Near Detector Rock Overlays

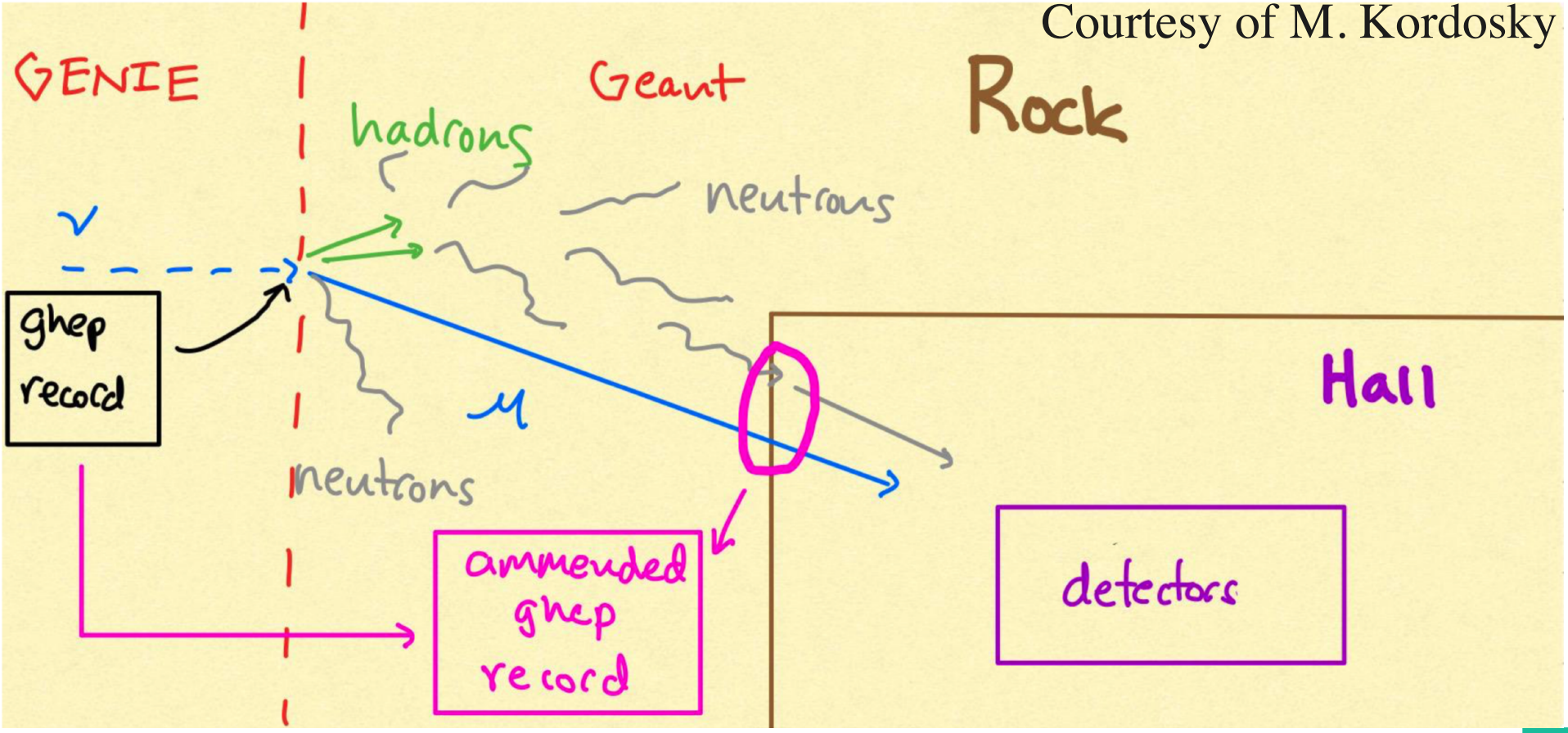
Tanaz Angelina Mohayai
Justo Martin-Albo
ND Software Integrate Meeting
Aug 30, 2019

Fermilab

Roadmap

- To produce the rock overlays for ND:
  - ★ Generate ν-events in rock using GENIE ghep files– some GENIE files from Dom Brailsford (in FHC mode) already in place, but if not generated with the optimized/engineered flux of Nov. 2017, need to be re-generated
  - Use GEANT4 to propagate the charged particles from rock ν-events, stop when they hit a detector enclosure at which point turn them back into GENIE – a code from Dom Brailsford with help/advice from Robert Hatcher, already in place

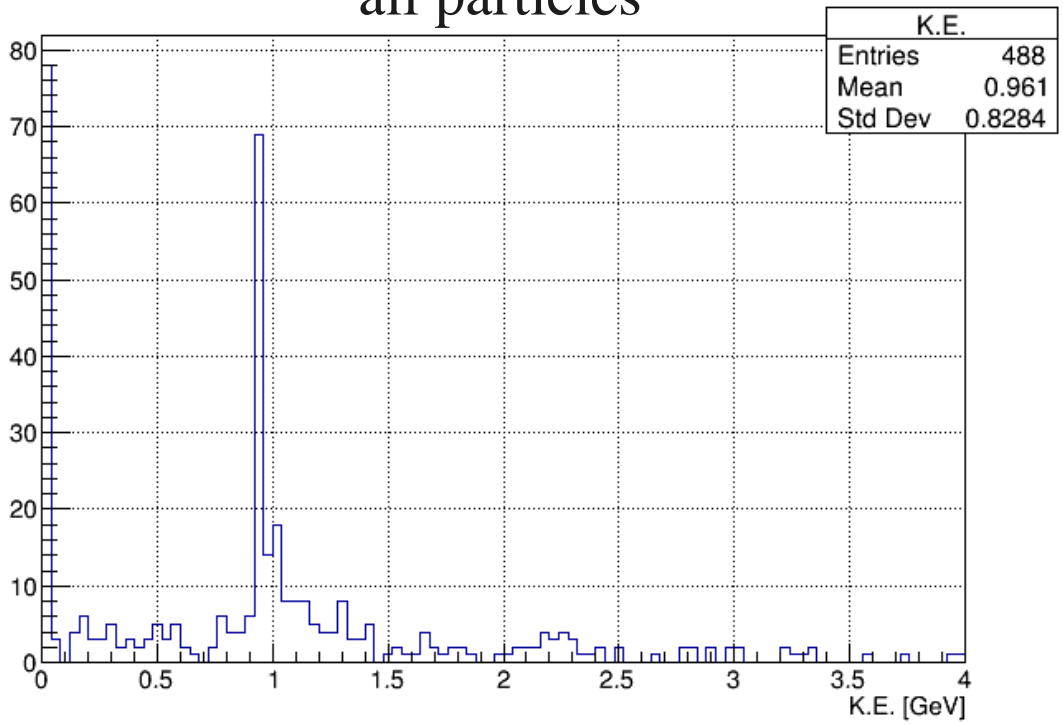
Courtesy of M. Kordosky



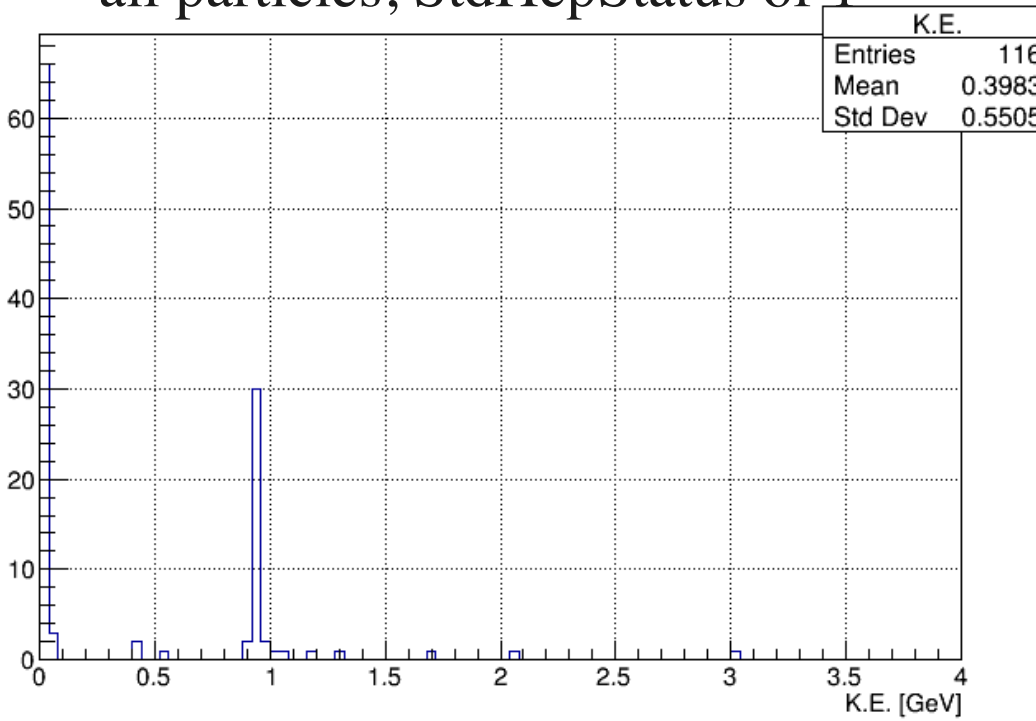
First Attempt at Rock Propagation

- Propagated a subsample of the FS particles from the existing rock GENIE events, used the old geometry file lar_mpt as a starting point
- Produced a GENIE output file
- Of interest are FS particles with StdHepStatus of 1; those are read in next stage of detector modeling (e.g. using GEANT4 or edep-sim) but there are other particles (e.g. secondary interactions)

all particles

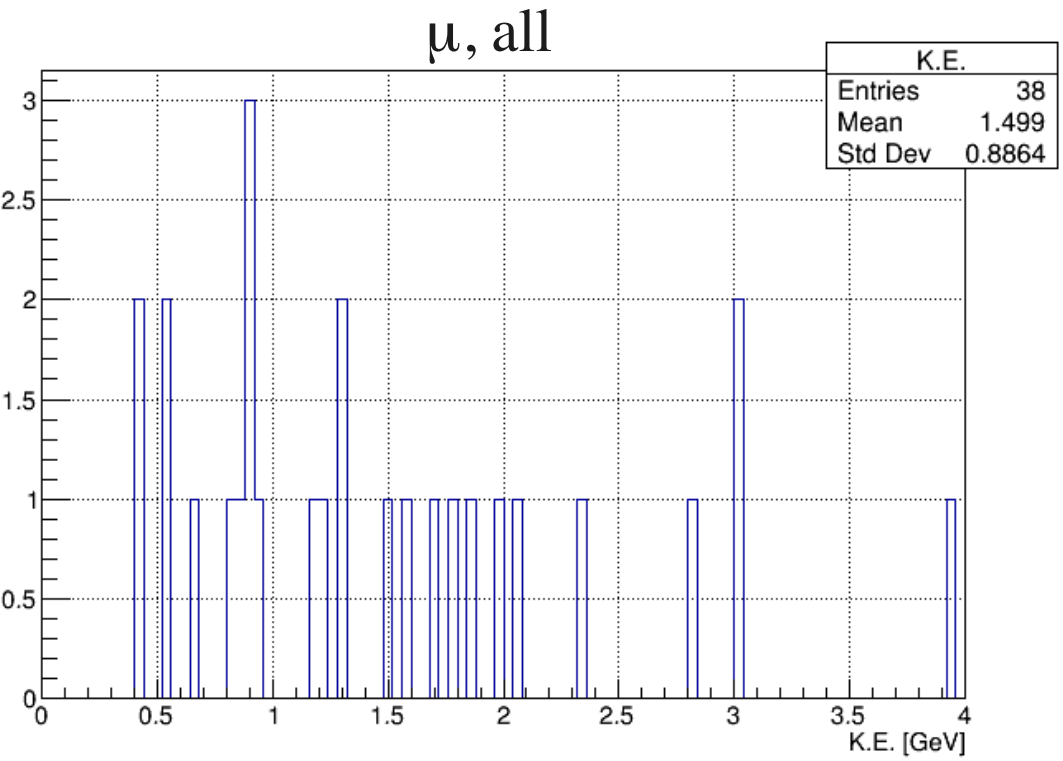


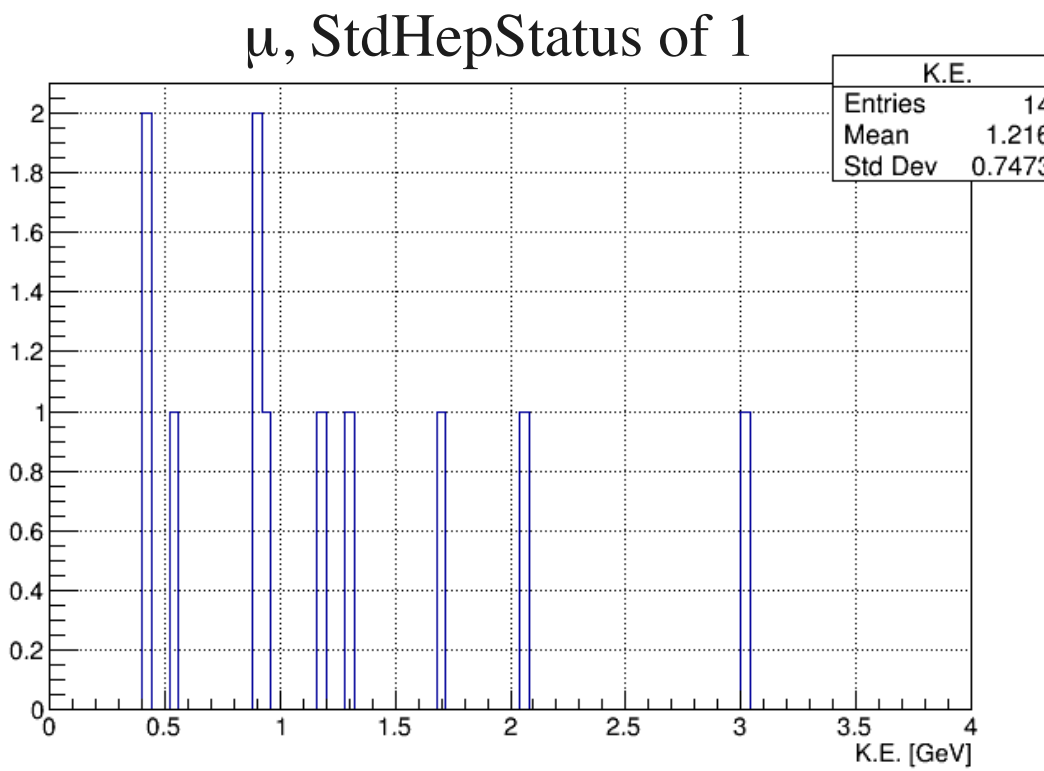
all particles, StdHepStatus of 1



First Attempt at Rock Propagation

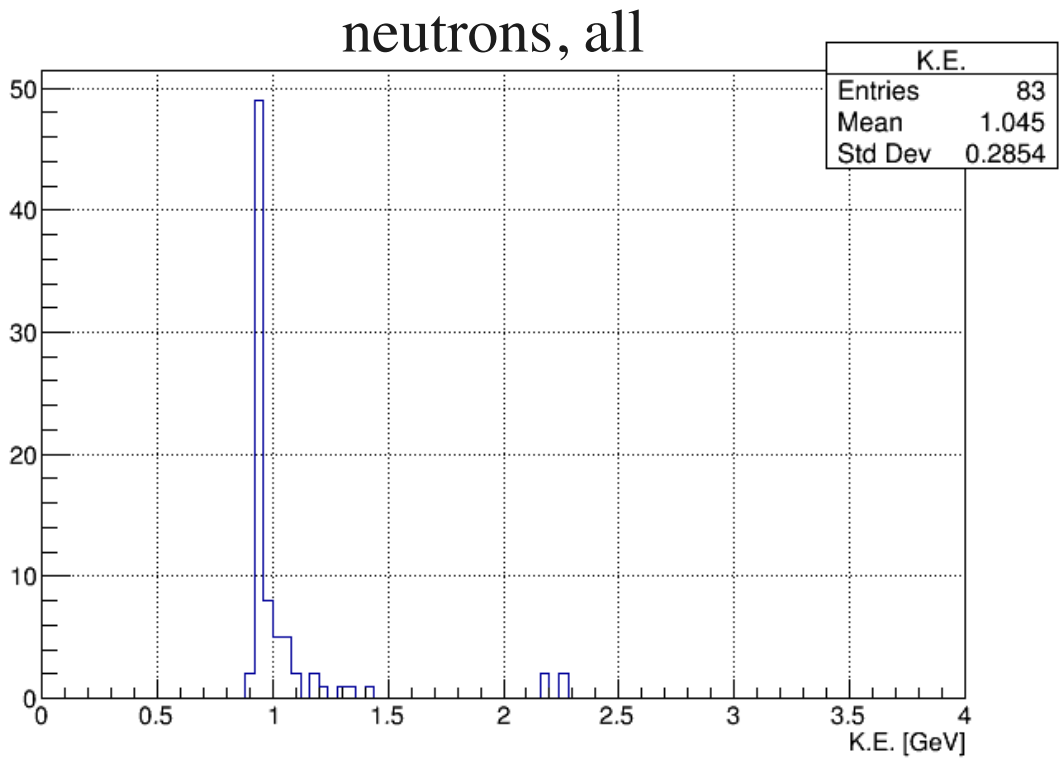
- Exploring the output GENIE file

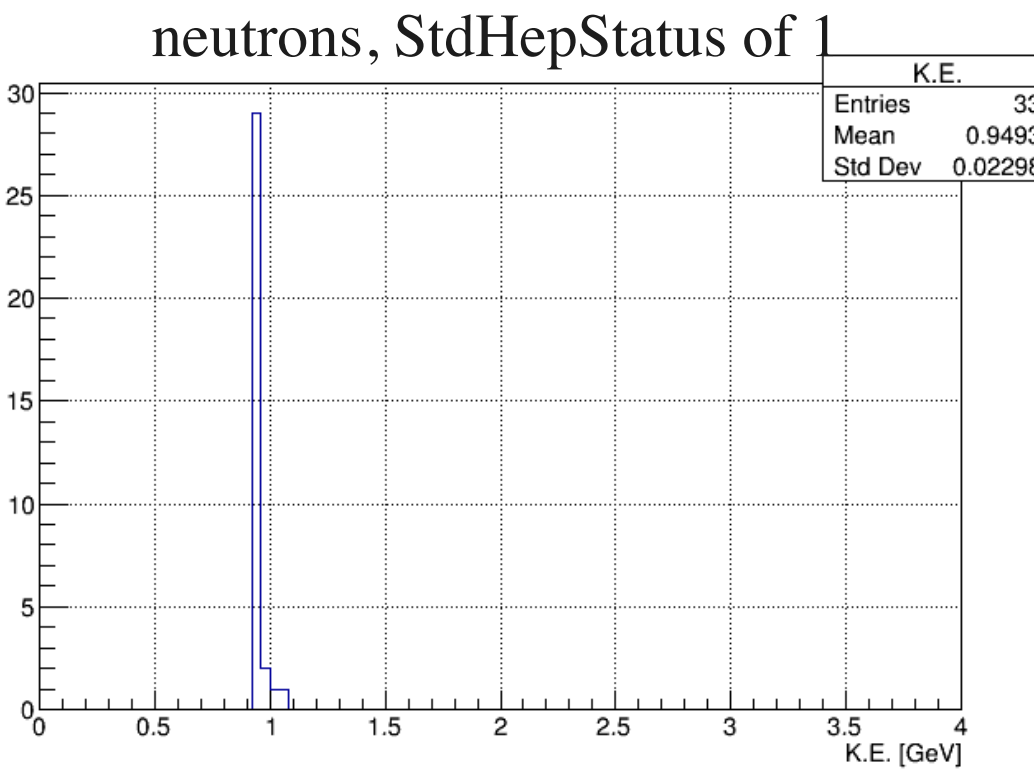




First Attempt at Rock Propagation

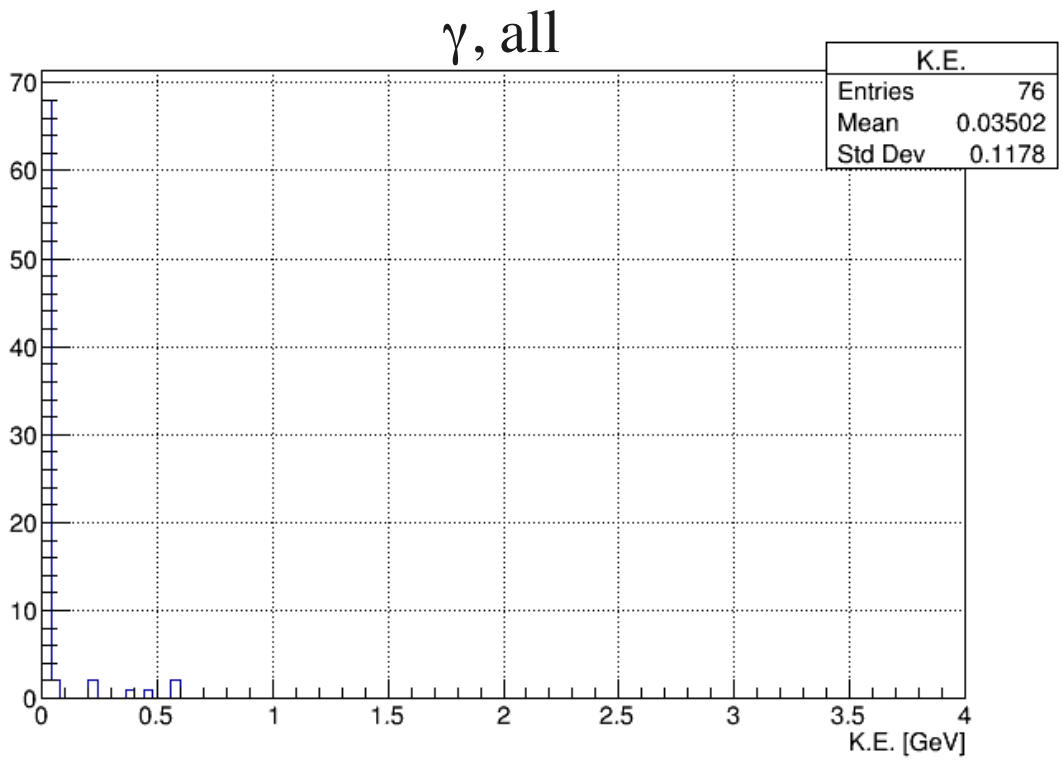
- Exploring the output GENIE file

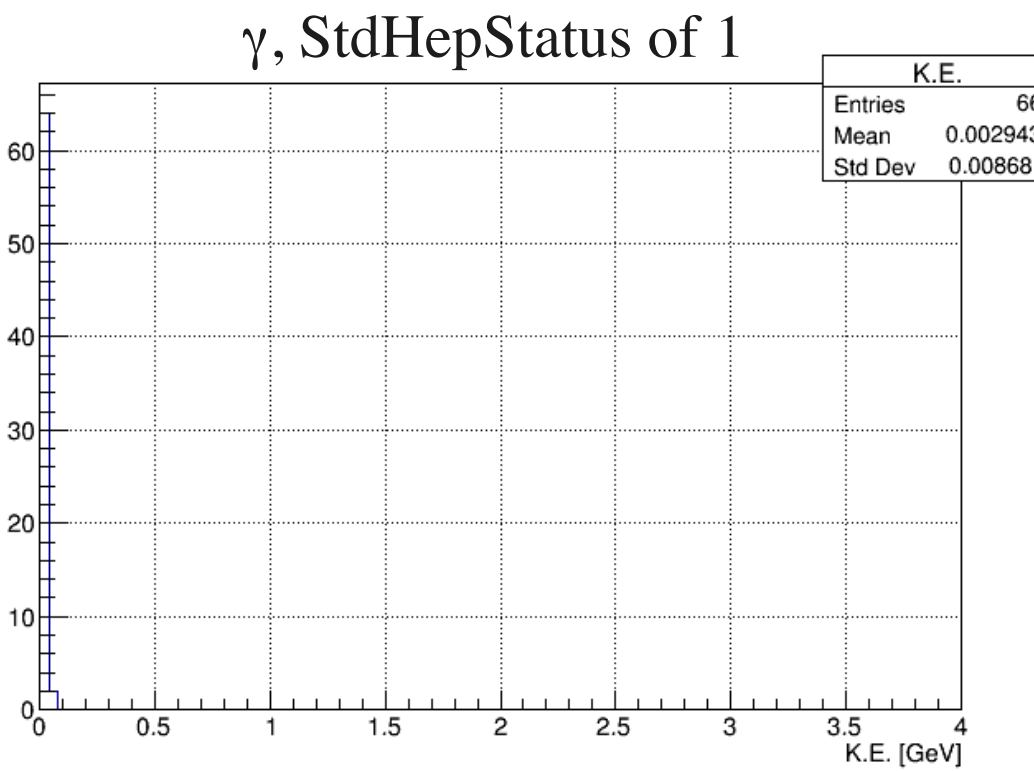




First Attempt at Rock Propagation

- Exploring the output GENIE file





Summary & Next Steps

- Rock-generation module needs two inputs:
  - GENIE ghep files – there are existing ones from Dom Brailsford but may need to be re-produced (e.g. as far as I know, the existing ones are only in FHC mode)
  - A geometry file – there is an old geometry file which I have used for the results shown here; we will use the ND Hall geometry when available
- ...to produces the ghep GENIE files
- We are getting the job submission machinery in place and will test it with the existing GENIE ghep files
- And will continue to validate the GENIE ghep files