Project Journal

24 November 2024

Meeting summary:

Enrique gave me a file with results of a simulation of neutrinos interacting with the **Faser**ν *detector.*

using a jet algorithm called anti-kT, we find a large number of jets from the neutrino interactions. We expect to see a small number of jets, so we might want to edit the radius parameter of the jet algorithm.

We also expect all of the hadrons to be included in the jets, so if we miss some of them, it's a sign that the radius might be too small.

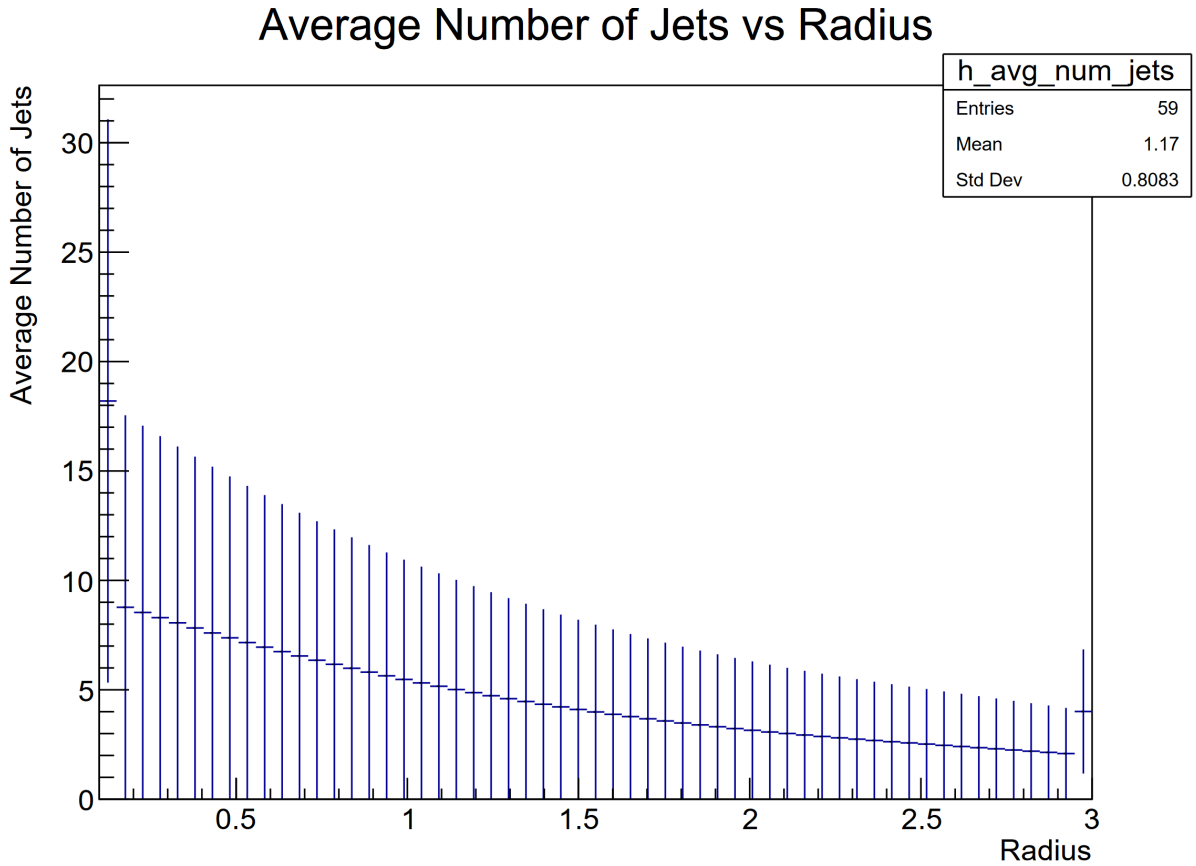
Next Steps:

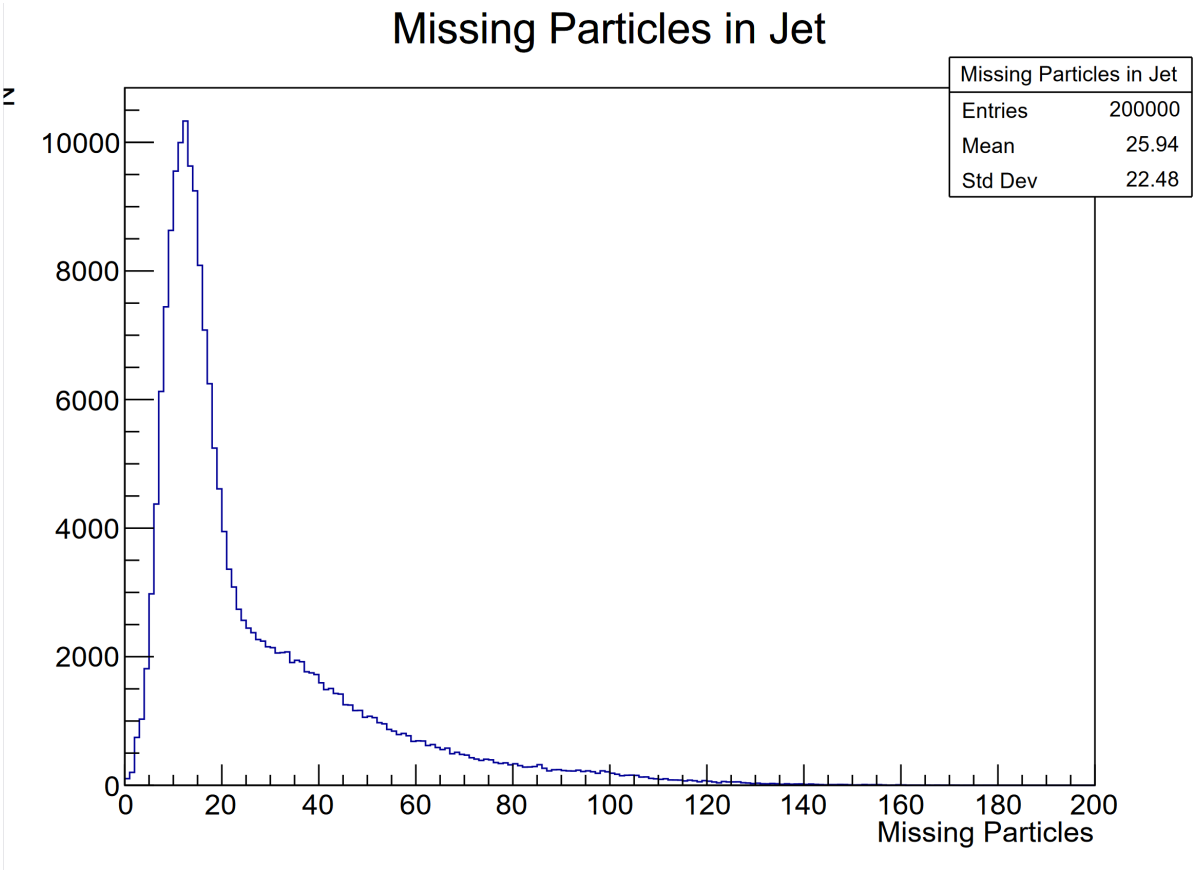
- *Run the analysis with a varying radius parameter to see how the number of jets and the number of included hadrons change.*
- *Create a plot similar to the one in this link (page 33)*

25 November 2024

Summary of Today's Work:

- *Setup and Initial Runs: Successfully set up the environment and ran initial tests using the jet algorithm.*
- *Data Visualization: Plotted data showing the behavior of jet numbers across different radii, finding a decrease with increasing radii. No optimal cutoff radius identified yet (See Figure 1).*
- *Custom Jet Algorithm: Implemented a custom algorithm (See Figure 2):*
  - *Assumes jets' energy and momentum align with CC event characteristics (e.g., negative momentum relative to leptons, energy summing to neutrino energy).*
  - *Issues Identified:*
    - *Multiple neutrinos and leptons in a single event are problematic, disrupting algorithm reliability.*





Next Steps:

- *Debug code to resolve multiple neutrino/lepton event handling.*
- *Determine an optimal jet radius for the custom algorithm:*
  - *Evaluate physical significance.*
  - *Plot relevant metrics to assess jet completeness and structure.*
  - *Find radius which saturates the number of included hadrons (or understand why one does not exist).*