

Ntuples with neutrinos from FLUKA CNGS 2003 simulations

Important notes:

- Please use the “numu” ntuples for  $\mu$  neutrinos and anti-neutrinos, the “nue” for electron  $\nu$  and  $\bar{\nu}$  : there are differences in direction biasing.
- Both tuple sets correspond to  $5 \times 10^6$  p.o.t.
- Events are **biased** : the  $\nu$  **weight** must be used in building distributions
- open the ntuples with record length = 4096

Description of variables

```
*****
*   Name
*****
* nevent      N. of the event (p.o.t.)
* nuid        Neutrino identity
* nuene       Neutrino energy
* nugen       Neutrino Generation level
* dcyid       Identity of the decay parent
* dcyene      Its energy
* dcyr        Decay position distance from beam axis
* dcyz        Decay position distance from target center
* oldid       Identity of ancestor from last inel.interaction
* oldmom      Its momentum
* oldx        Position of last inel. interaction (x)
* oldy                            y
* oldz                            z
* oldcx       Direction of the ancestor from last inel.int.(x)
* oldcy                            y
* oldcz                            z
* weight      Weight of the neutrino
* radGS       Radius of arrival at GranSasso
*****
```

Where:

- neutrino identity is 1 for  $\nu_e$ , 2 for  $\bar{\nu}_e$ , 3 for  $\nu_\mu$ , 4 for  $\bar{\nu}_\mu$
- $\nu$  generation level: 1 is primary particle, 2 is product of first inelastic interaction or decay, and so on. Therefore:  
 $p + C \rightarrow \pi \rightarrow \nu$  : nugen is 3  
 $p + C \rightarrow \pi \rightarrow \mu \rightarrow \nu$  : nugen is 4
- particle identity is in FLUKA numeration scheme (see the FLUKA manual)

- two ancestors are recorded: the particle whose decay originates the neutrino, and the particle produced in the last inelastic interaction in the chain. The two coincide if there is no intermediate decay.
- all dimensions are in cm, energy and momentum in GeV and GeV/c
- z axis along the beam, x horizontal, y vertical. Origin at the center of the target.