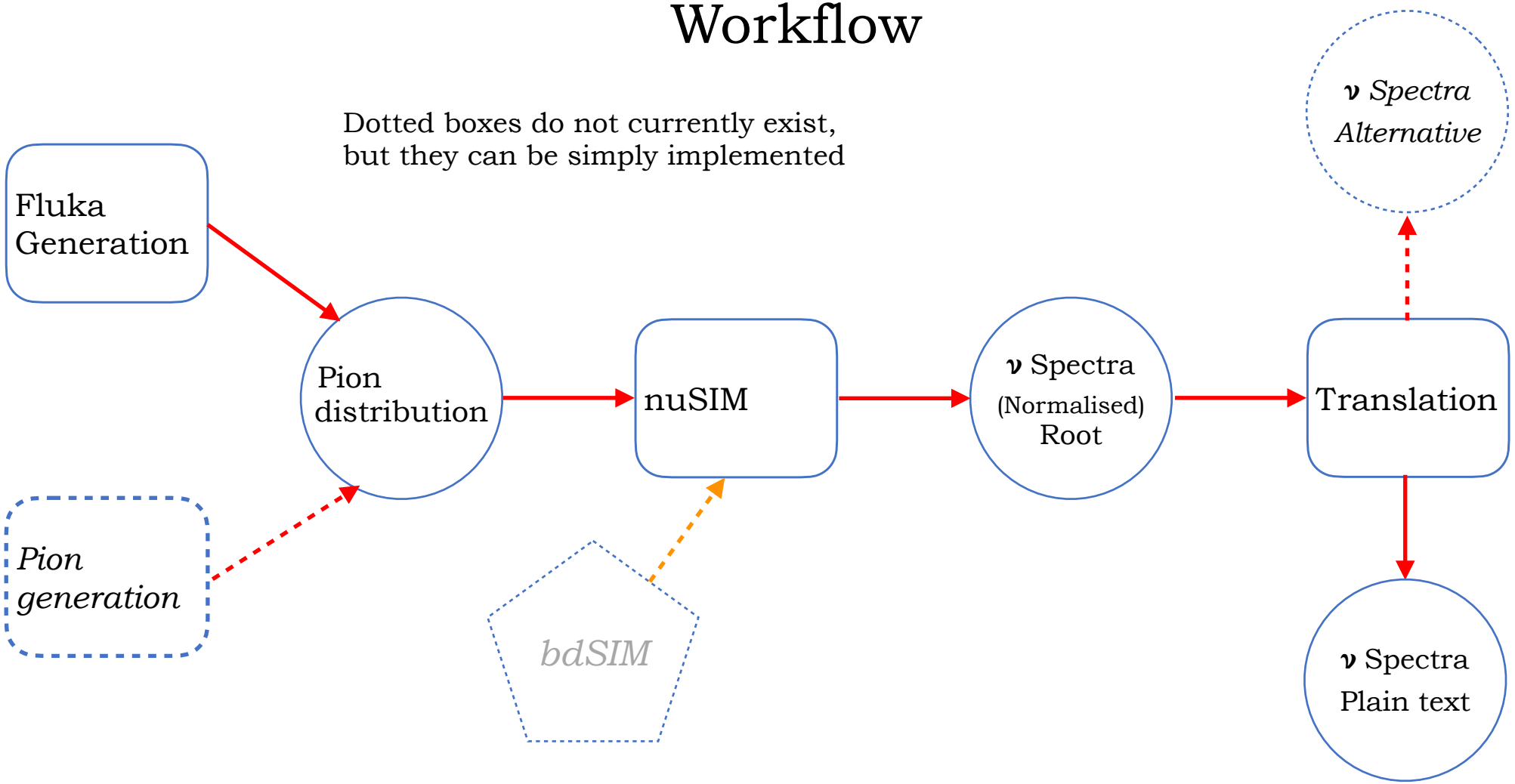

nuSTORM IOP
23 November 2023
νSTORM

Workflow

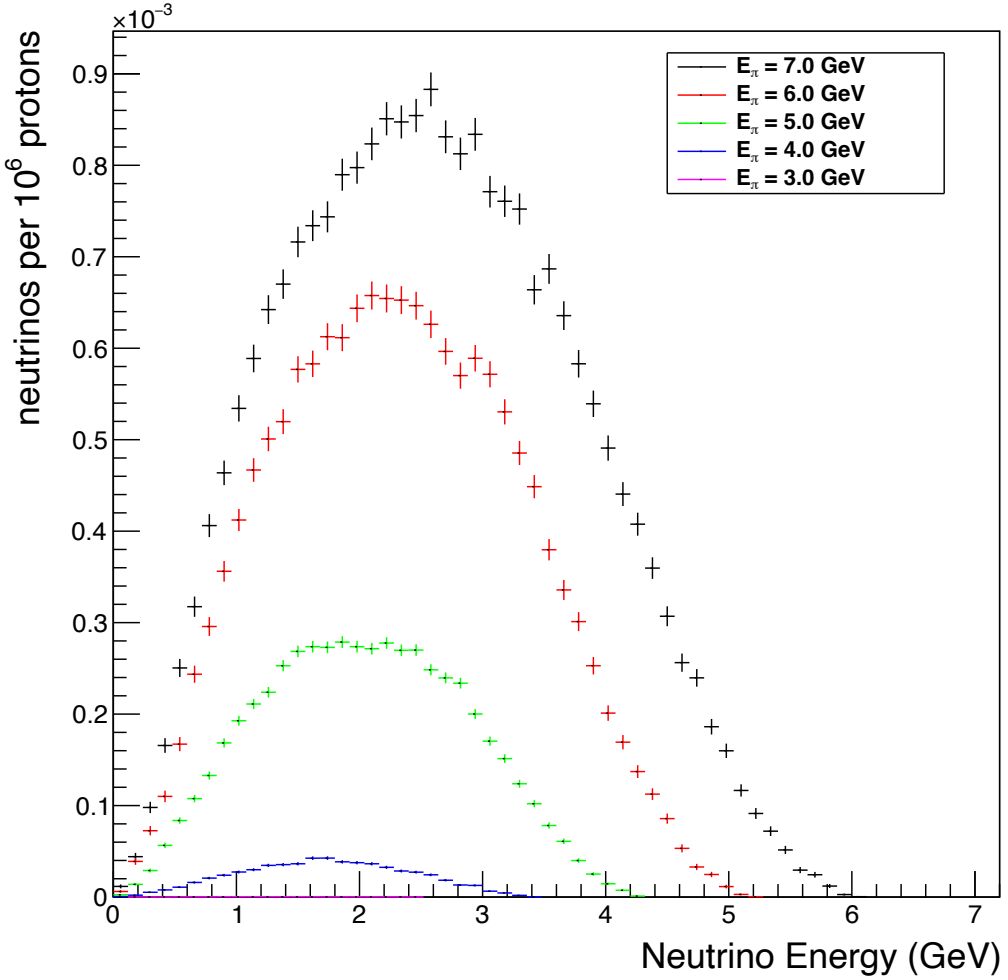


Marvin's thesis showed that the ν spectra shape, at a particular pion energy, is independent of the pion momentum spectra.

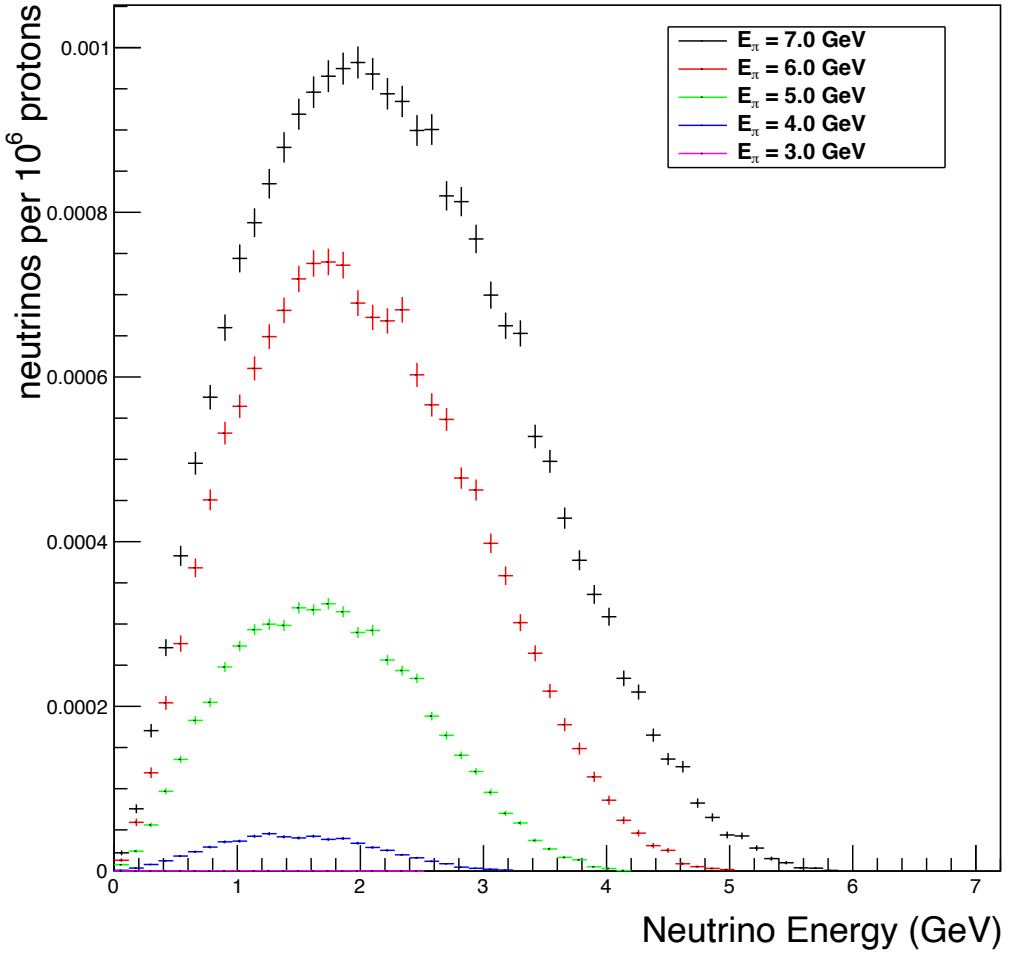
As the design of the ring progresses we will get snap shots of how the captured muon beam evolves. nuSIM was designed to allow the beam emittance to be imported at various points in the complex. Plan is to implement this feature to provide rapid feedback on the physics effects of design changes

Normalised neutrino fluxes for the captured muon events

Normalised ν_μ flux



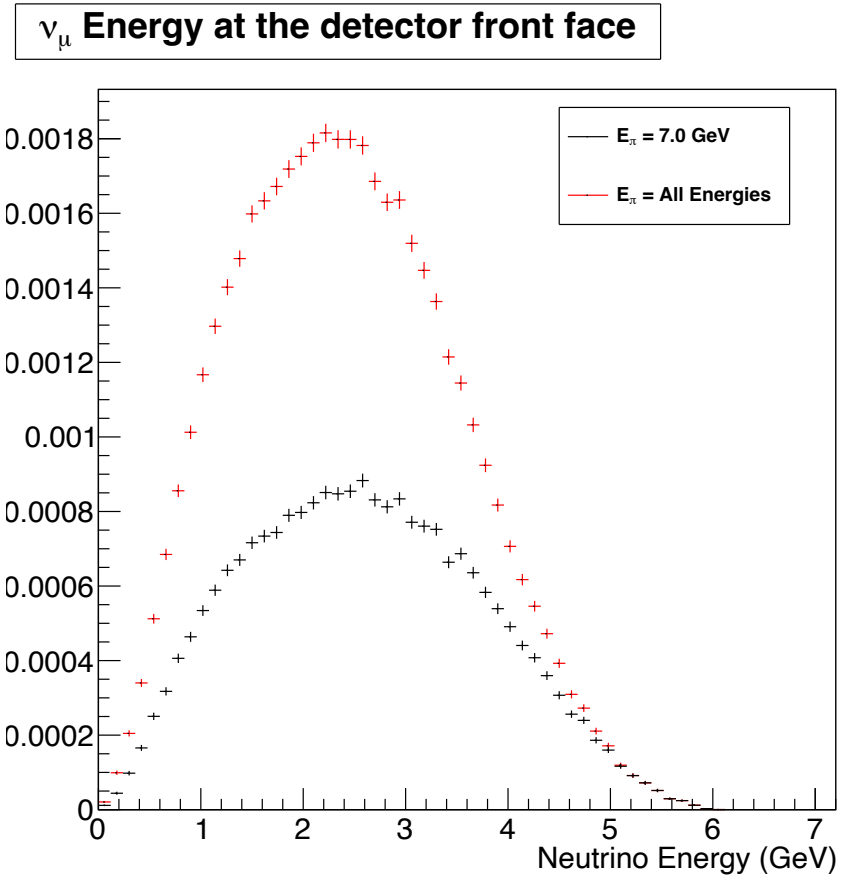
Normalised ν_e flux



Total flux for both neutrino flavours is essentially identical.

The Pion energy of 3.0 Gev is not visible and 2.0 GeV was not generated

Normalised neutrino fluxes for the captured muon signal - higher energy dominates

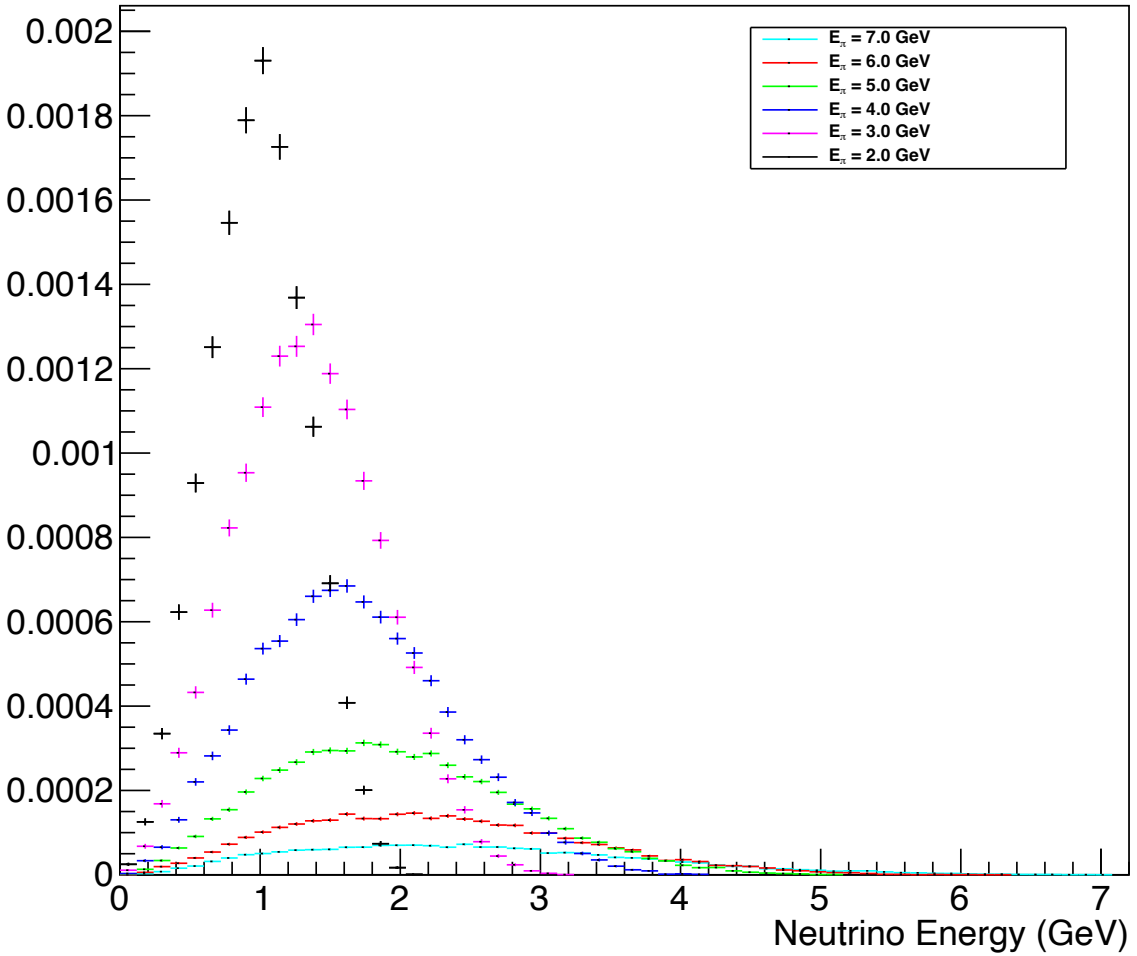


Comparison of 7.0 GeV running with the total

Normalised to protons on target for each setting

Normalised neutrino fluxes for the flash/early muons (decay before capture)

ν_μ Energy at the detector front face



Total flux for both neutrino flavours is essentially identical

Here the flux is greater at lower energy

2.0 GeV is shown here.

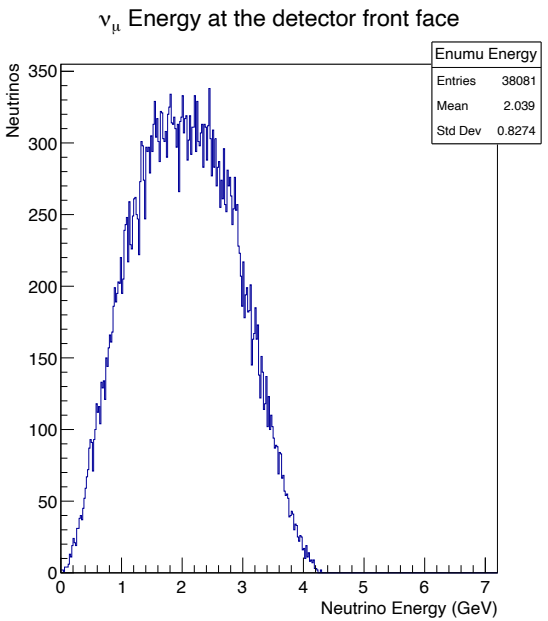
The 1 GeV peak is about 25% of the 7 GeV peak for the captured muons

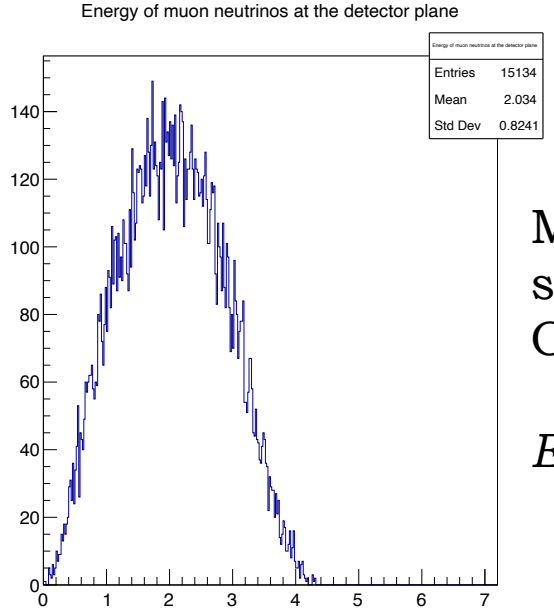
It may be worth using the flash muons as part of the (not for any oscillation analysis)

New horn datasets

Paul Jurj generated some new pion data sets which correspond to a modified horn design.

The application in the workflow fluka output to nuSIM input … written for this data





Mean 2.039 and 2.034
sigma 0.824 and 0.827
Only the 5 GeV data sets created

Expected from Marvin's work

Starting to study from which part of the pion production phase space the neutrinos which reach the detector are coming.
Optimise pion production in the correct part of phase space

nuSIM produces the necessary information

Current data sets on data.nustorm.org/

The data sets are labeled with the pion central energy E3 Or E30

Then “Spectra”

The generation type PiFlash

The run number 567

The run number is so I can go back and check details
Of the run which creates the dataset

The file type .root

eg E60SpectraMuSig570.root

There will be two txt files associated with this file with the spectra written out in plain text .txt

E60SpectraMuSig570Nue.txt
E60SpectraMuSig570Numu.txt