

# DUNE FDSP MUSUN MCC 9.1 Request

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# The Physics Case

- As part of the DUNE FD Calibration Task Force duties, we would like to see how well we can align the FDSP and calibrate  $dE/dx$  and the electron lifetime using cosmic rays.
- The MUSUN generator provides a realistic model of muons at the 4850' level.
- Standard FDSP 1-module G4, detector simulation, and reco for this sample.
- 20,000 events requested – not all may even hit the detector
- We are not fussy about getting every last event, and even biases induced by crashes on some events and not others have no physics impact.
- We will probably ask for more later
- Deadline: DUNE Physics Week: Nov. 14

# RITM0612142

We would like 20000 MUSUN cosmic-ray events simulated and reconstructed as part of MCC9.

I tested 10 events interactively to get an idea of time and space requirements.

Software version(\*\*) used in the test: `dunetpc v06_49_00 -q e14:prof`

fcl files:

```
prodMUSUN_dune10kt.fcl
standard_g4_dune10kt.fcl
standard_detsim_dune10kt.fcl
standard_reco_dune10kt.fcl
standard_ana_dune10kt.fcl
```

(\*\*) Bug found and fixed(\*\*\*) in trajcluster after request made. Caused memory exhaustion. New SW version request:

```
dunetpc v06_54_00 -q e14:prof
```

(\*\*\*)Thanks Tingjun!!!!

# RITM0612142: 10-event test

- The generator stage (prodMUSUN\_due10kt.fcl) takes very small amounts of CPU and memory and the output file is very small. 20K events should take about 6M of total output file space.
- The G4 step takes maybe 10 sec/event, has a VM peak of 1.2 GB, and makes a 500 kB/event rootfile.
- The Detsim step takes 70 sec/event, has a VM Peak of 1.1 GB, and makes a 1.1 MB/event rootfile
- The Reco step takes 60 sec/event, has a VM peak of 5.3 GB, and makes 1.8 MB/event rootfile.
- The Ana step takes 0.2 sec/event, has a VM peak of 1.2 GB, and makes a 100 kB/event tree file, and also merges the input rootfiles for another copy.

10 events did not explore all failure modes. The trajcluster virtual memory exhaustion problem did not show up. Memory usage is pretty large though.

# XML file

- A sample XML file was e-mailed to Anna and Ivan.
- Some changes needed:
  - Would like not to use persistent dCache for storage of intermediate stage output. Scratch dCache should be sufficient. Stages have to run in time though.
  - Would like to retain the anaTrees. They are called "anatree.root" after the mergeana step. They will need to be renamed, stored on tape and entered in SAM.