INGRID Work

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Neutrino energy weighting

- The default jnubeam hadron production is GCOLOR/GFLUKA
- Currently, the results with FLUKA2008 hadron model is good consistent to NA61result.
- Need weighting the Energy spectrum made by Jnubeam default hadron production model with FLUKA2008 model result.
  - Simple weighting method : × energy spectrum ratio of FLUKA to GCOLOR/GFLUKA

Use Jnubeam file configuration

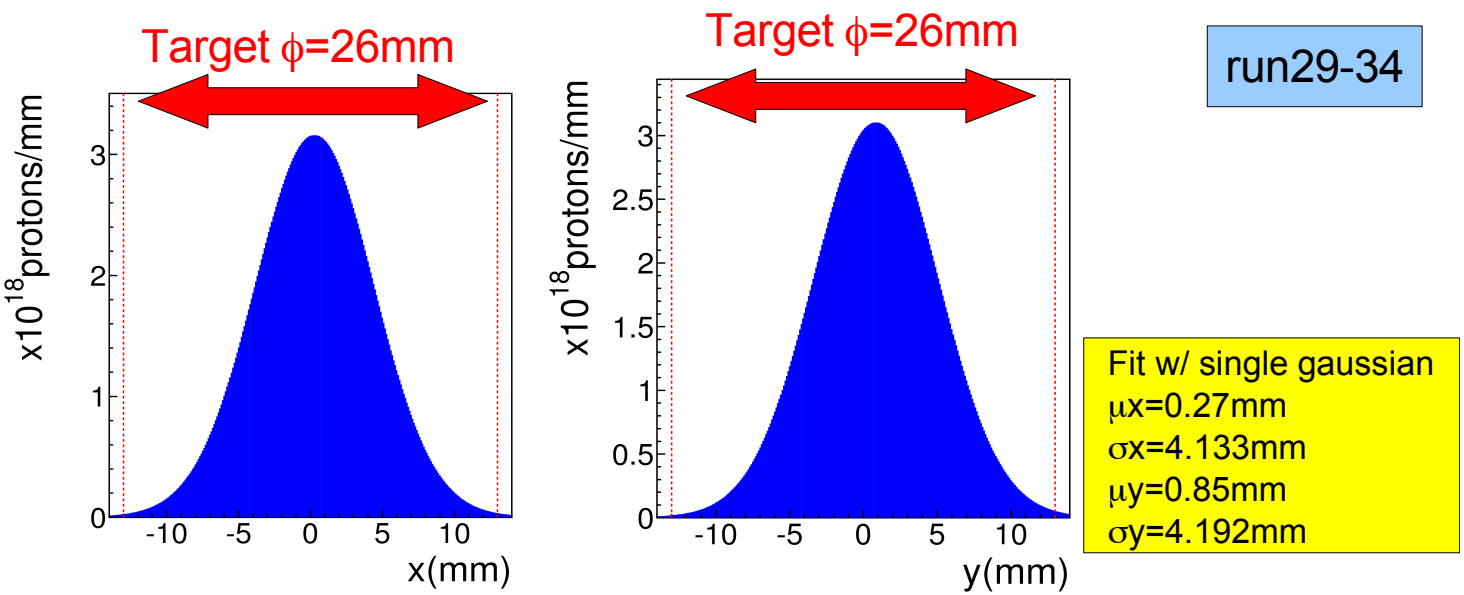
- Jnbueam default hadron production (GCOLOR/GFLUKA)
  - Jnbeam vervion : 10c
  - nominal beam (target center, no divergence, beam r.m.s = (0.4243,0.4243)
  - MC stat : 5e5 trigger/file × 2000
- FLUKA2008
  - Jnubeam version : 10b
  - Real beam : accumulated beam profile of Run29~34
    - This detail is next page.
  - MC stat : 1e5 trigger/file × 500 (lower stat than 10c)
- Weighting effect : difference of hadron production and difference of beam profile.

Real beam parameta

- This is P.9 of kakuno-san slide (http://jnusrv01.kek.jp/Indico/getFile.py/access?contribId=0&resId=0&materialId=slides&confId=250)

Accumulated beam profile @ target

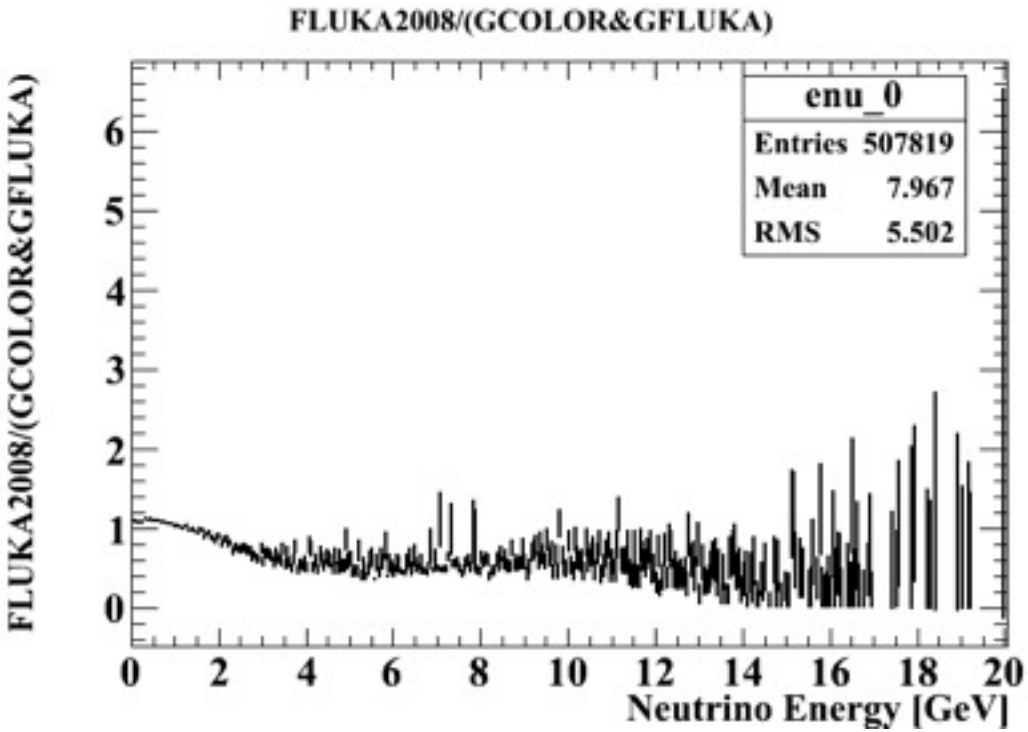
- gaussian assumption for shot-by-shot beam profile
-integrate shot-by-shot beam profile on target
-number of protons from CT05



cf. simple targeting efficiency = 99.1%

Neutrino energy weighting

Ratio FLUKA2008/(GCOLOR&FLUKA) at module 0

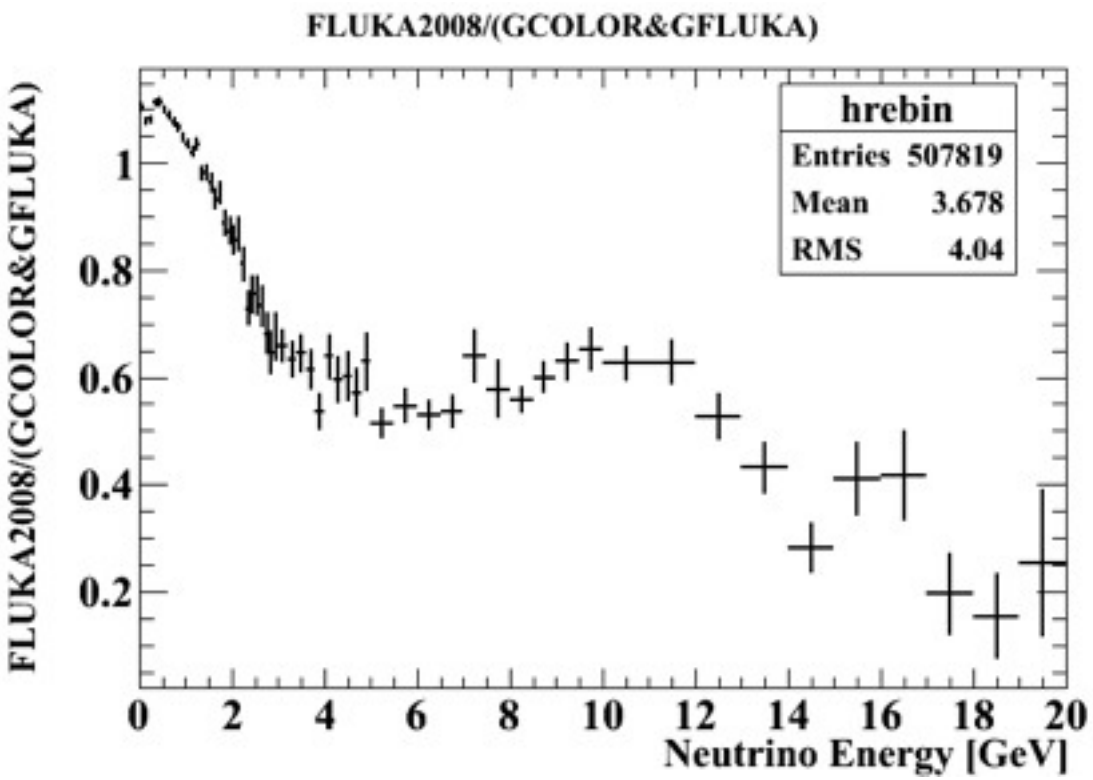


numu
bin size is 50MeV uniformly.
→ this is fine binning.
→ you can re-create this ratio at your own binning definition.

This hist is here : /home/akira.m/scraid0/jnubeam/enuweight/10c_fluka
file name "enuweight_numu.root " is about numu.
hist name "fRatio_numu_0" is about module 0.

Neutrino energy weighting

Ratio FLUKA2008/(GCOLOR&FLUKA) at module 0



This is one example of re-bin ratio.

bin size is
100MeV : 0~3GeV
200MeV : 3~5GeV
500MeV : 5~10GeV
1GeV : 10GeV ~

This hist is here : /home/akira.m/scraid0/jnubeam/enuweight/10c_fluka
file name "enuweight_rebin_numu.root " is about numu.
hist name "fRatio_numu_0" is about module 0.

Next step

- Start to create this ratio hist → done
  - original bin size is 50MeV uniformly.
  - At more high energy region (~20GeV).
  - about numu, numuber (if any time nue, nuebar)
- Start to study with this weighting ratio.
  - Change of # of observation of INGRID.
- If need, the bin size will be changed.

Primary Proton beam weighting

- We can do weighting (nominal beam → real beam) event by event with primary proton beam position information.
  - Use ration of two beam profiles (two gauss function) , for example nominal beam and real beam.
- Kubo-san already made the ROOT macro
  - Posted on Jnubeam repository.
    - also put here : http://www-he.scphys.kyoto-u.ac.jp/~akira.m/jnubeam/Rew2Gaus/

For INGRID MC

- I already changed the INGRID MC to store the primary proton beam position information (gpos[0],gpos[1]).
  - change neut interface, output data structure.
- I already conformed that the gpos of INGRID MC output file is consistent with one of original Jnubeam Flux file.
- INGRID MC is ready!

Other INGRID MC change...

- Already reflected Otani-san work
  - Scintillator geometry.
  - Hall geometry

About NEUT work

- Today morning, I can ask hayato-san to change NEUT code.
  - To avoid the infinite loop of NEUT for low energy neutrino (below threshold energy of binding energy of neucleon.
  - Hayato-san need to attend to some meetings today. So, after this meeting, start to work.
- The strategy : cut lower energy than 100MeV.
  - This low energy neutrino can make neither pion nor muon.