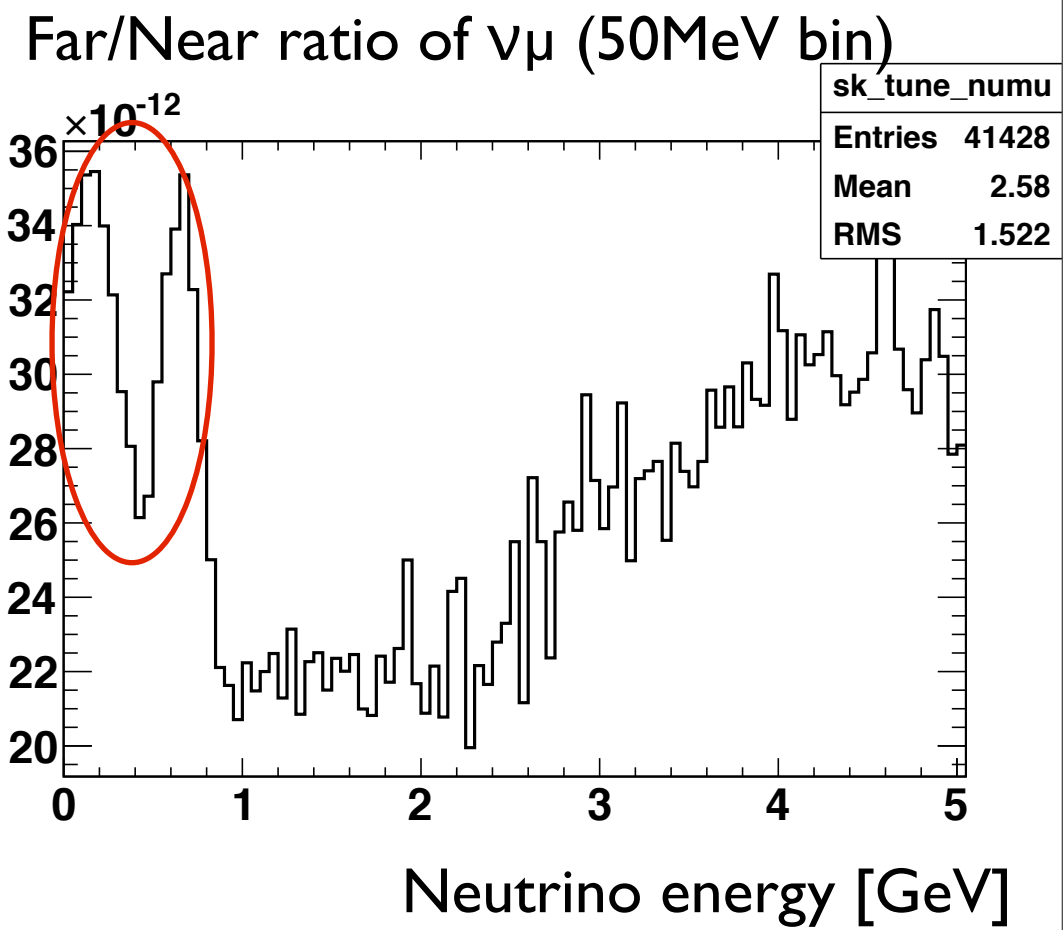
Far/Near ratio binning

A.Murakami

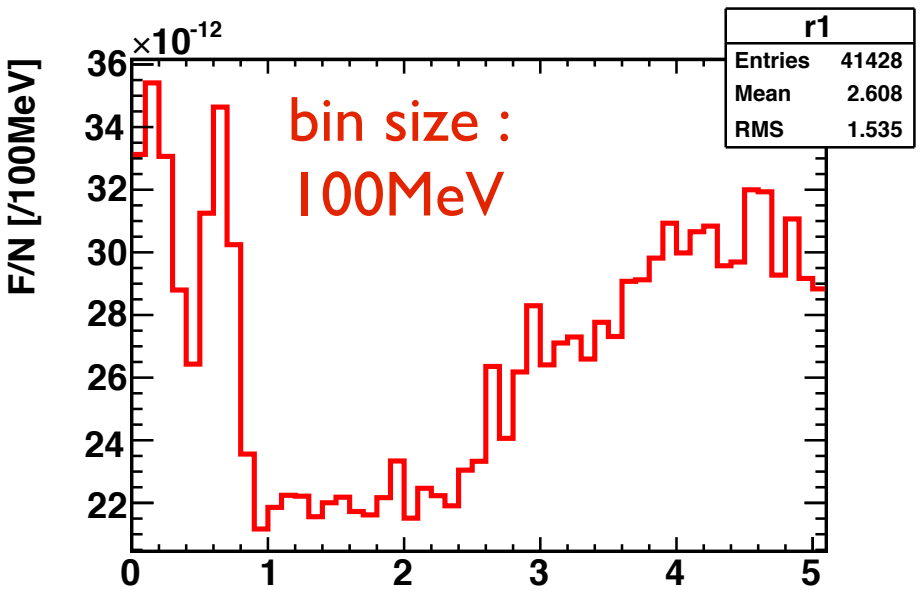
- Look at Far/Near ratio with several binning of neutrino energy.
  - Need to consider the best binning for ND280 fitting.

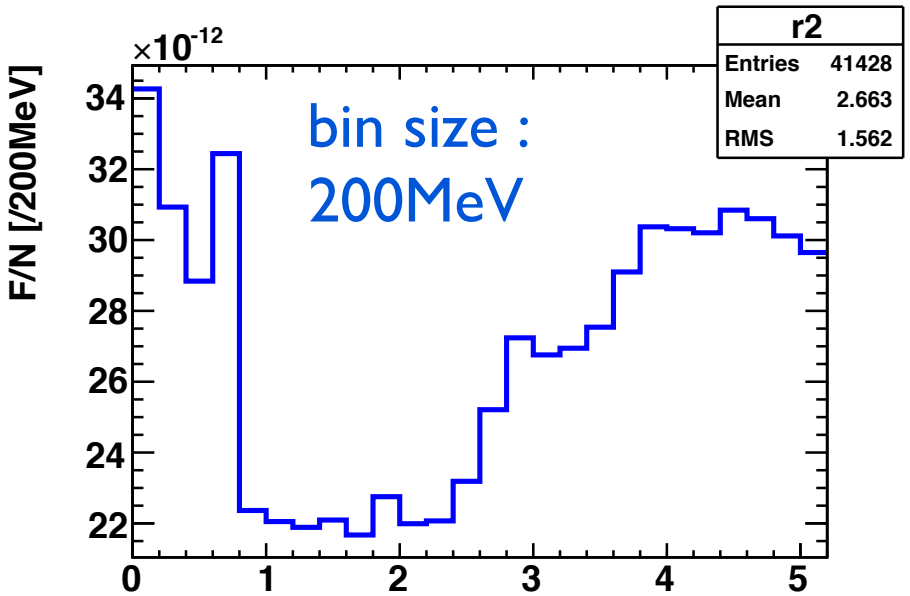
Far/Near ratio

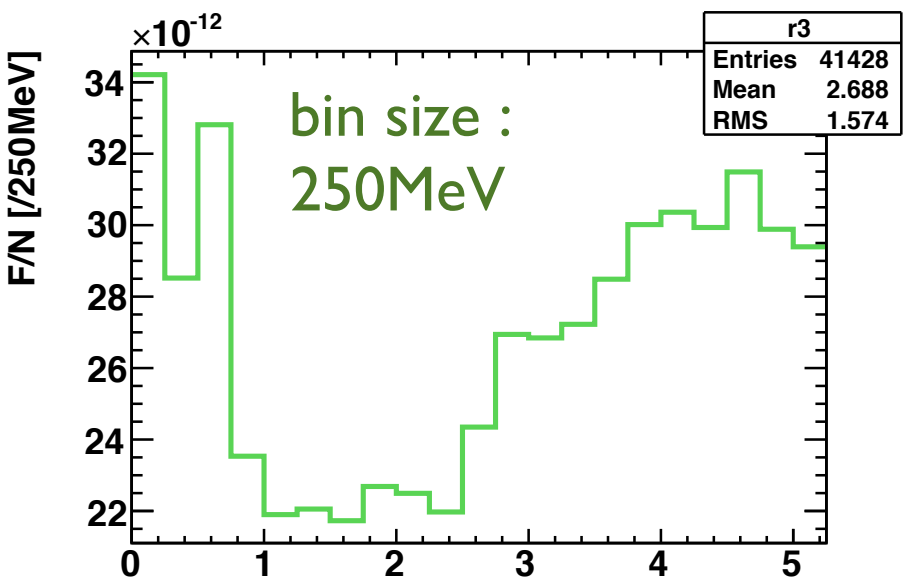
- Flux : 10d , pion- & prod- tune
- There is dip around 400MeV.
- When the binning is more coarse, I check how this dip structure changes.
  - I just merge some bins into one. The bin size is changed from 50MeV to 100, 200, 250, 400MeV.

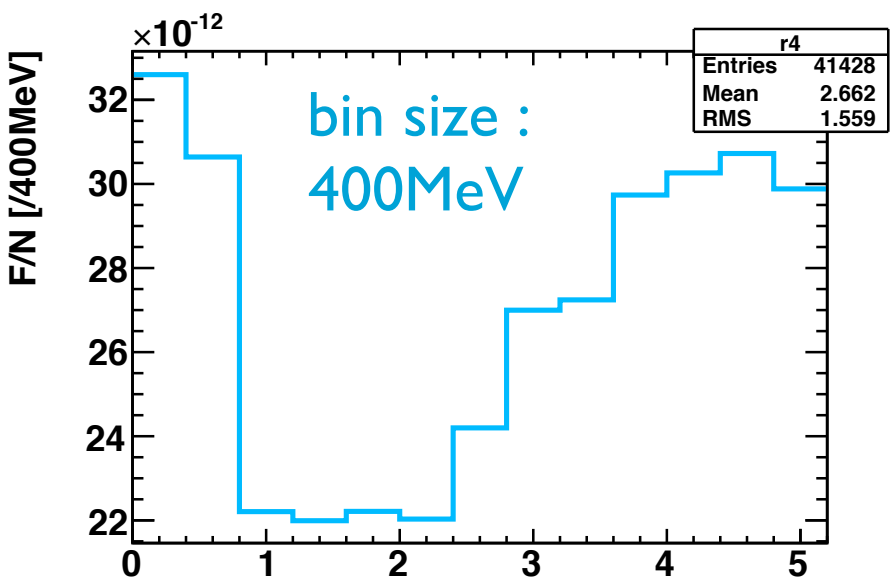


Far/Near at several binning









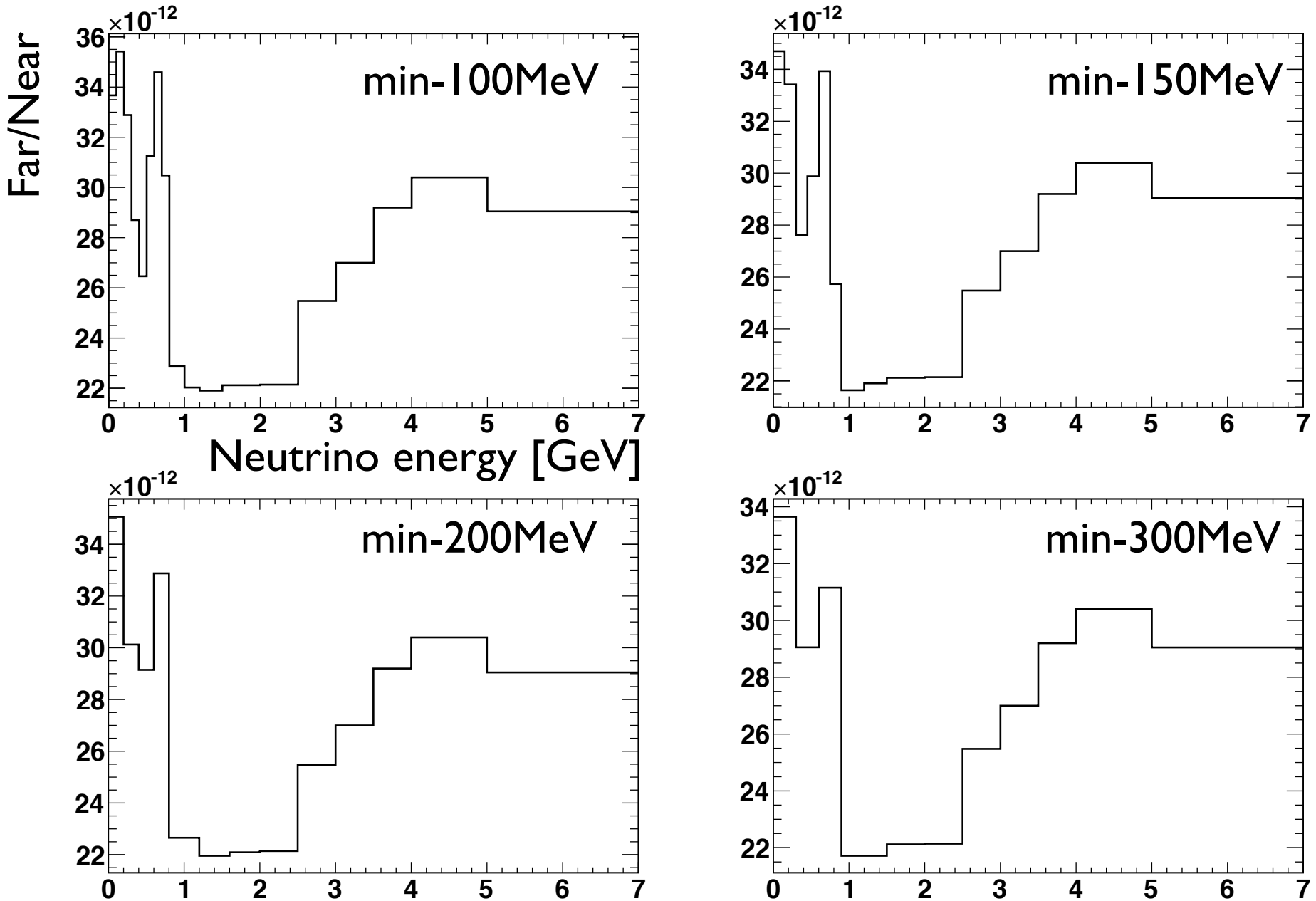
There is no dip structure around 400MeV w/ **400MeV** binning.

New binning

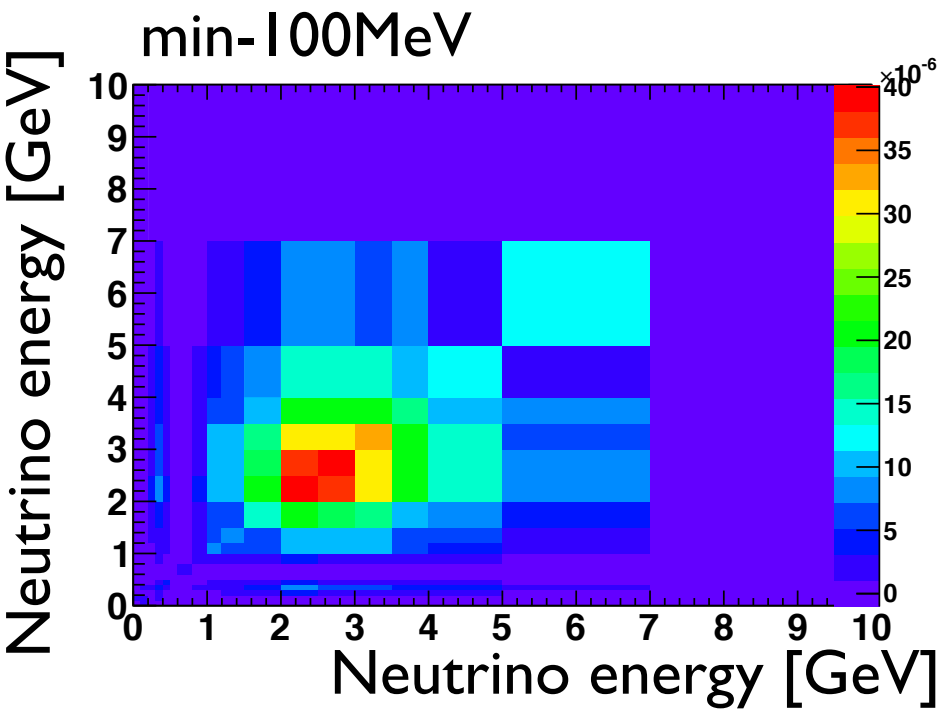
- I check the Far/Near with the following binning.
  - I change the minimum bin size and the bin structure below 2GeV. About higher than 2GeV, same at each binning.
- I also check the Far/Near covariance and error of pion.

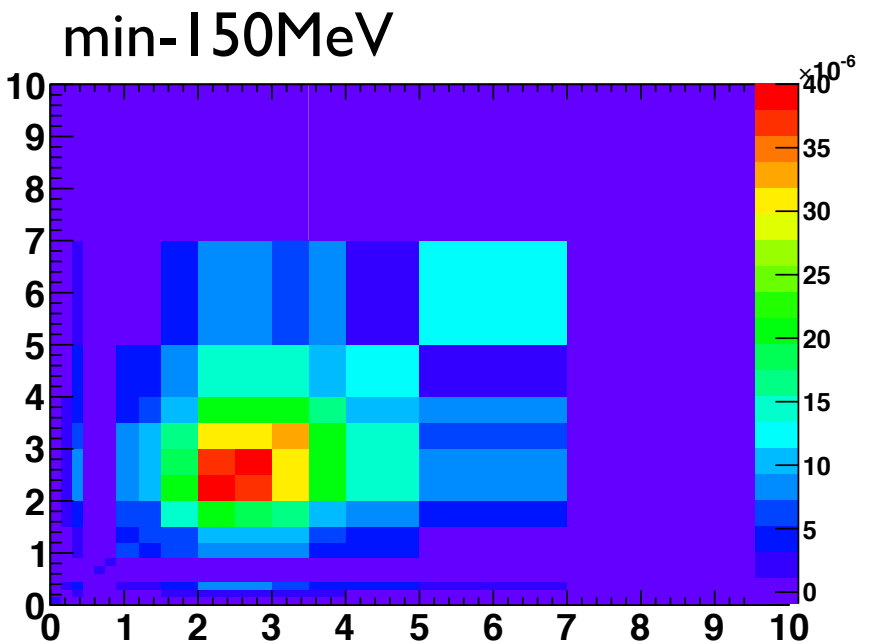
```
min-100MeV : bins[20] = {0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7,
0.8, 1.0, 1.2, 1.5, 2.0, 2.5,3.0, 3.5, 4.0, 5.0, 7.0, 10.0};

min-150MeV : bins[17] = {0.0, 0.15, 0.3, 0.45, 0.6, 0.75, 0.9,
1.2, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0,5.0, 7.0, 10.0};

min-200MeV : bins[15] = {0.0, 0.2, 0.4, 0.6, 0.8, 1.2, 1.6, 2.0,
2.5, 3.0, 3.5, 4.0, 5.0, 7.0, 10.0};

min-300MeV : bins[13] = {0.0, 0.3, 0.6, 0.9, 1.5, 2.0, 2.5, 3.0,
3.5, 4.0, 5.0, 7.0, 10.0};
```

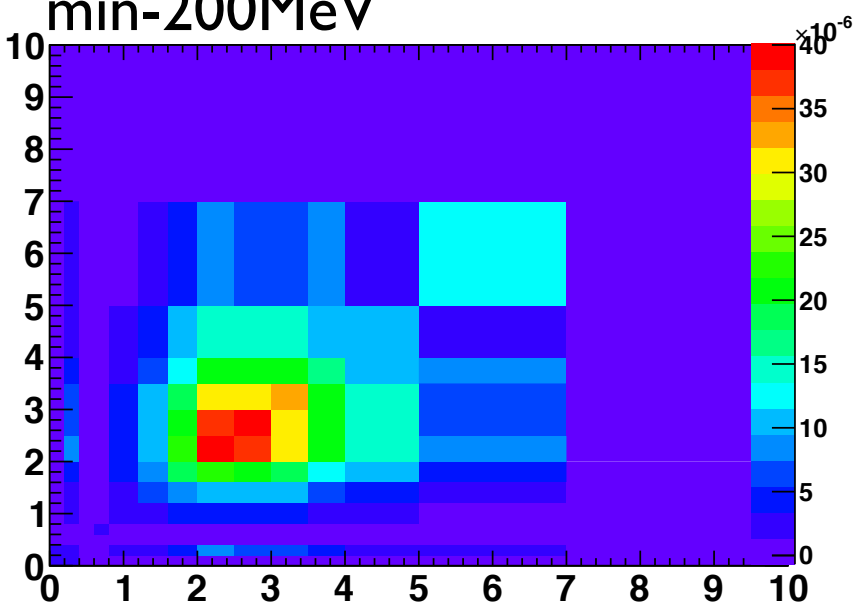
Far/Near with new binning

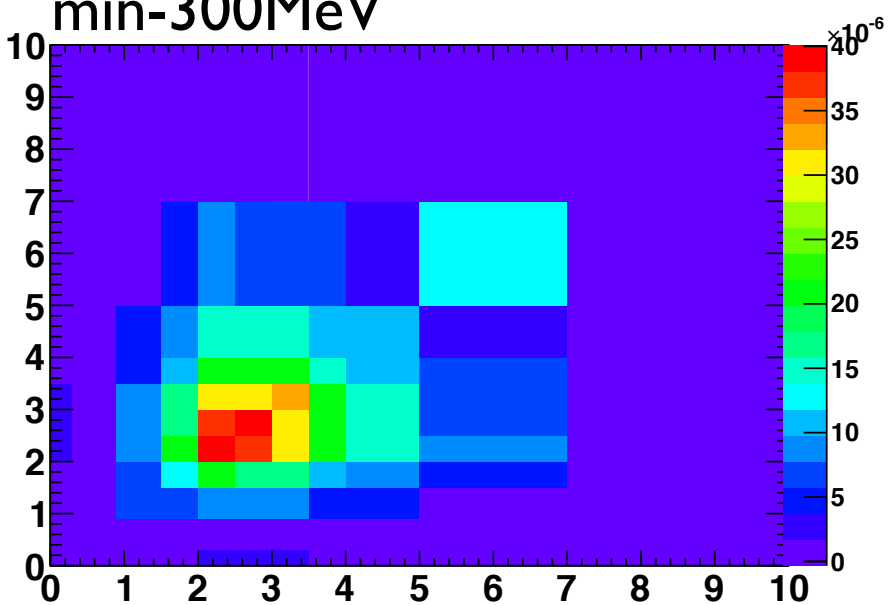


Far/Near covariance (π)w/ new binning



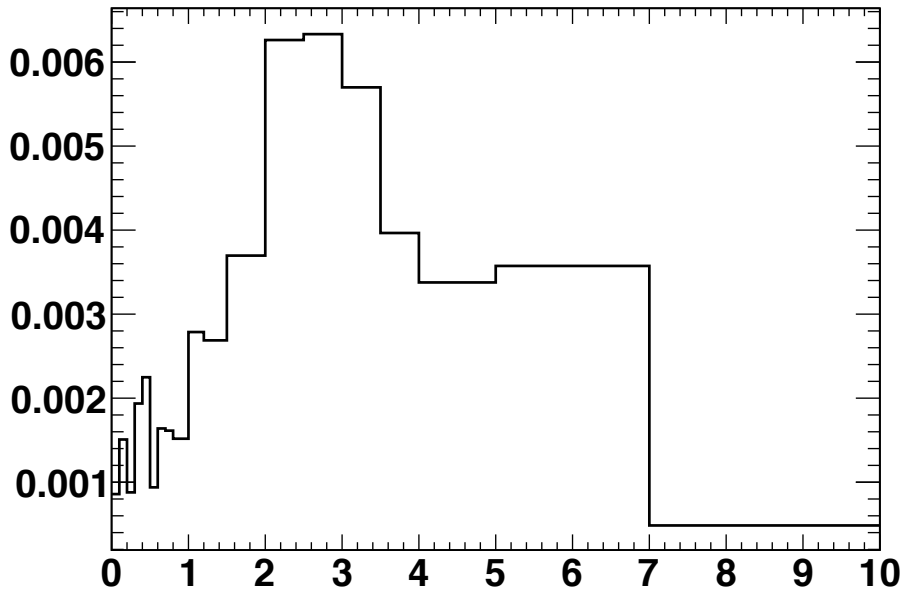




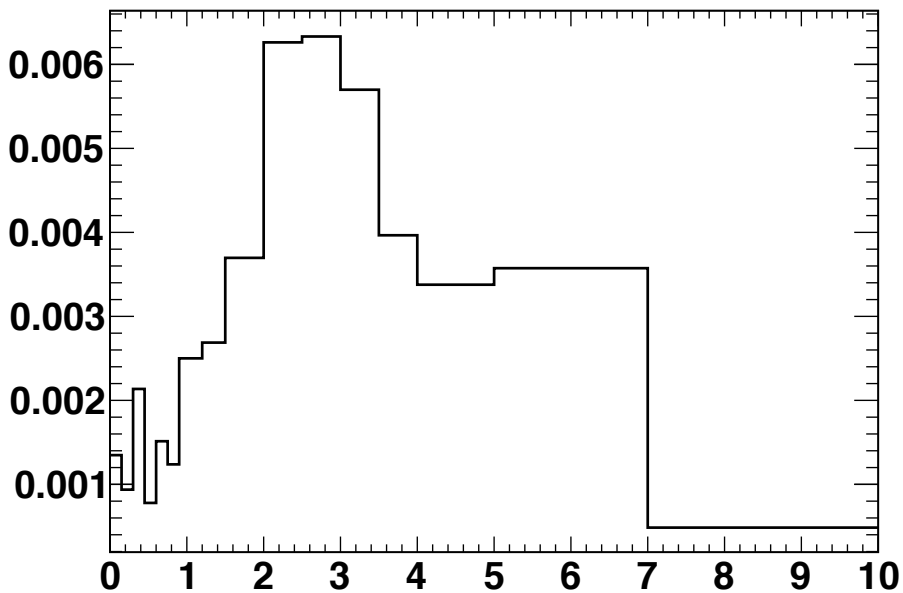


Far/Near error (π)w/ new binning

min-100MeV

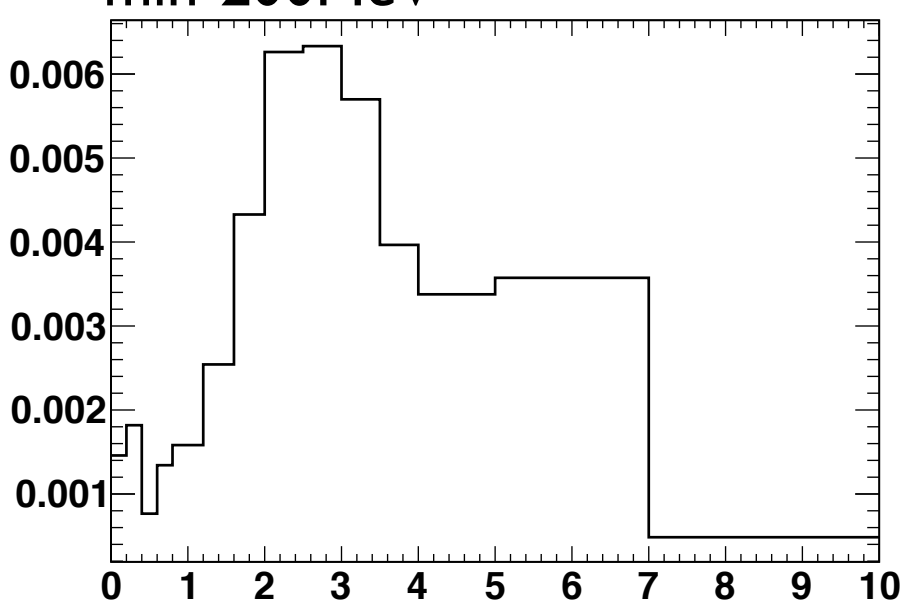


min-150MeV

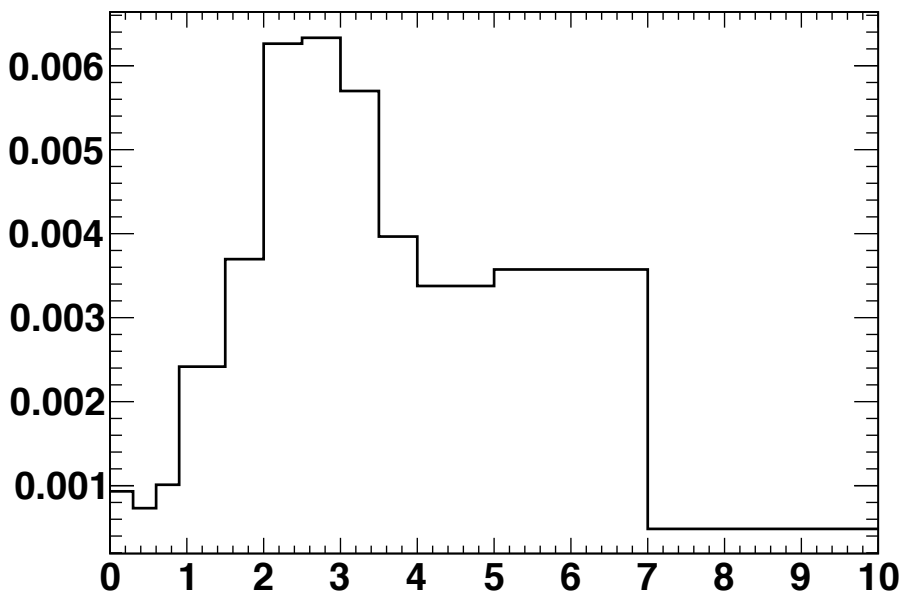


Neutrino energy [GeV]

min-200MeV



min-300MeV



- The bin size around around peak energy is important because the structure of Far/Near change drastically according to the bin size.
  - The dip structure of Far/Near around peak energy disappears with coarser than ~400MeV bin size.
- The maximum bin size around peak energy need to be less than 300MeV to consider Far/Near structure.
  - Surely, need to optimize the bin size of Far/Near with careful consideration of ND280 analysis.