nuStorm results

December 5, 2021

Normalisation application

1. Flags to control processing

tlFlag	are pion decays in the transfer line complex processed
lstFlag	are pions which decay after the production are analysed
psFlag	are pions which decay in the production straight processed
muDcyFlag	are muons from pions which decay in the production straight processed

   decayMuons will all be called if both muDcyFlag and psFlag are set True

2. The flags have counters associated with them to see how often the processing methods are called. Mostly used to allow print out of the first n events of that type
3. Set up values from the parameters file
4. Initialise the run number, the number of events, the event weight and the pion central momentum
5. Initialise event history
6. start loop
   (a) generate a pion and fill the target location
   (b) get the pion lifetime and use it to determine the length of the flight of the pion before decay
   (c) optionally call the transfer line method (tlDecay) if the length is correct and the flag is set. If not set the values at the beginning of the production straight, the production straight location thus has things which have really decayed if the tlFlag is set false
   (d) optionally call the beyondPS method if the length of flight takes the pion beyond the production straight and the lstFlag set
   (e) if the pion decay happens in the production straight and the psFlag is set, then call decayPiInPS

(f) fill the eventHistory root structure

7. write out to the root file and close it

Methods

tlDecay()

1. set the production straight location to have no particle and give it a weight of 0.0
2. unpack the pion kinematic variables from the PionEventInstance object
3. unpack the muon and ν kinematic variables and use it to fill the muonProduction and nuFlashpi locations

The muon is not decayed and the path of the ν is not checked to see if it crosses the detector plane

beyondPS()

1. The pion kinematic variables are unpacked and the pionDecay location is filled with the correct value of the pathlength and the time. The position in x,y,z is not filled in, nor is the momentum co-ordinates, since if the pion travels beyond the end of the production straight its path is not well defined.
2. The flash ν is set with the same limitations
3. The muon is set with the same limitations

It is possible that the total momentum of the ν and muon should be put into p_z

ring()

translate from linear distance s, to x, in the ring, with appropriate angles for the beam direction

decayPiInPS()

Pions decay in the production straight

decayMuons()

Muons from pions in the decay straight, which make it into the ring acceptance. Even 'fast' muons which are produced in the production straight, need to make the full acceptance cut, since the acceptance in the production straight is not known (at least to me).

event History application

This reads a file of event histories and delivers them to the user for processing. Below is described the current processing