

MicroBooNE Dirt Status Update

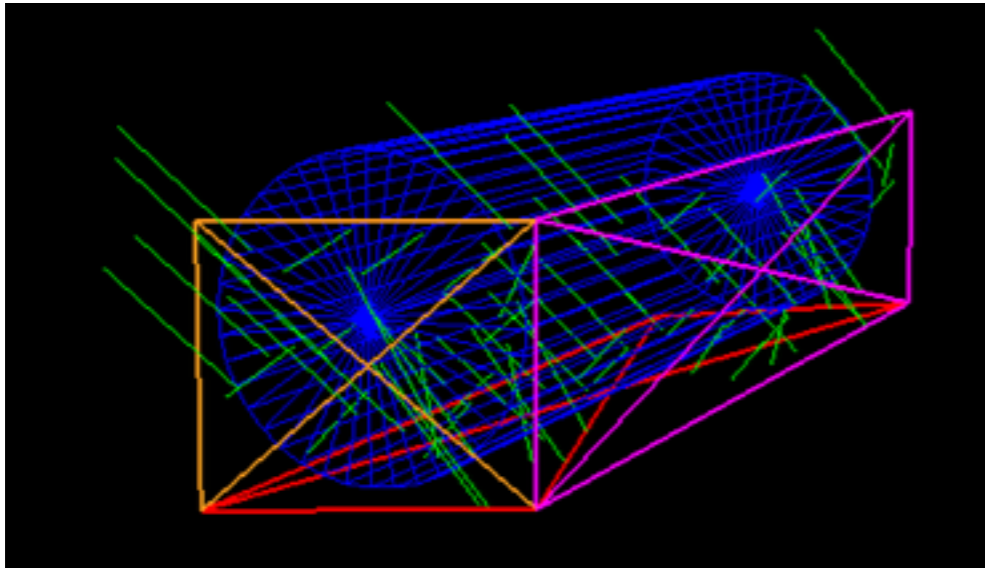


Douglas Davis

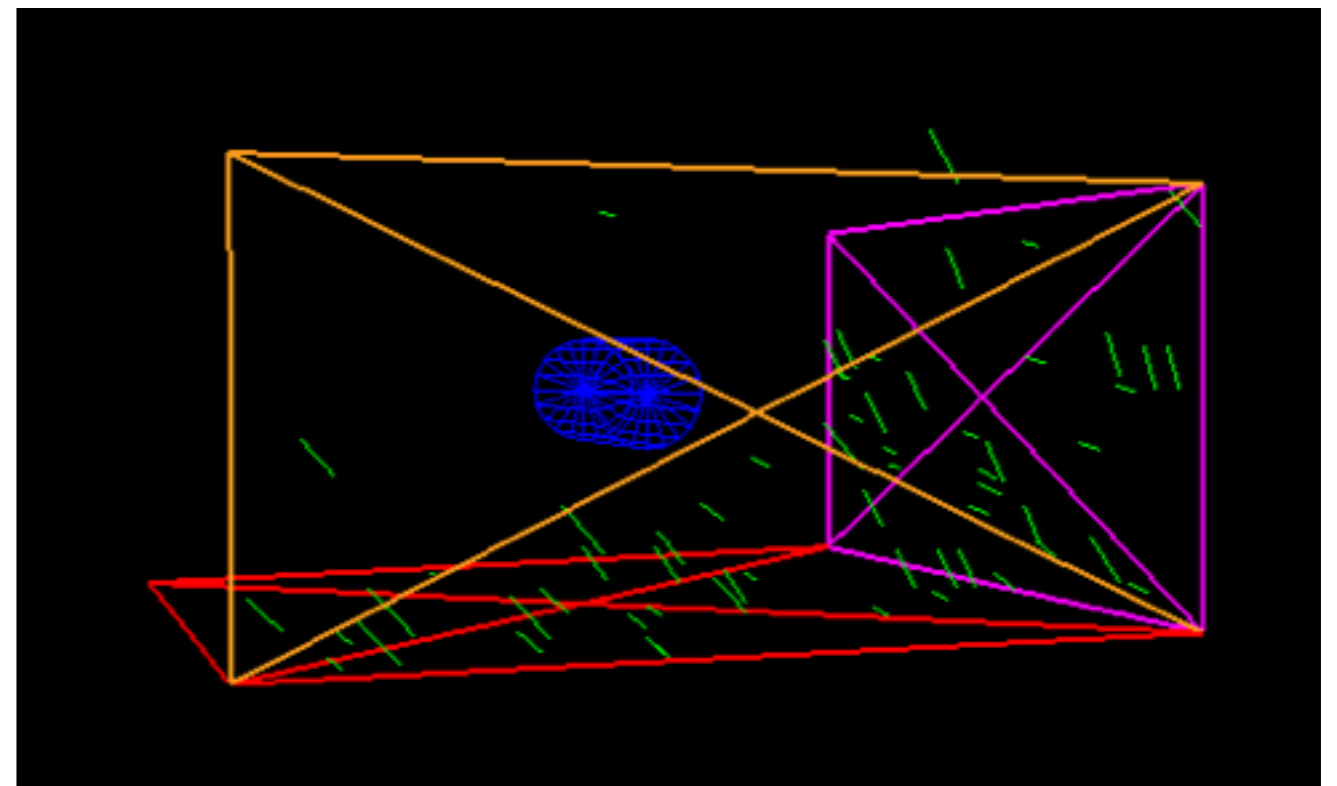
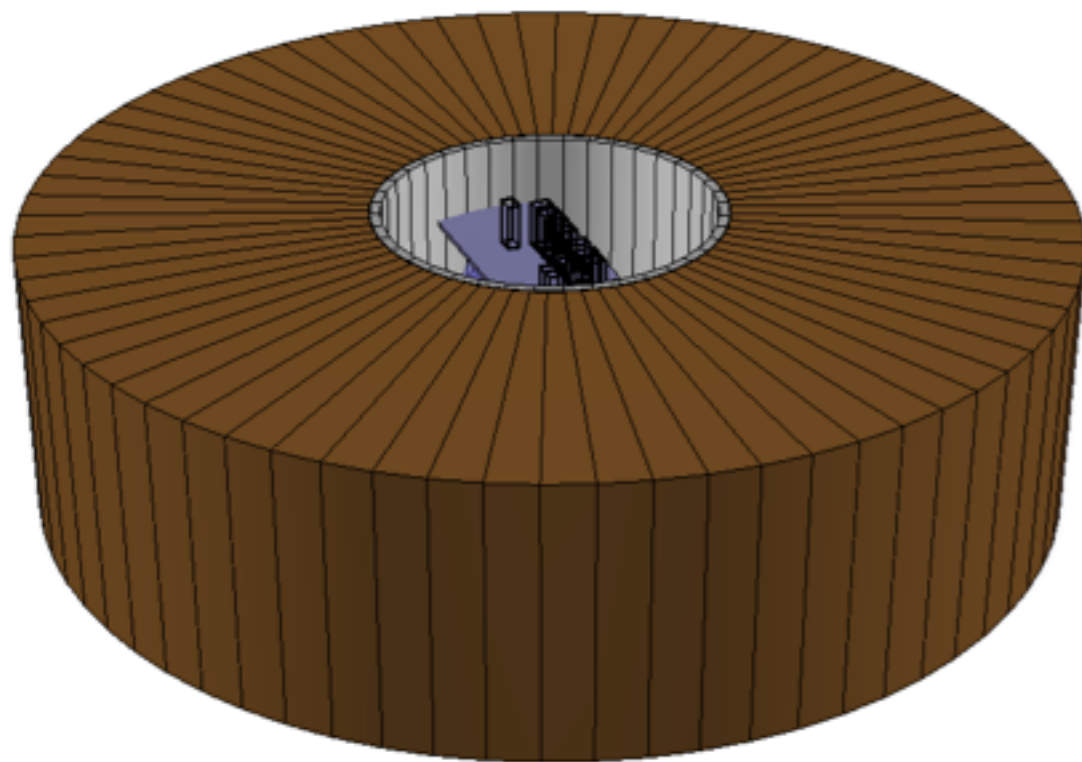
The University of Texas at Austin

11 April 2014

Dirt Flux Windows (for NuMI)



- Top Left: Flux windows for generating NuMI events in the TPC.
- Bottom Left: MicroBooNE geometry volWorld.
- Bottom Right: Flux windows for generating NuMI events in volWorld
- Zarko is working on BNB dirt Events



Generating NuMI (dirt) Events

- uboone_code/uboone/EventGenerator/GENIE/genie_microboone_numi_simple.fcl was added in feature/yale_dirt to accomodate the flux files for NuMI TPC events and dirt (world) events
- genie_microboone_numi_simple.fcl establishes a connection to the location of the GENIE simple flux files located here: /uboone/data/numi_gsimple_fluxes_02.27.2014
- Six directories exist there, and six producers exist in genie_microboone_numi_simple.fcl.
- Six additional FHICL files which point to the producers in genie_microboone_numi_simple.fcl
 - There are 2 for each window
 - One for TPC events, and the other for dirt events
- These FHICL files run through GENIE and LArG4

```
genie_microboone_numi_simple.fcl
prodgenie_simple_numi_bott_dirt.fcl
prodgenie_simple_numi_bott.fcl
prodgenie_simple_numi_long_dirt.fcl
prodgenie_simple_numi_long.fcl
prodgenie_simple_numi_norm_dirt.fcl
prodgenie_simple_numi_norm.fcl
```

```
microboone_genie_numi:                @local::standard_genie
microboone_genie_numi.BeamName:        "numi"
microboone_genie_numi.GlobalTimeOffset: 1.6e6
microboone_genie_numi.POTPerSpill:     3e13
microboone_genie_numi.EventsPerSpill:  0
```

#####

```
microboone_genie_simple_numi_bott:    @local::microboone_genie_numi
microboone_genie_simple_numi_bott.FluxType: "simple_flux"
microboone_genie_simple_numi_bott.FluxFiles: ["numi_gsimple_fluxes_02.27.2014/bottom_window/*.root"]
```

#####

Preliminary Look into Events

- I have generated 100k events for each window using dirt windows
- Brief module is used to look at GENIE and LArG4 information
- So far, looking for neutrino vertex volume to not contain the string “TPC” and with a particle in the event handle to have a step in a voluming containing the string TPC.

```
std::string vertex_vol;  
std::string tpc_string = "TPC";  
fVertexInTPC = false;  
vertex_vol = geom->VolumeName(mctruth->GetNeutrino().Nu().Position(0).Vect());  
if ( vertex_vol.find(tpc_string) != std::string::npos )  
    fVertexInTPC = true;
```

← for each event

for each particle in the event →

```
in_tpc = false;  
for ( int ii = 0; ii < n_traj_points; ++ii ) {  
    vol_string = geom->VolumeName(particle.Position(ii).Vect());  
    if ( vol_string.find(tpc_string) != std::string::npos )  
        in_tpc = true;  
}  
  
fInTPC.push_back(in_tpc);
```

- Zarko and I are both working out normalization right now

Preliminary Look into Events

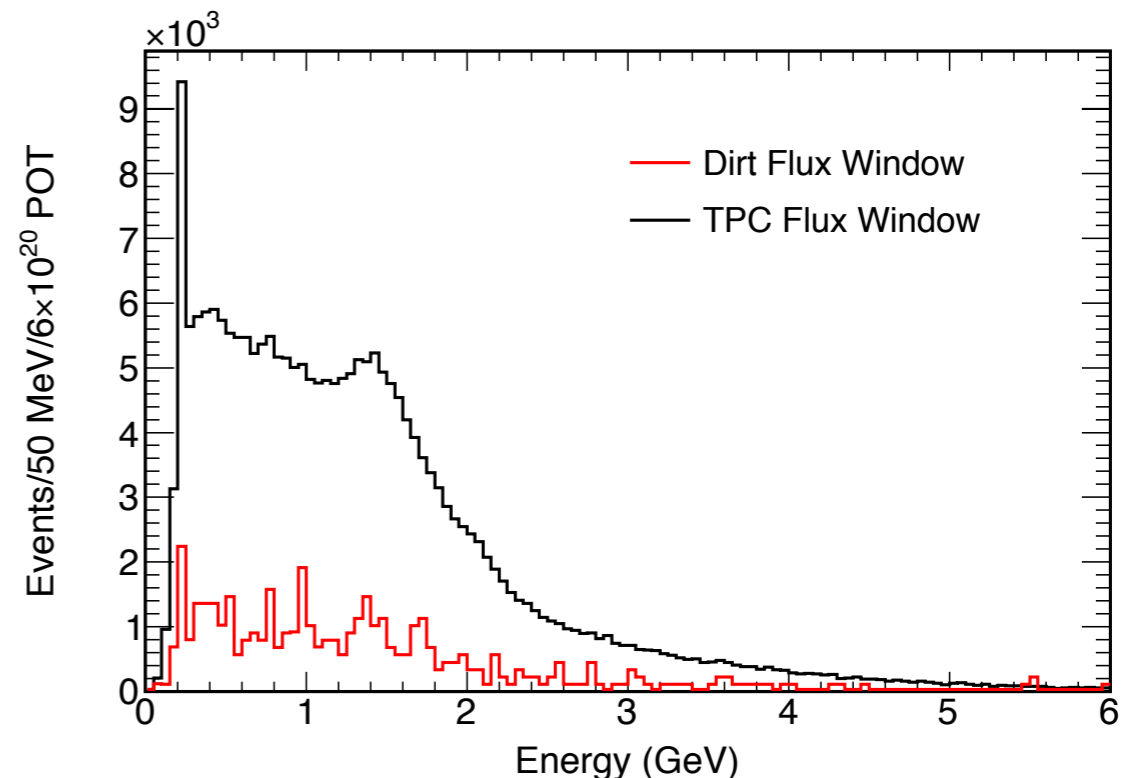
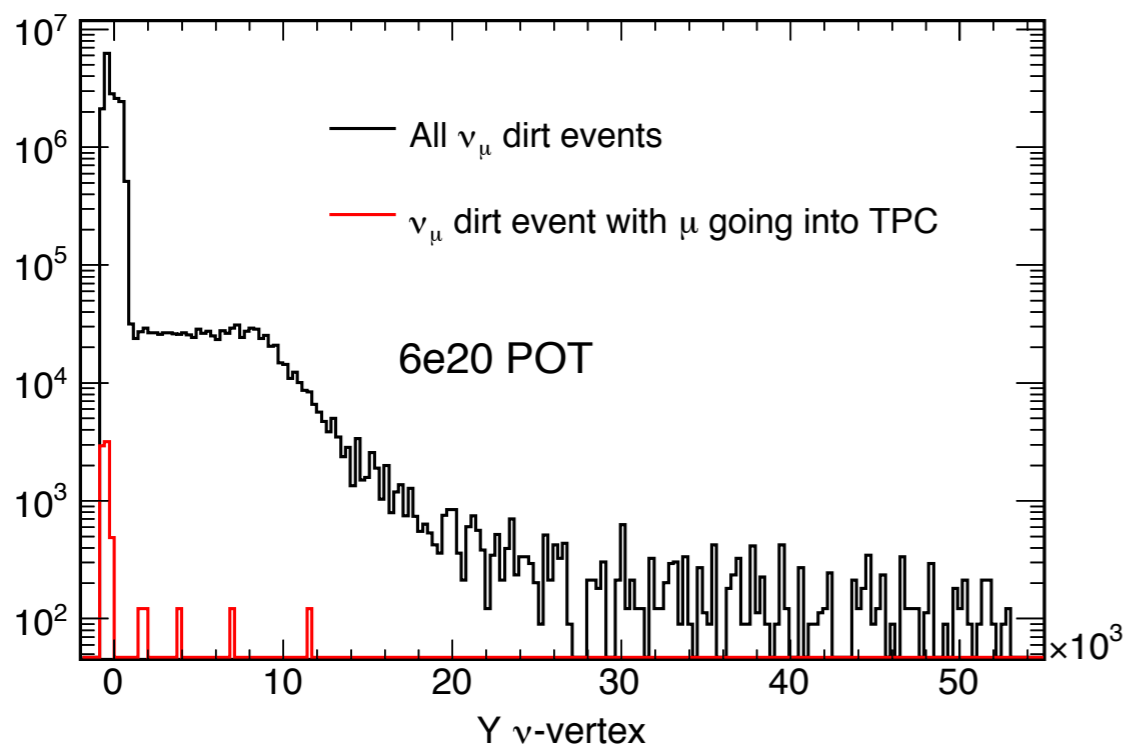
Fraction of events with at least some particle stepping in Detector:

- Bottom window: $\sim 5.1\%$ (5102/100k)
- Length window: $\sim 1.9\%$ (1853/100k)
- Normal window: $\sim 8.7\%$ (8687/100k)

Fraction of numu events with a “rock muon” stepping in the TPC:

- Bottom window: $\sim 0.13\%$ (97/77k)
- Length window: 0% (0/77k)
- Normal window: $\sim 1.4\%$ (1077/76.5k)

- We’ve found that there is not very much geometry below MicroBooNE — with the detector sitting above the NuMI beam-line, this is possibly a problem.
- In the interest of validation, we compare the number of events with vertex in TPC scaled to the same POT as runs with only TPC events. Not ready to give event rate estimates because of this.

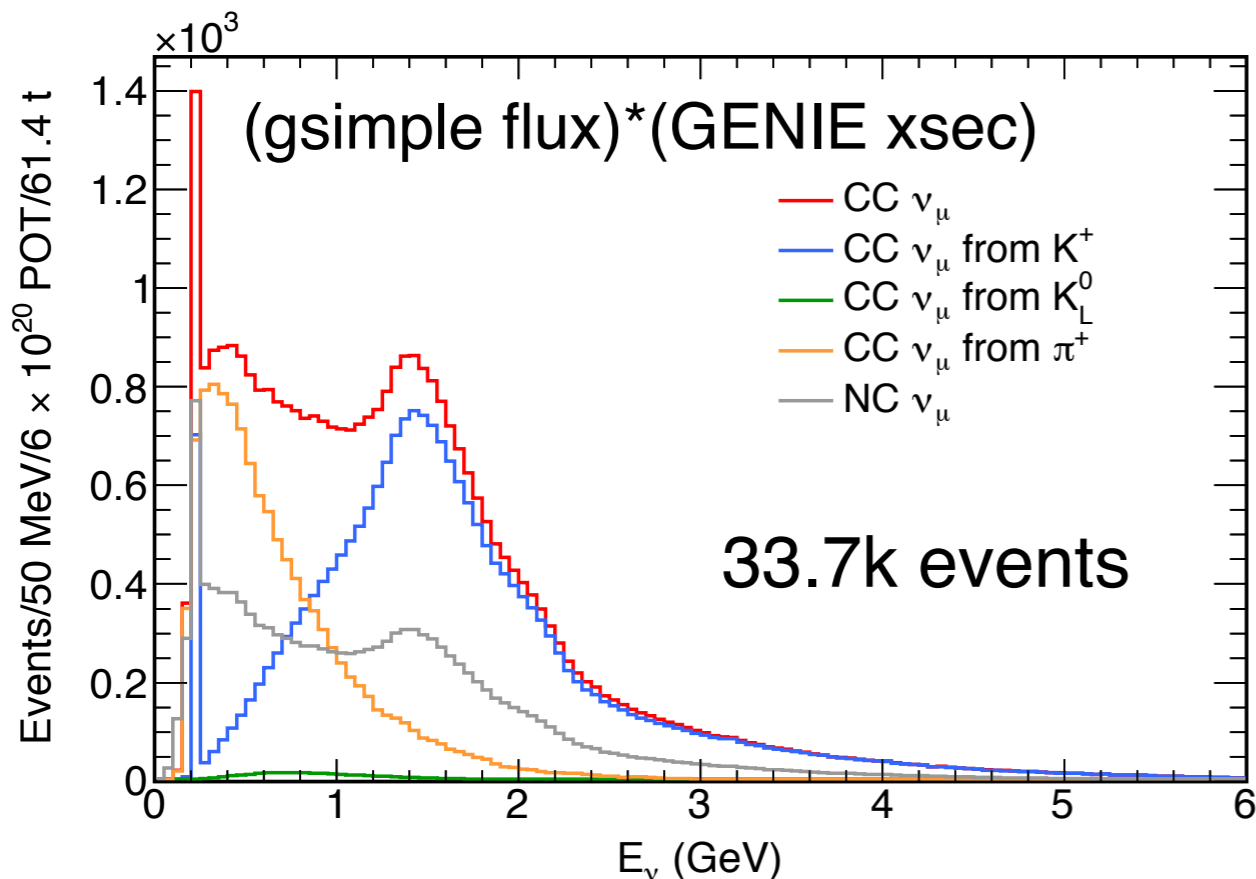
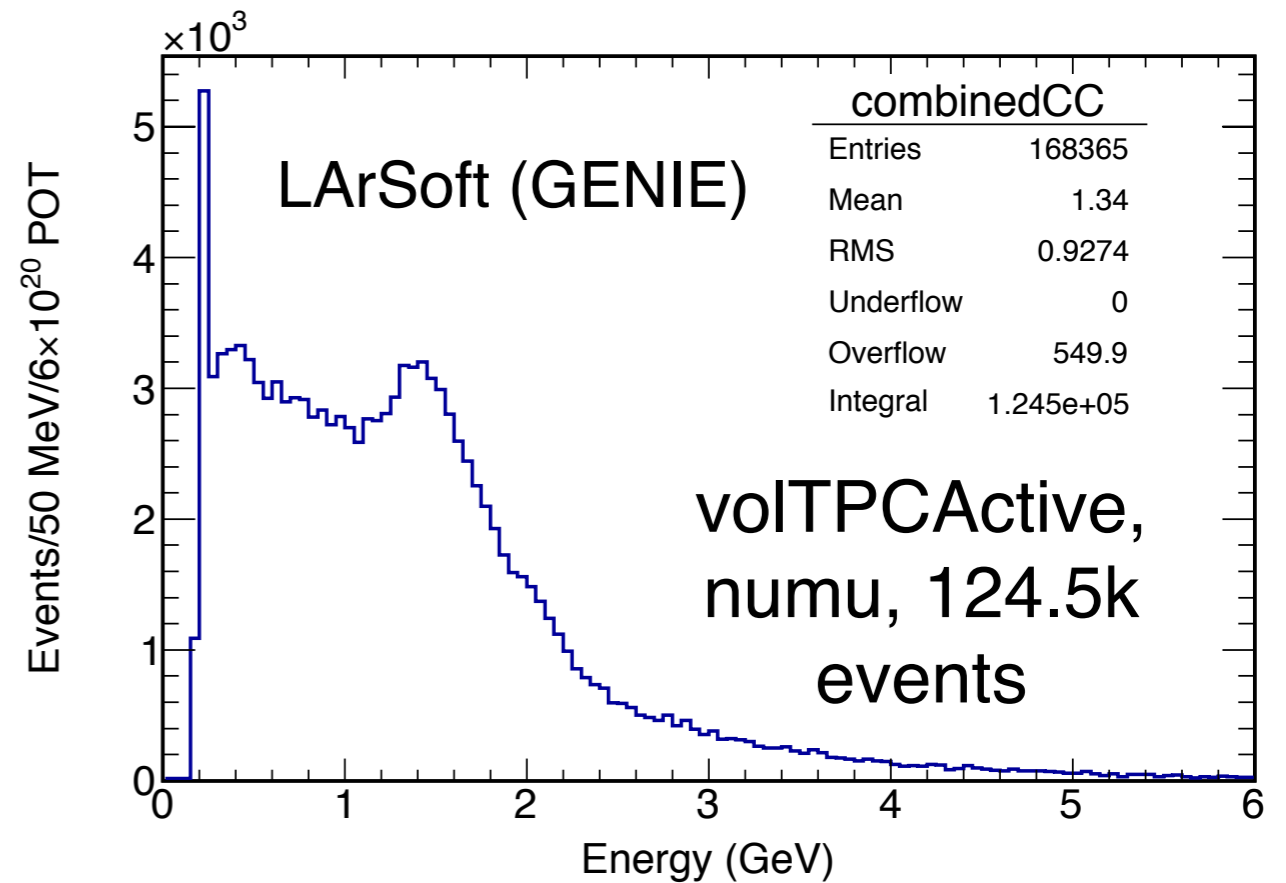
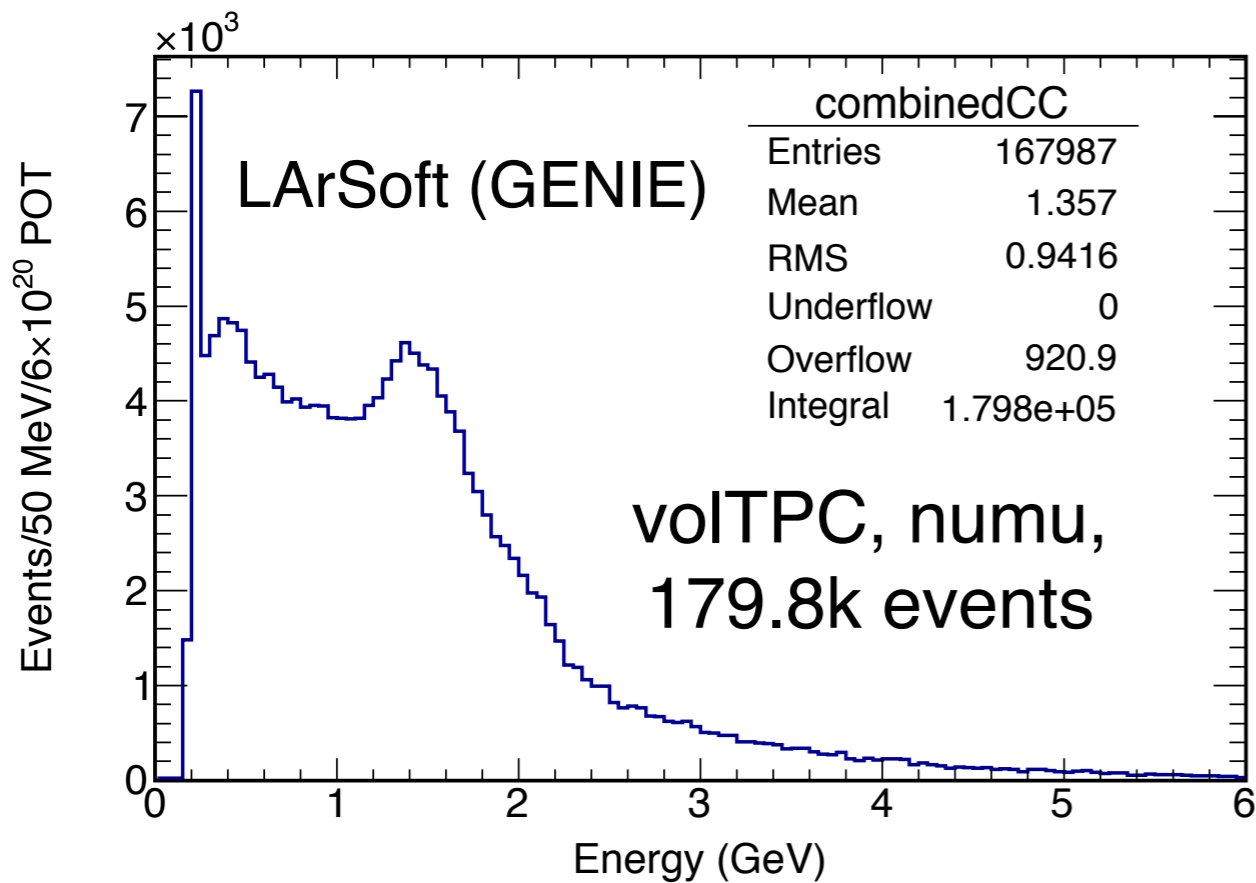


Summary

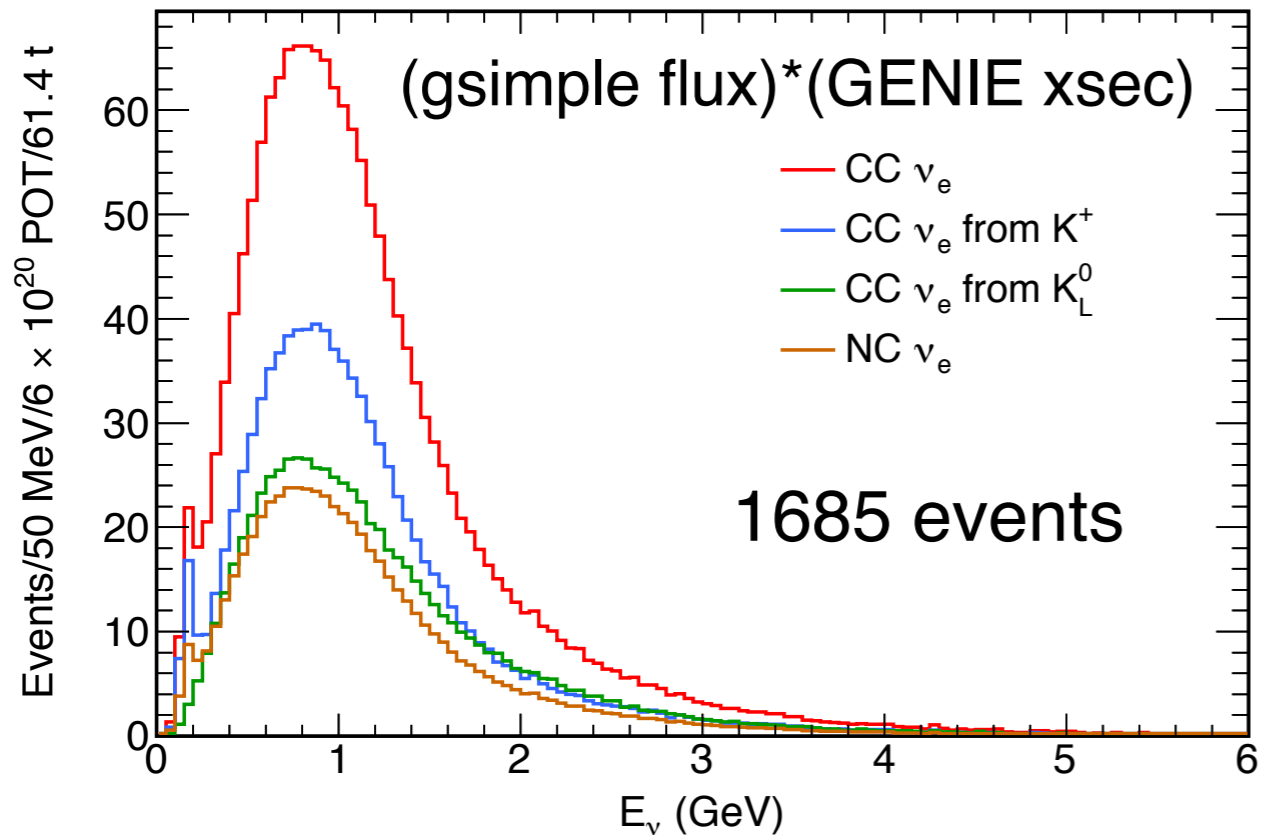
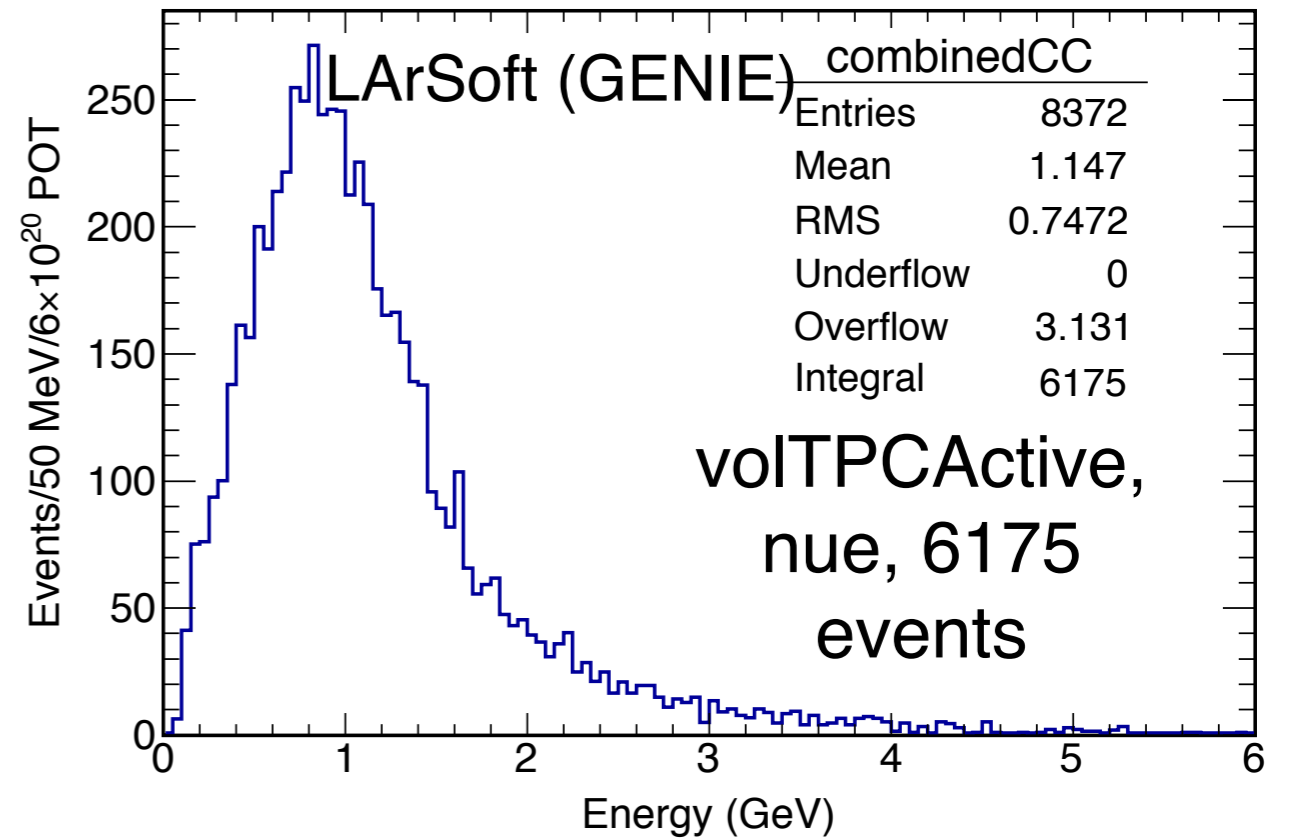
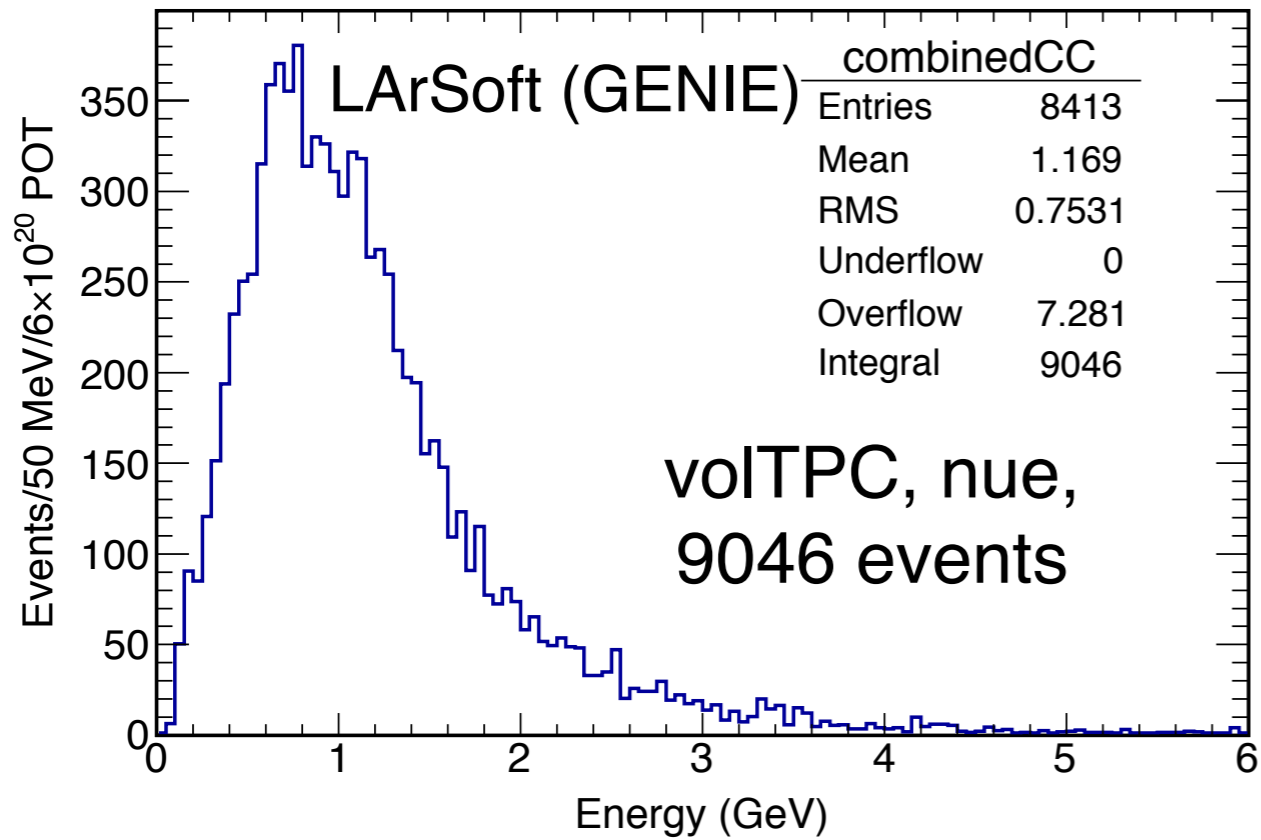
- Method to run dirt events is established
- We've generated a sample have some MC and started to look through it
- Normalization for BNB and NuMI being worked on

Backup

(Normalization Issues with Detector Events)



For each of these histograms, I start with 3 histograms (1 for each window) and normalize to POT. I then add the window histograms together to get a final histogram. for the flux*xsec histogram I normalize to 61.4 tons (no volume normalization for the LArSoft runs)



same thing as previous slide

