Efficiency of the matching of tracks between SFGD and bHAT

Preliminary work

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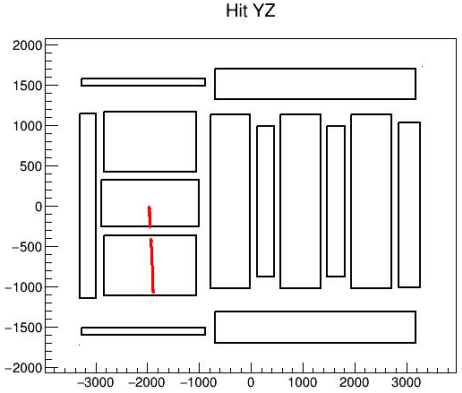
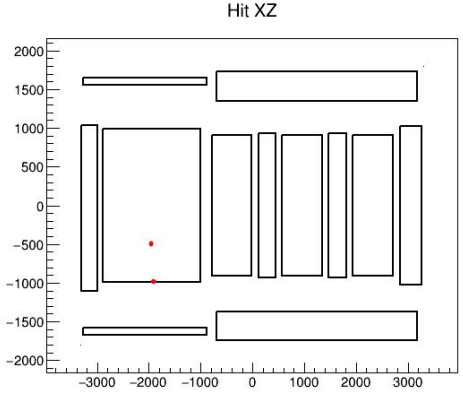
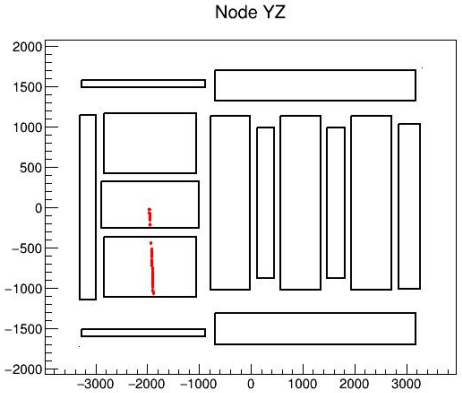
Introduction

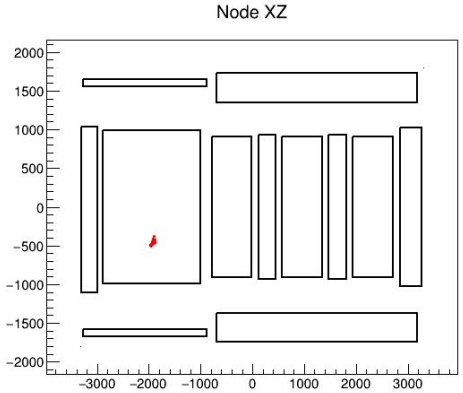
- Matching of tracks done with the **eventRecon** software
- `RunEventRecon.exe` performs the global reconstruction inside ND280
  → updated by William for ND280-up
- Between SFGD and TPC1, the efficiency of the matching is ~90%
- Goals:
  - find back the same matching efficiency b/n SFGD and TPC1
  - find the matching efficiency b/n SFGD and bHAT
  - improve the latter if needed

Matching, some plots





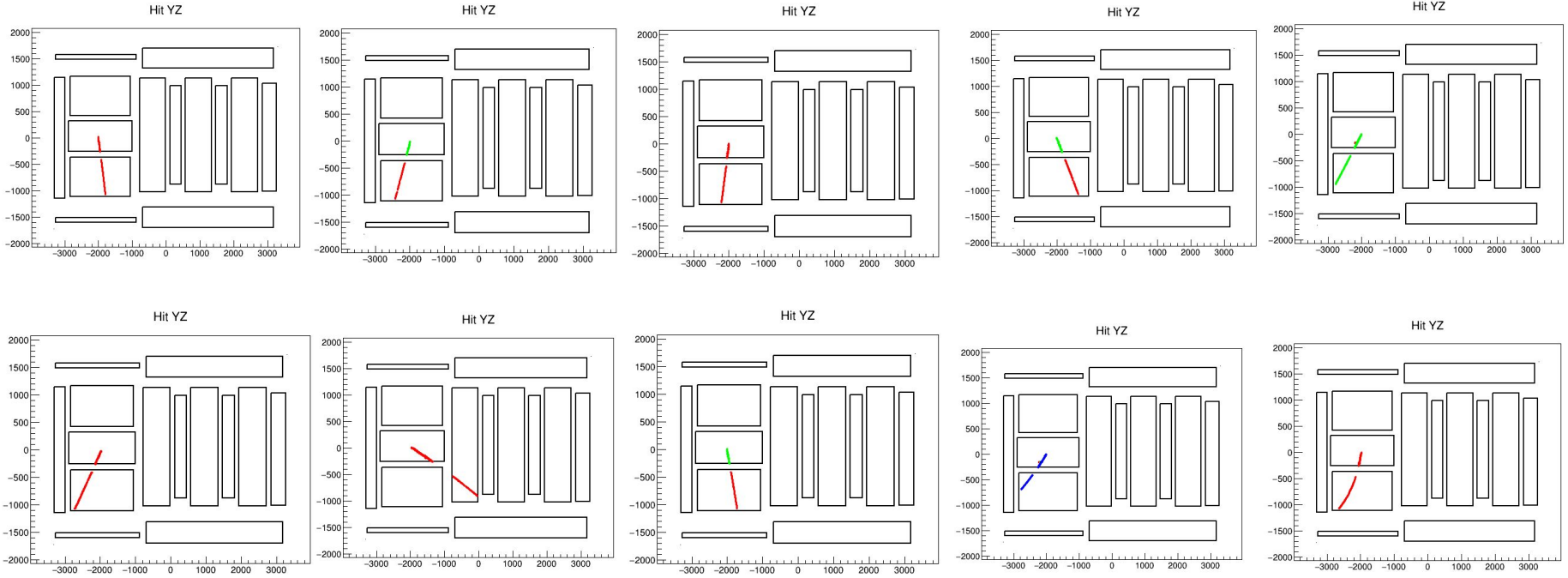




It seems to work well with the new release of **nd280Software** version **14.18**

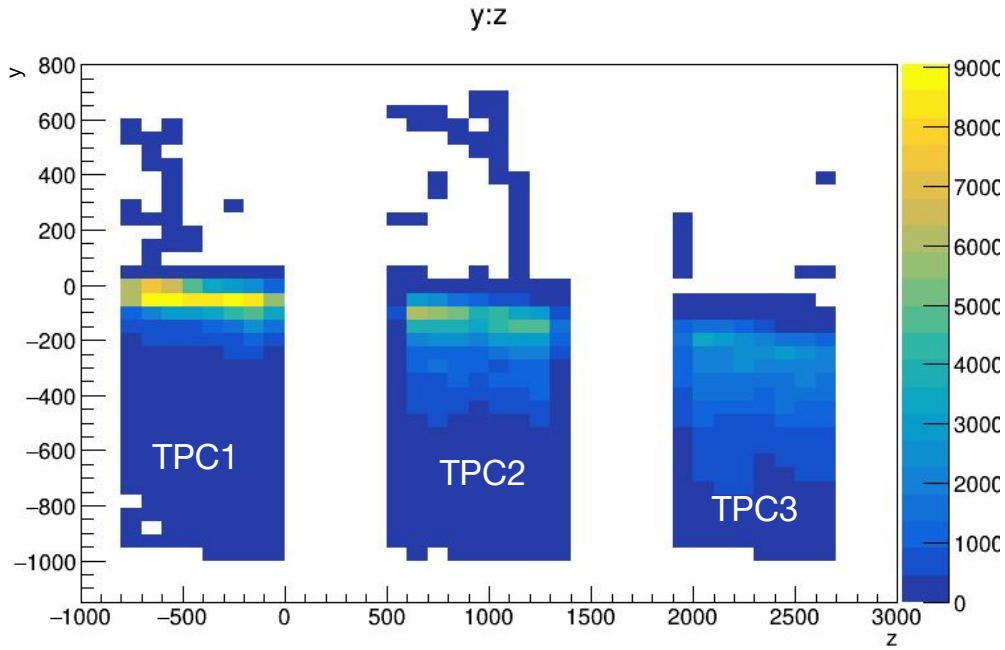
Same color = merged

Matching, some plots



Same color = merged

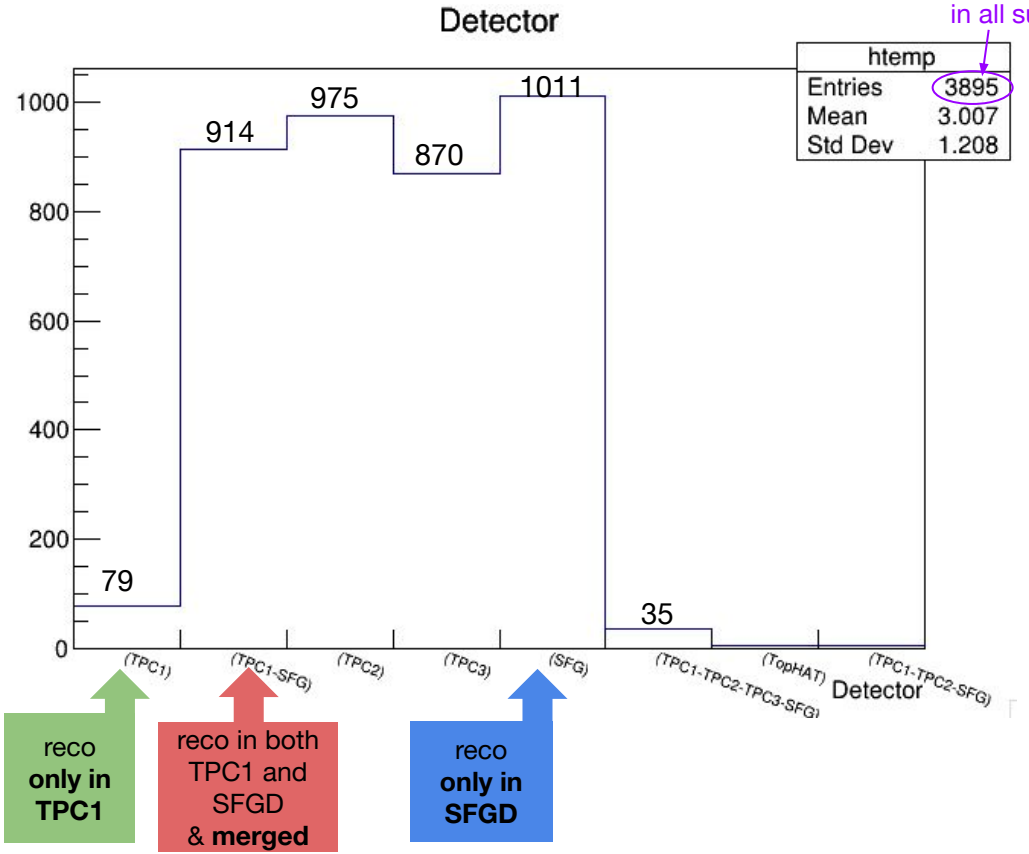
SFGD+TPC1 matching efficiency



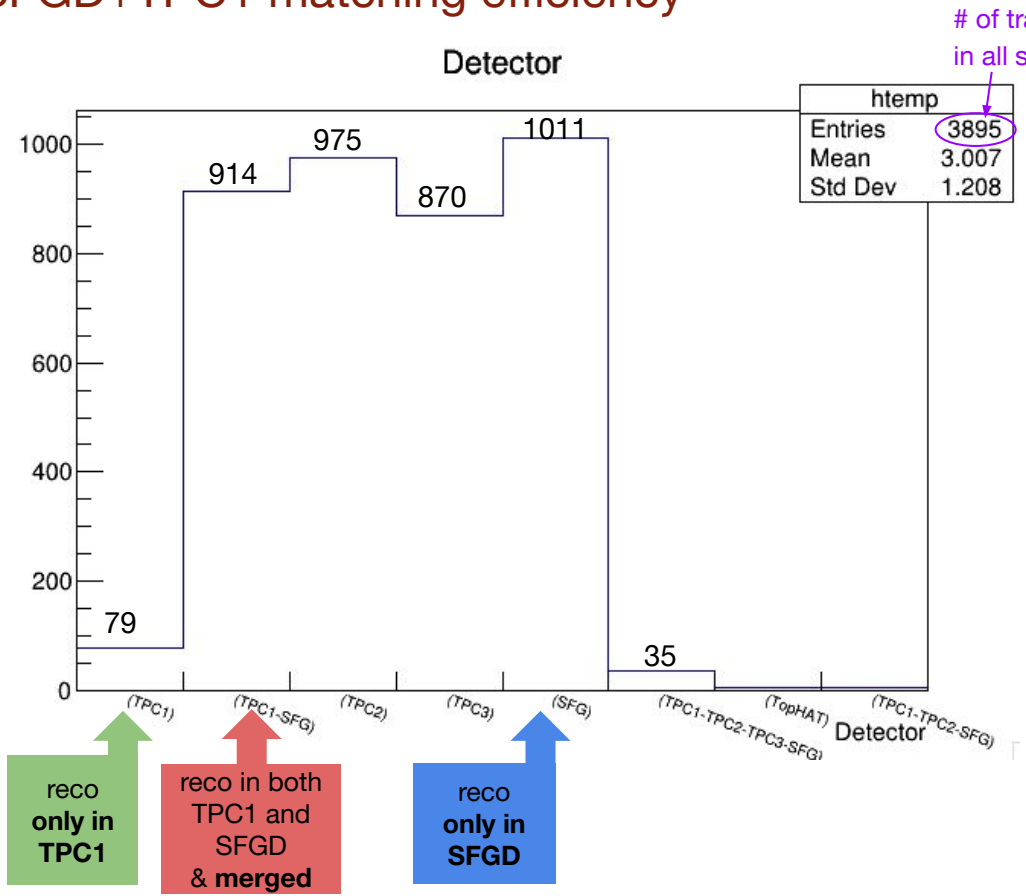
particle gun:

- 1000 mu-
- 100-3000 MeV
- from (-50,0,-200) cm ~ middle of SFGD
- direction: (0,0,1)
- map of B

SFGD+TPC1 matching efficiency

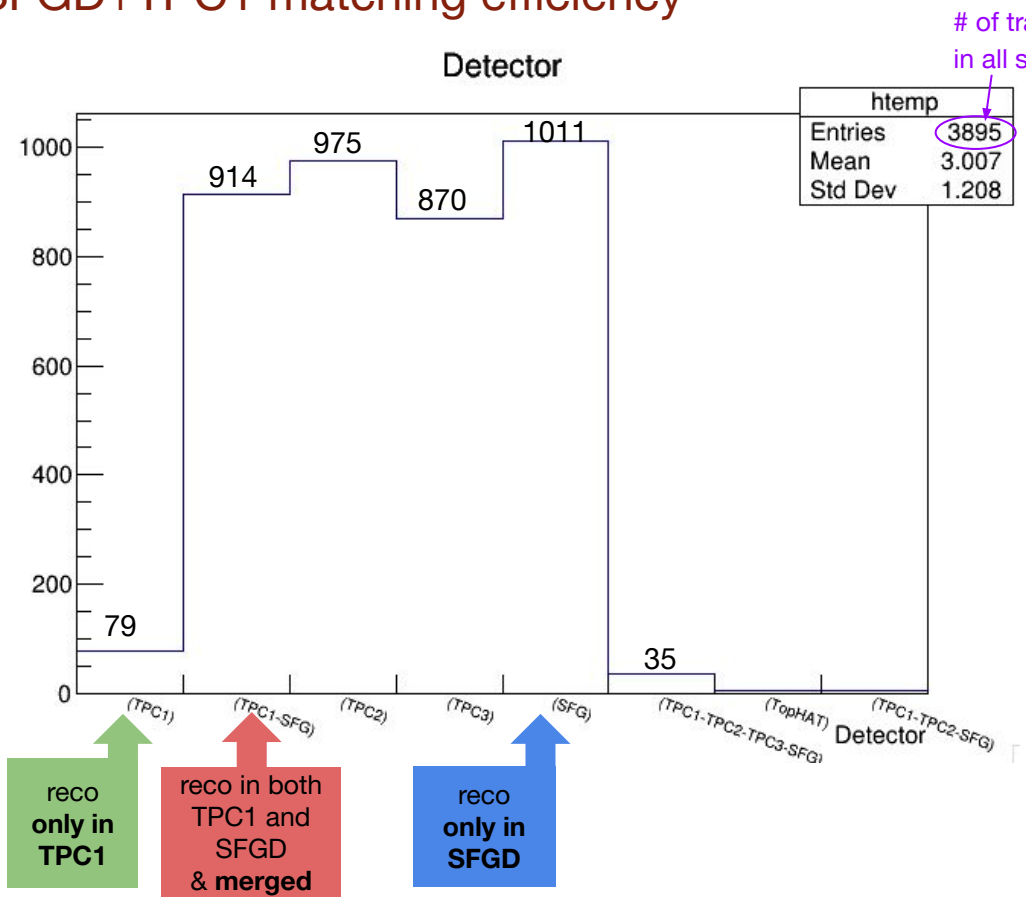


SFGD+TPC1 matching efficiency



$$\text{eff} = \frac{\#\text{ matched tracks}}{\#\text{ tracks reco by SFGD and TPC1}}$$

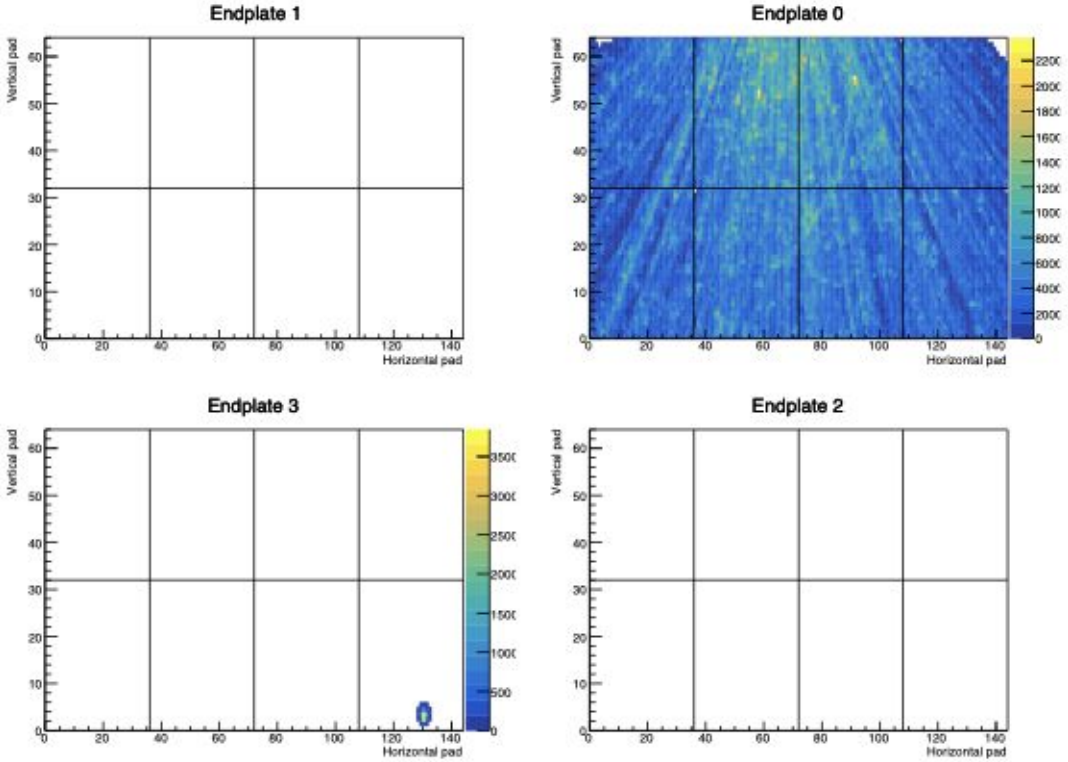
SFGD+TPC1 matching efficiency



$$\text{eff} = \frac{\#\text{ matched tracks}}{\#\text{ tracks reco by SFGD and TPC1}}$$

$$\text{eff} \simeq \frac{\#\text{ matched tracks}}{\#\text{ generated tracks}} = \frac{914}{1000} = 91\%$$

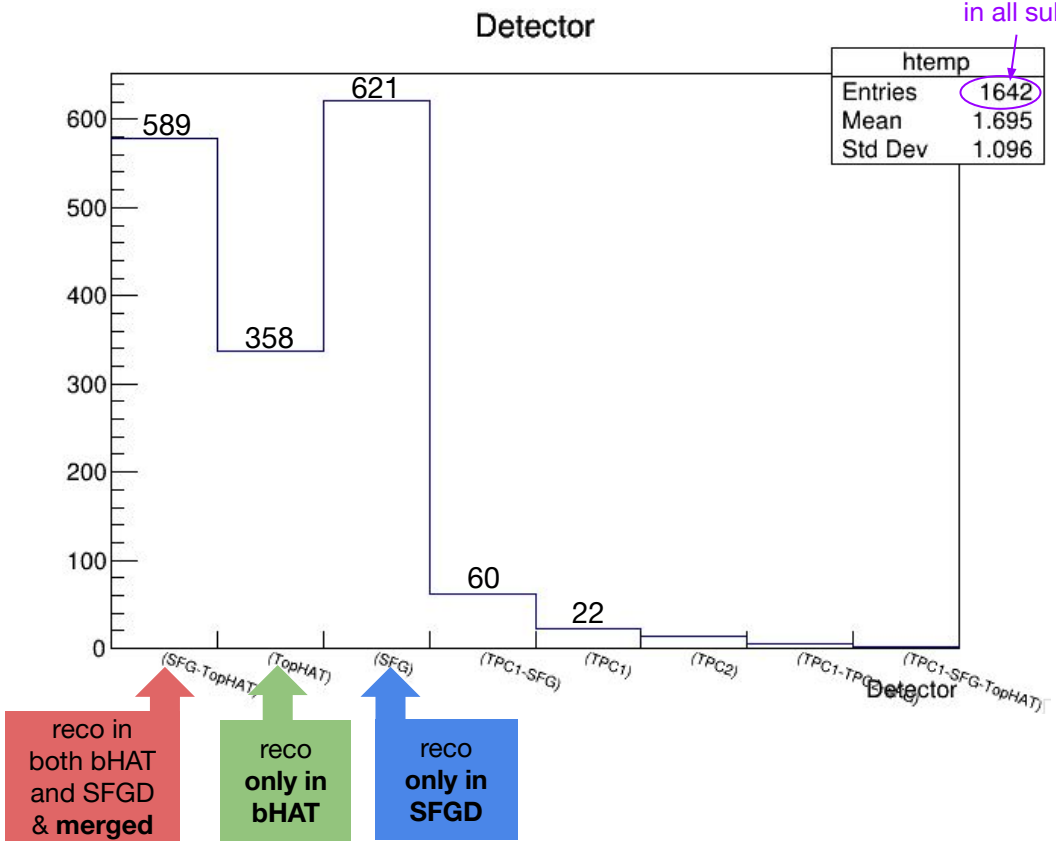
SFGD+bHAT matching efficiency



particle gun:

- 1000 mu-
- 100-3000 MeV
- from (-50,0,-200) cm ~ middle of SFGD
- in a cone of [20,170]°
- map of B

SFGD+bHAT matching efficiency



$$\text{eff} = \frac{\#\text{ matched tracks}}{\#\text{ tracks reco by SFGD and bHAT}}$$

$$\text{eff} \simeq \frac{\#\text{ matched tracks}}{\#\text{ track reco by bHAT}} = \frac{589}{918} = 64\%$$

from hatRecon

(but should check that whenever a track is reco in the bHAT, it was also reco first in the SFGD)

To do next

- Compute real matching efficiency (need to add reco results of separate detectors in the code)
- Check efficiency dependencies on angle, momentum, …
- Improve SFGD + bHAT matching efficiency

+will soon start working on nue selection and analysis in ND280 pre-up with prod7 and then in ND280 up

Back-up