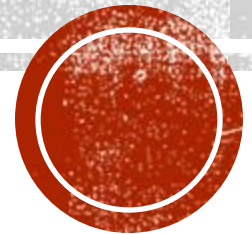


Cosmic selection: MC and data

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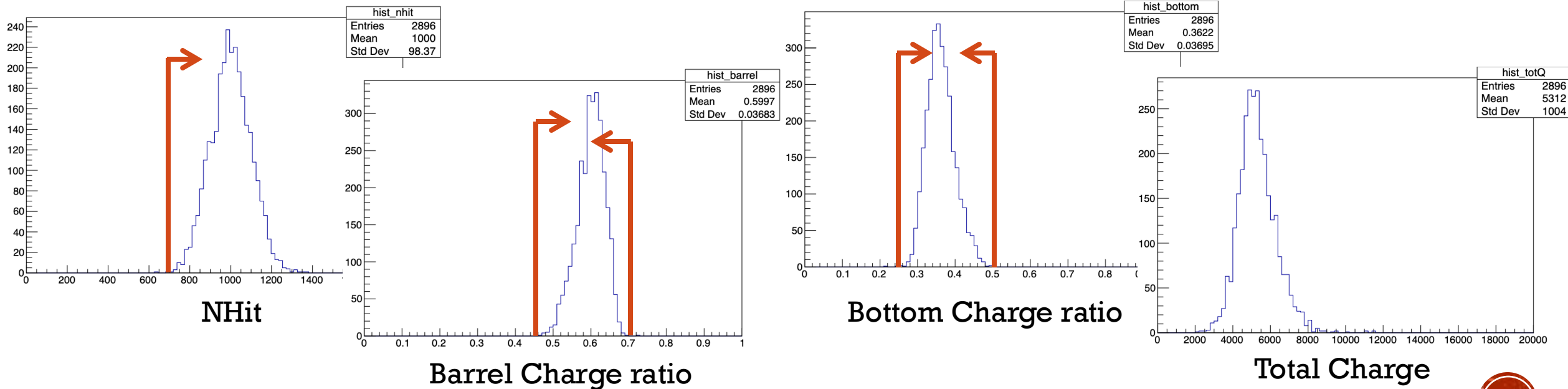


Reminder

- We want to use cosmic muons for calibration
- Some MC are used to derive cuts, and applied on data
- Basic distributions look different though
- Goal: see if poorly untuned fitQun or ML could reconstruct entrance/exit points

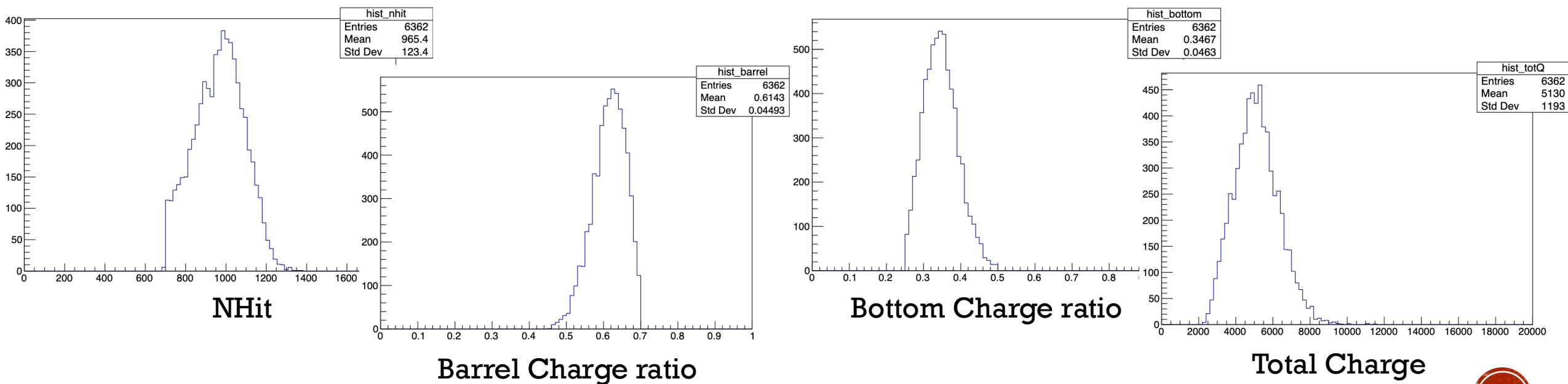
To match MC and data

- Check data file to flag PMTs with no hits → bad channel list
- Apply bad channel mask in MC
- Check truth top-down events to revise cuts



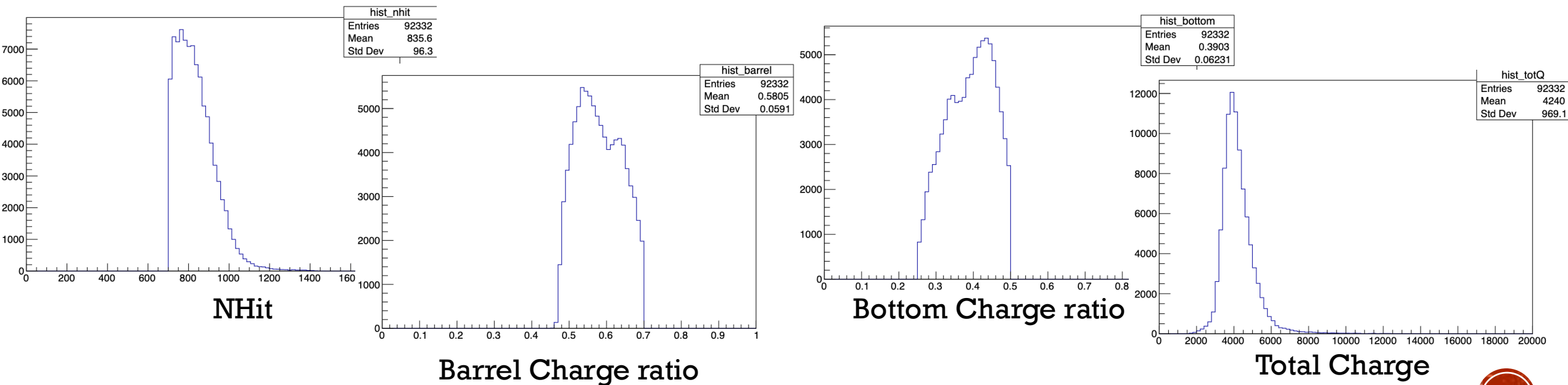
To match MC and data

- Check data file to flag PMTs with no hits → bad channel list
- Apply bad channel mask in MC
- Apply revised cuts on MC



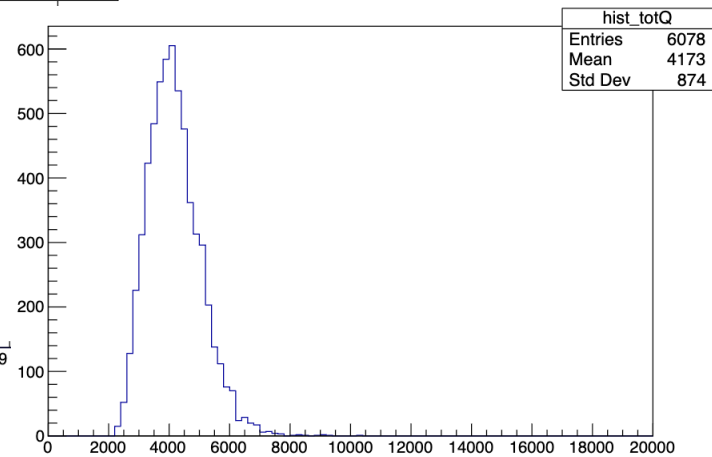
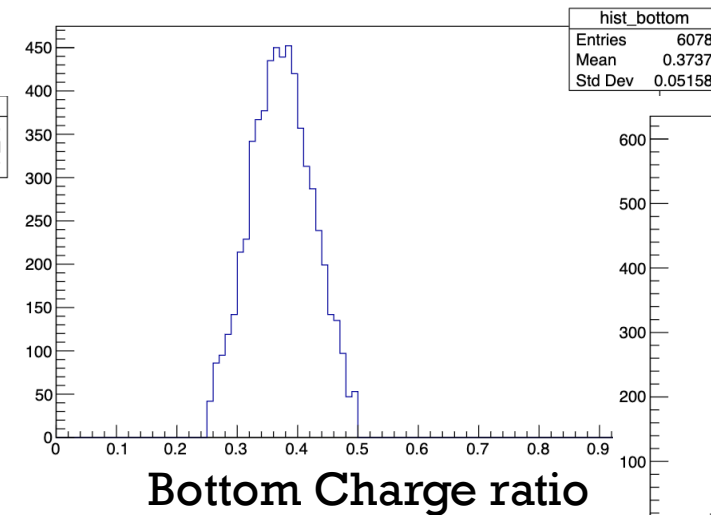
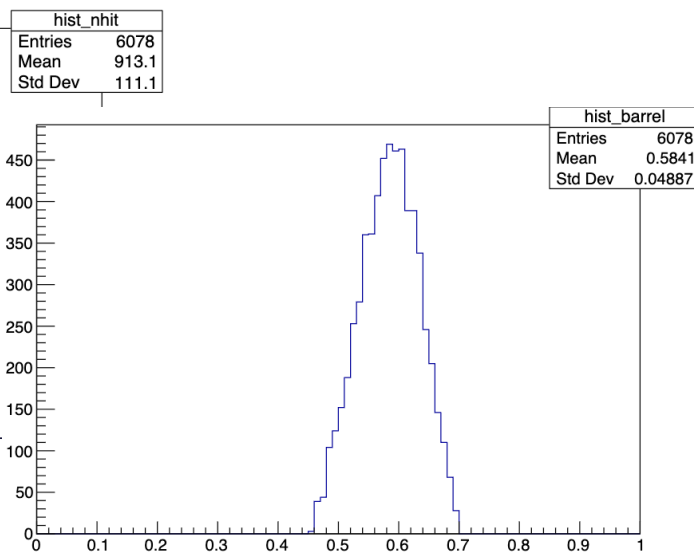
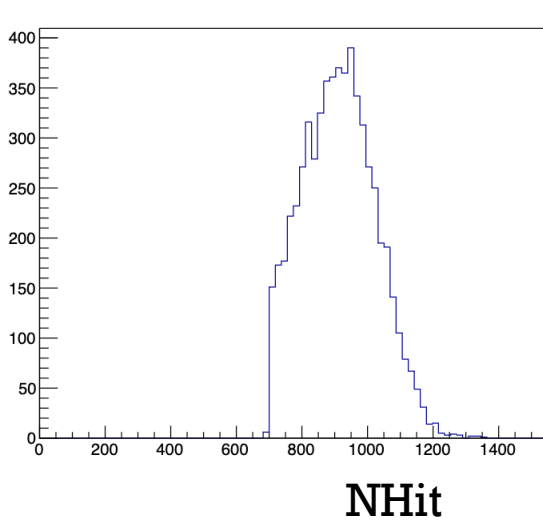
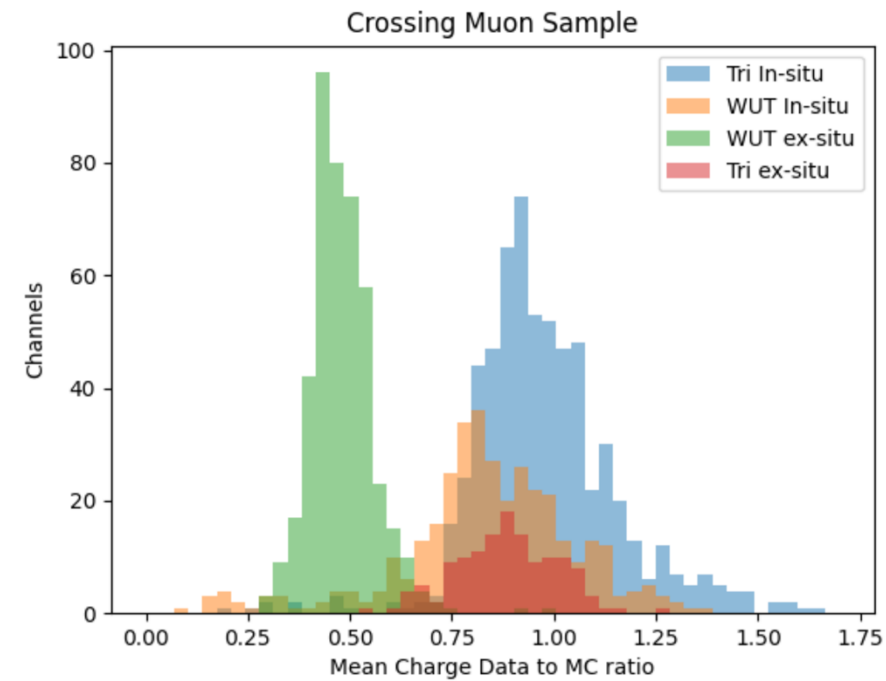
To match MC and data

- But with the same cuts on data
 - NHit and charge peak shifts to lower value
 - Double peaks in charge ratio



To match MC and data

- From independent study of through going beam muons
 - One group of PMTs has ~10% less charge collected
 - Another group has additional 50% less charge
- Reprocess MC to apply ad-hoc correction



Barrel Charge ratio

Total Charge

Thoughts

- PMT efficiency adjustment brings MC closer to data but not perfect
 - 10% less NHits but similar total charge: less low charge hits from reflection? Digitization model not correct (e.g. under-amplified region)?
 - Charge ratios are shifted: efficiency reduction is not uniform?
- However the fake data is sufficiently different from nominal, can be a good test for fiTQun reconstruction (after all only entrance and exit points matter at this stage)
- Need to implement PMT masking in fiTQun
 - Ryo suggested a way that looks easy enough