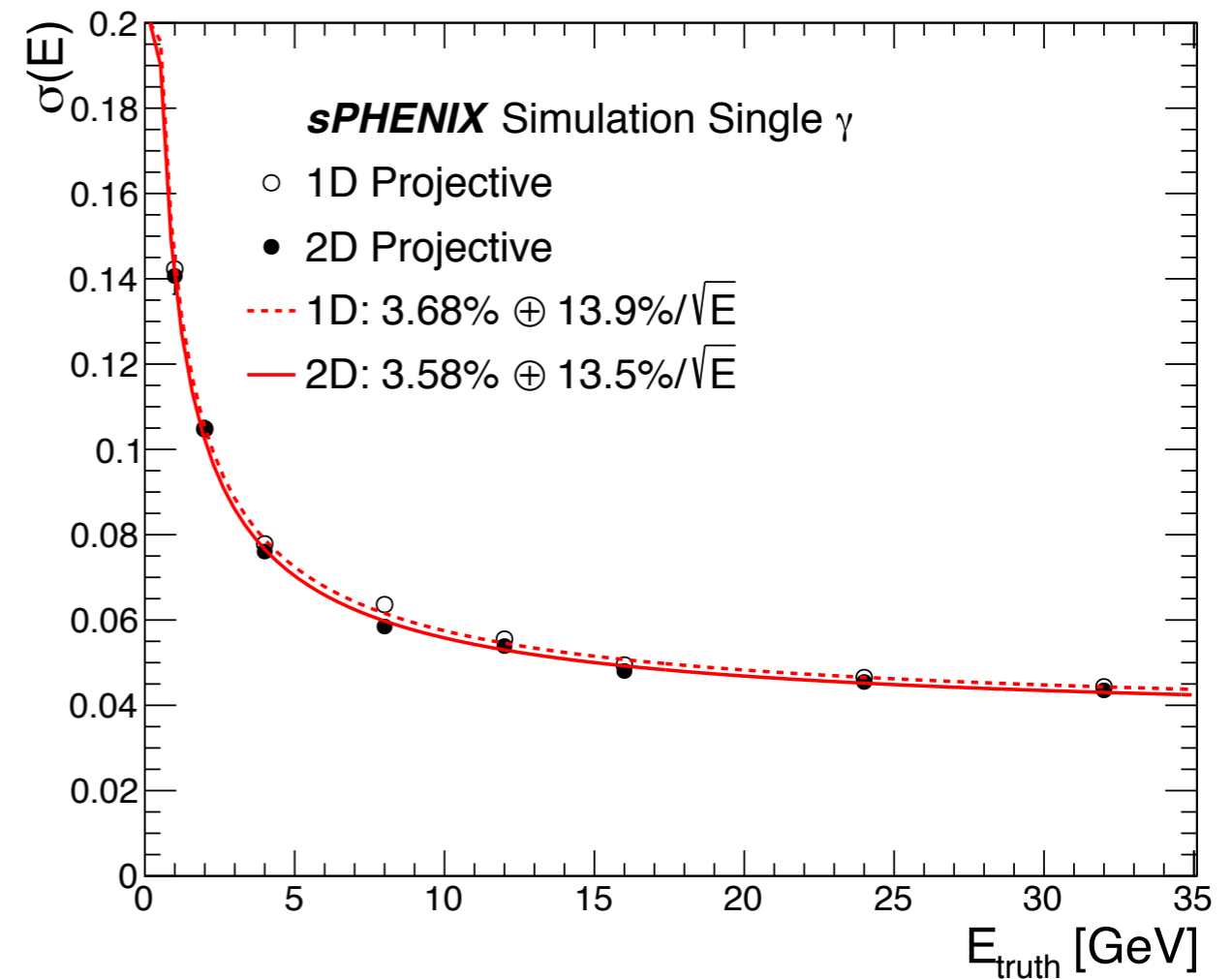
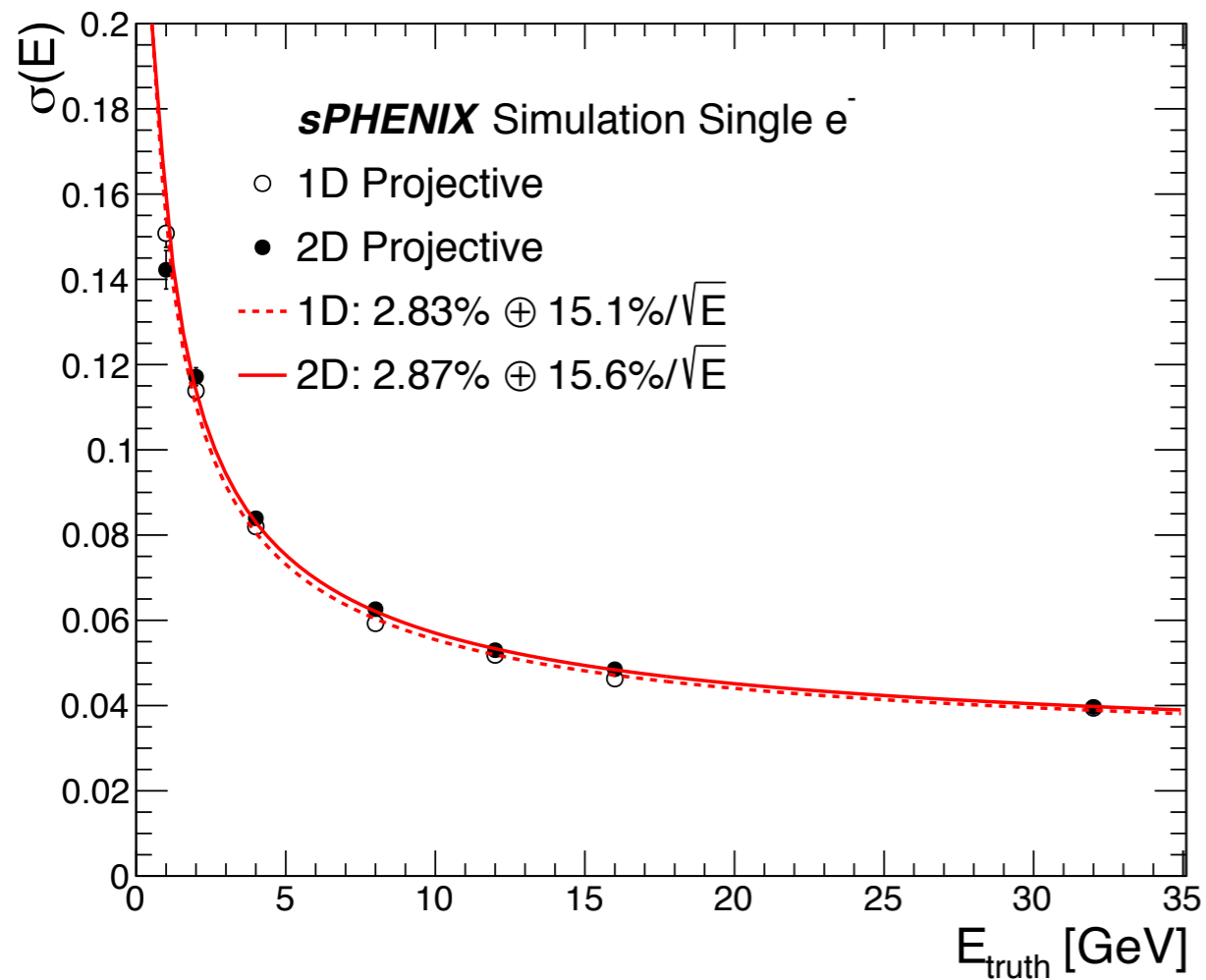
- sPHENIX Simulation**
- 1 perfect tower simulation,  $11.8\%/\sqrt{E} \oplus 2.1\%$
  - Position uncorrected,  $\eta=0$
  - Position uncorrected,  $\eta=0.3$
  - △ Position uncorrected,  $\eta=0.6$
  - ▽ Position uncorrected,  $\eta=0.9$
  - Position corrected

# Single Particle Linearity



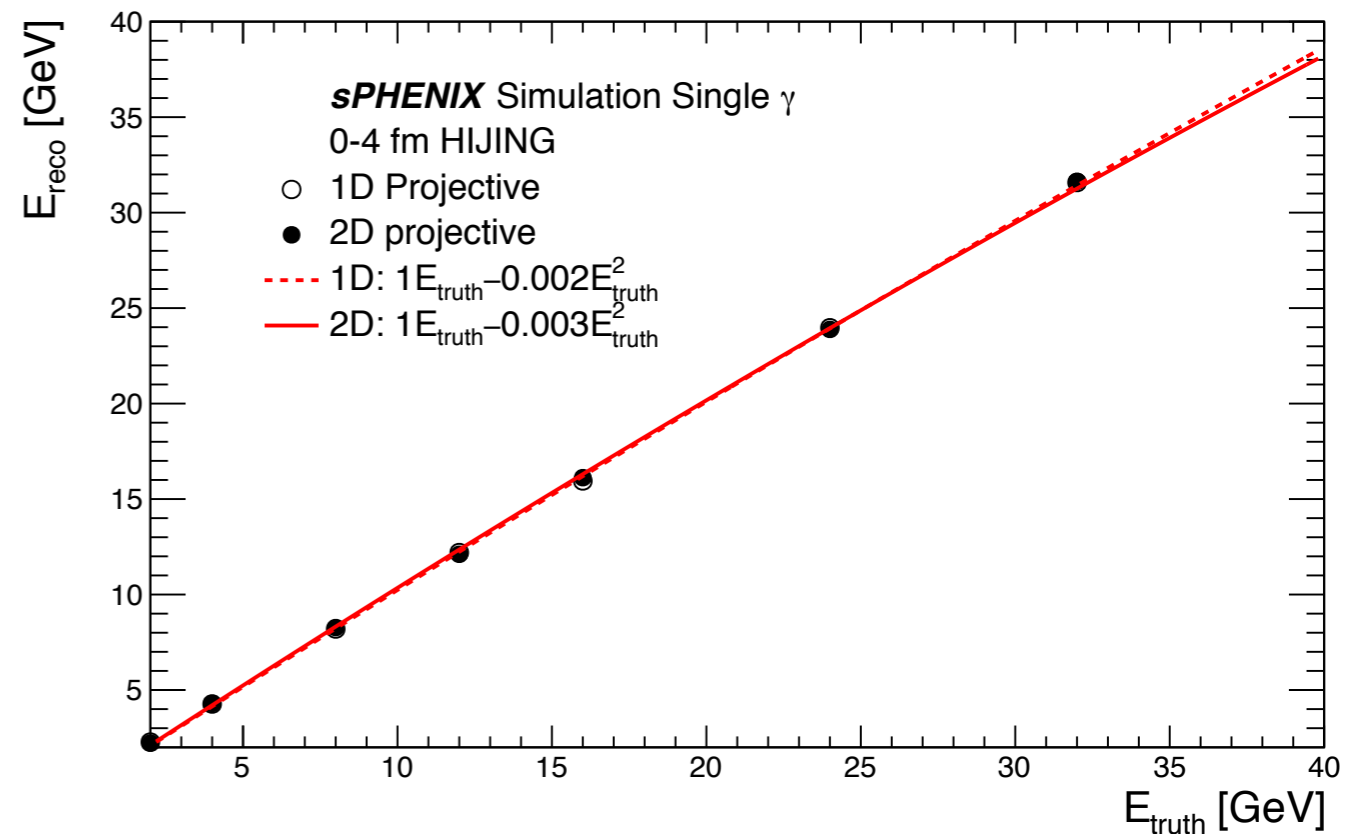
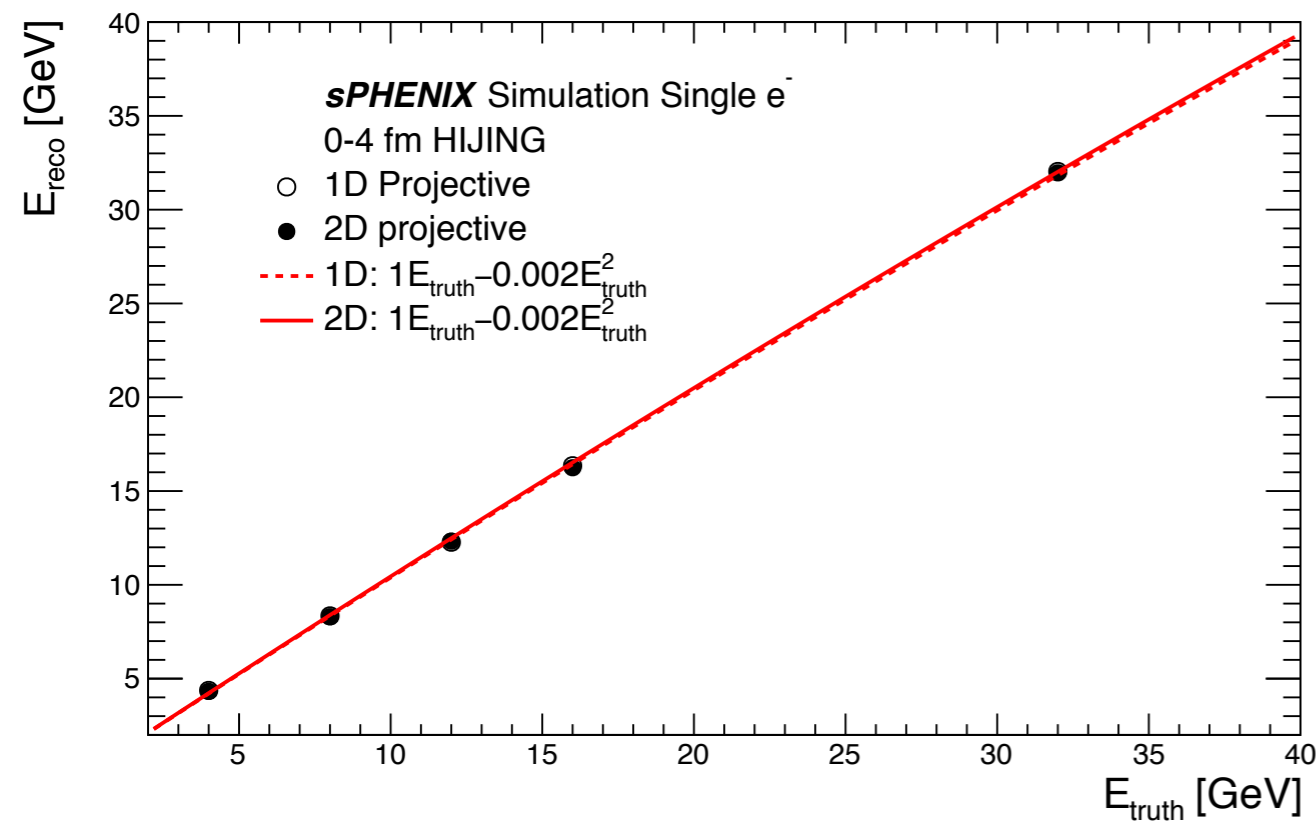
- Excellent linearity in single particle simulations
- Simulations are thrown with  $|z_{\text{vtx}}| < 10$  cm
- Note: electron does not have a 24 GeV point because for some reason the single particle G4hits files did not exist for electrons

# Single Particle Resolution



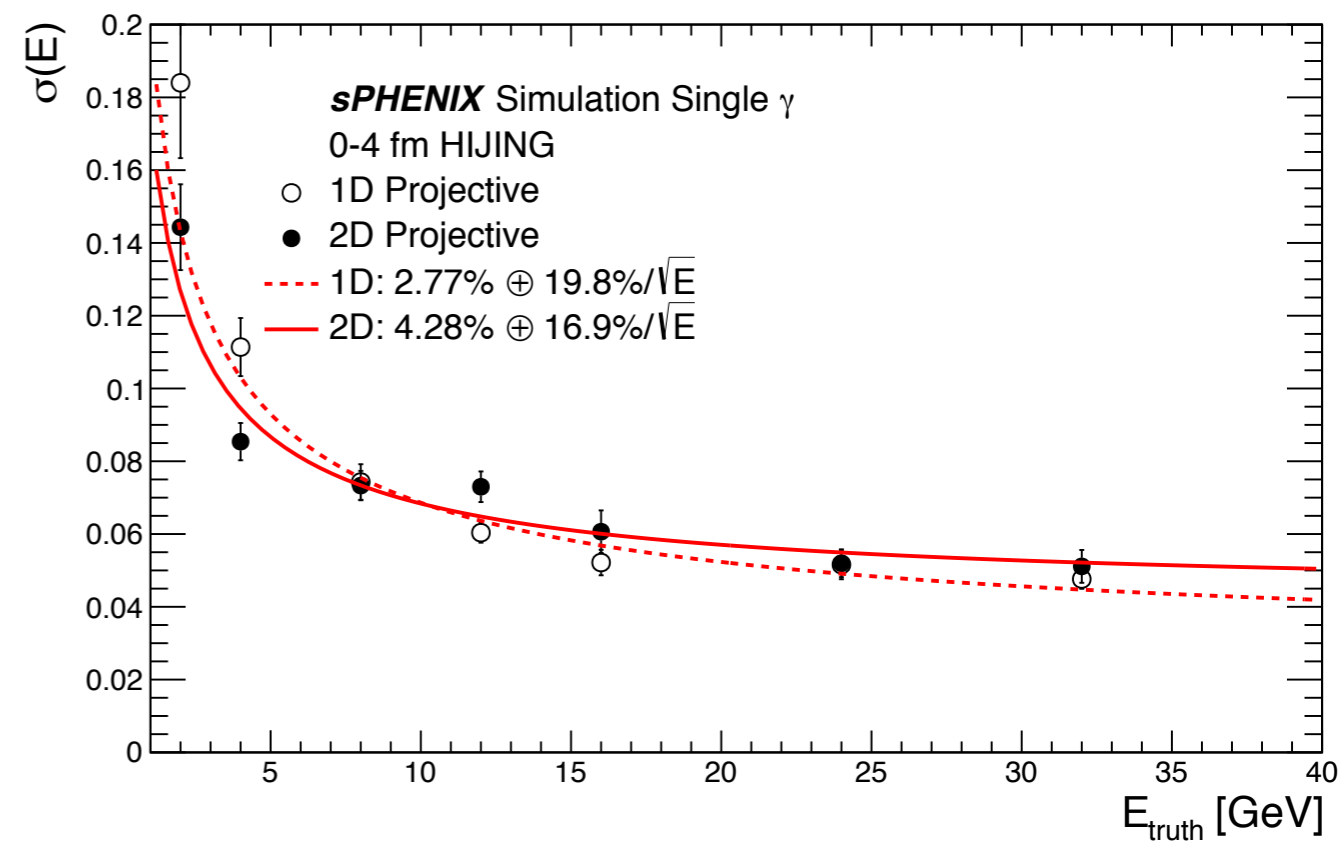
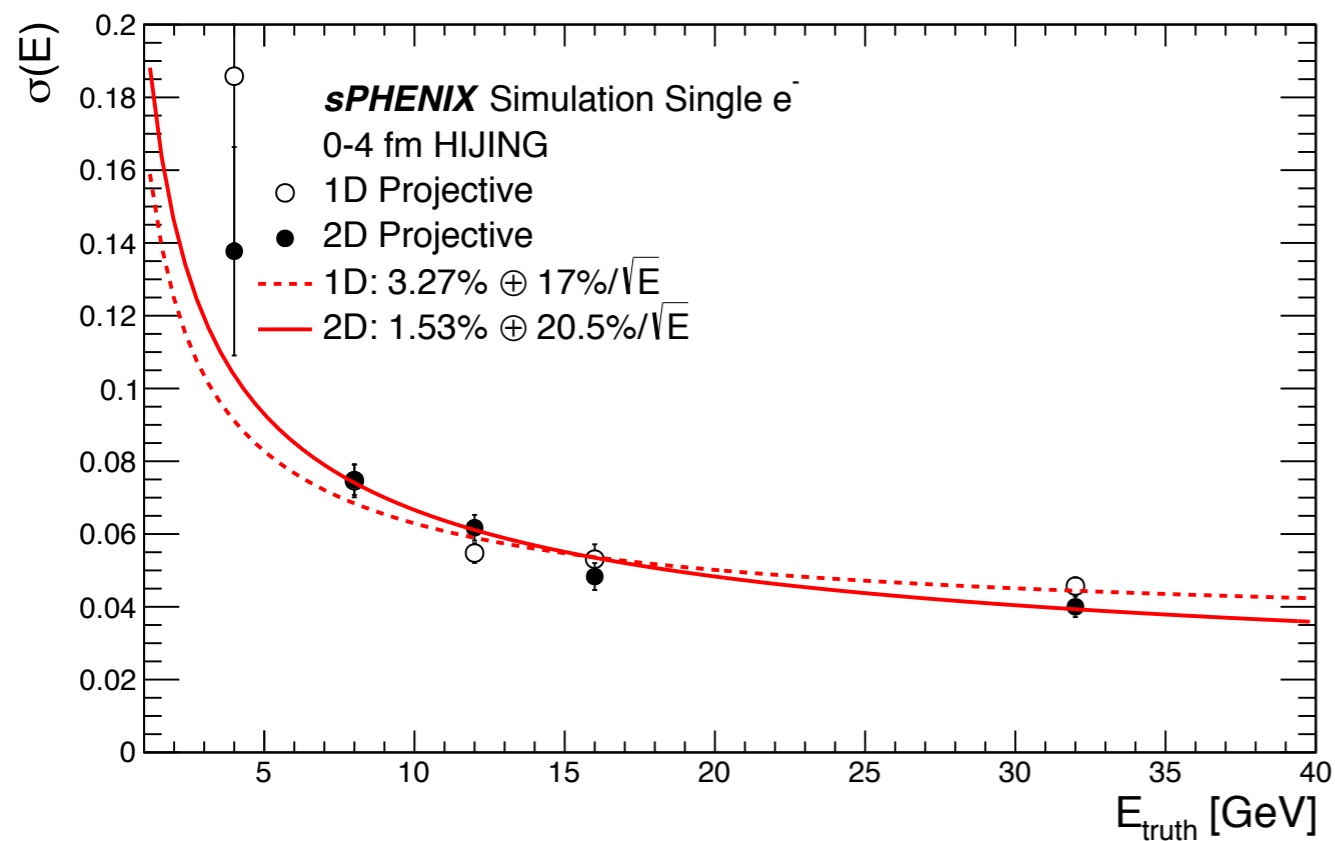
- Resolutions compare reasonably well to page 2, July 2017 simulation results

# Single Particle Embedded Linearity



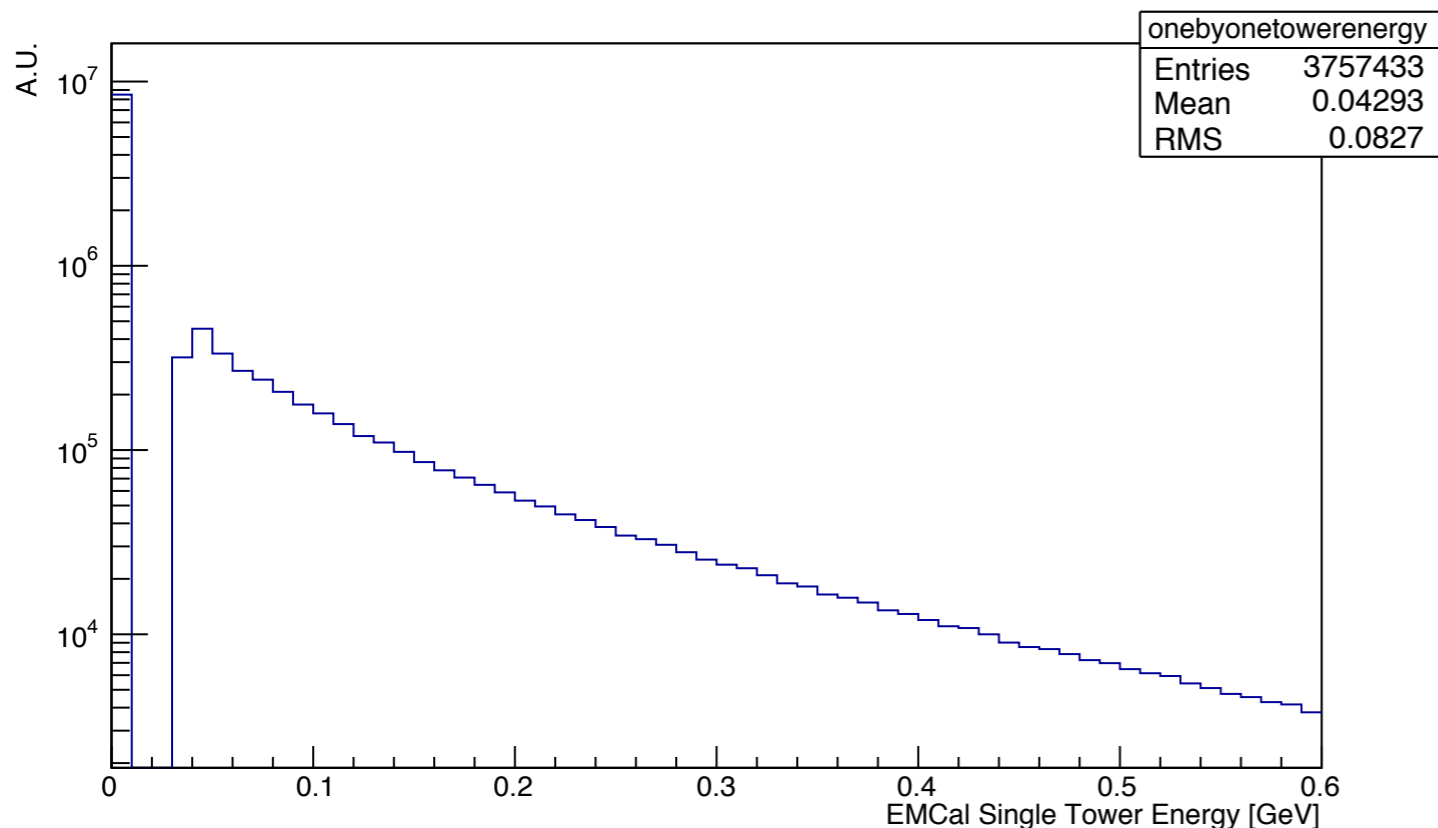
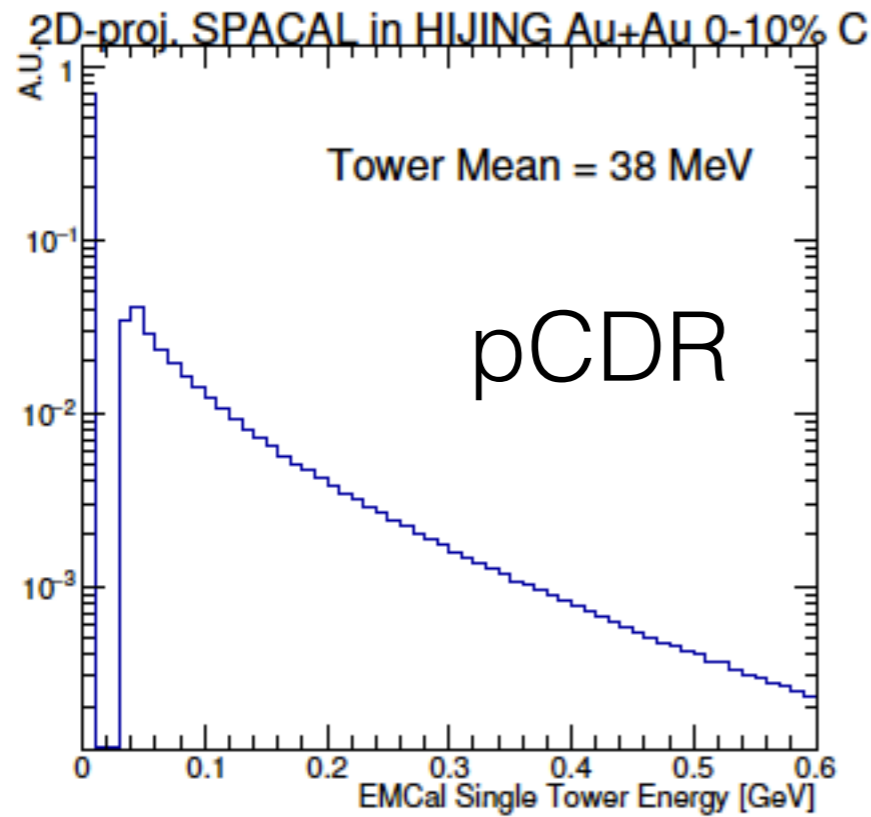
- Linearity does not degrade significantly in 0-4 fm embedded events

# Single Particle Embedded Resolution



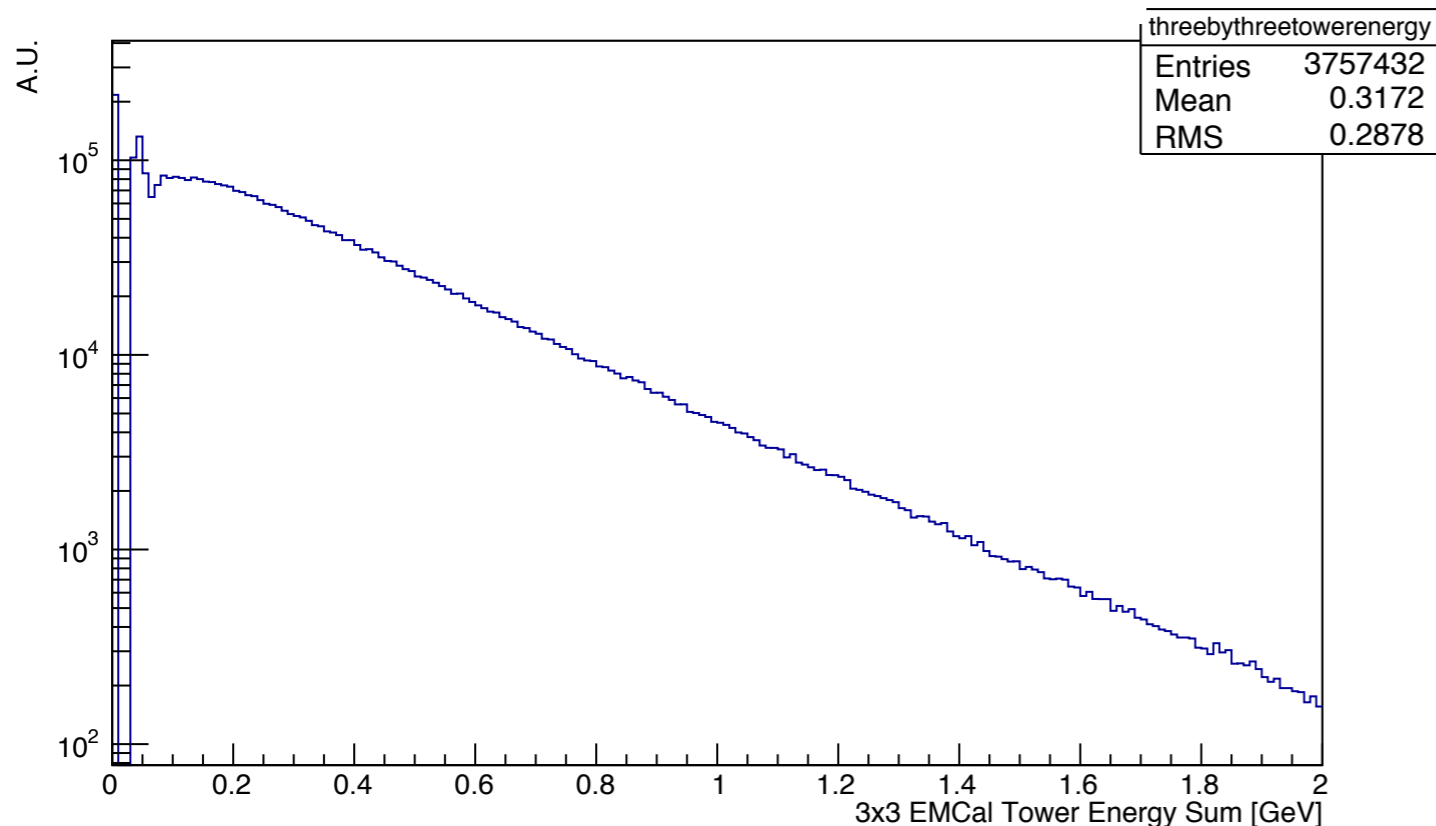
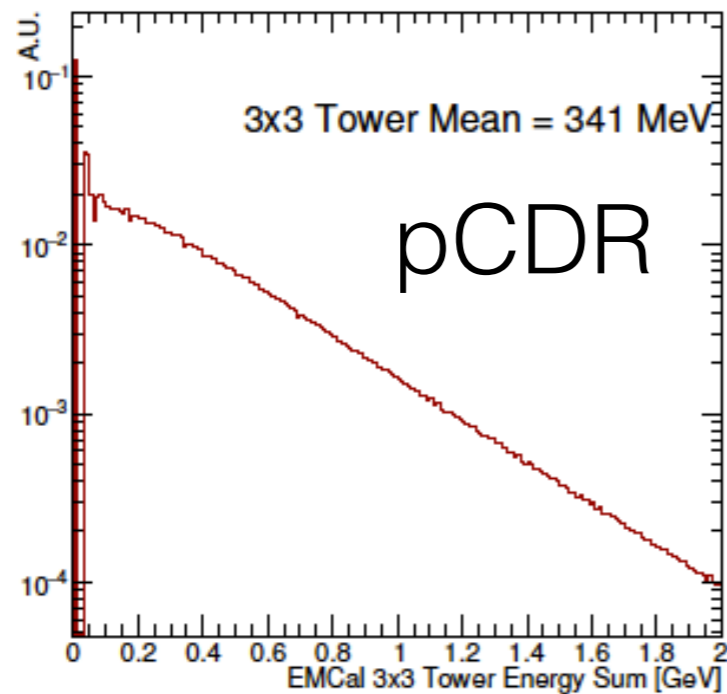
- Constant term compares reasonably to the non-embedded case
- Stochastic term hard to interpret since I run out of statistics and it is very difficult to reconstruct 1 GeV photons accurately in the 0-4 fm background

# Mean Energy per Tower



- Mean energy per tower in 0-4 fm single particle simulations across entire calorimeter (i.e. 1D and 2D projective are both included here)
- Mean energy per tower ~43 MeV
- pCDR plot has ~38 MeV for only 2D projective towers

# Mean Energy per 3x3 Tower



- Sum 3x3 tower energies in 0-4 fm HIJING background
- Mean 3x3 tower energy is  $\sim 317$  MeV
- pCDR plot has mean 3x3 tower energy  $\sim 341$  MeV