

WCSim study for mPMT hybrid option

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mPMT meeting

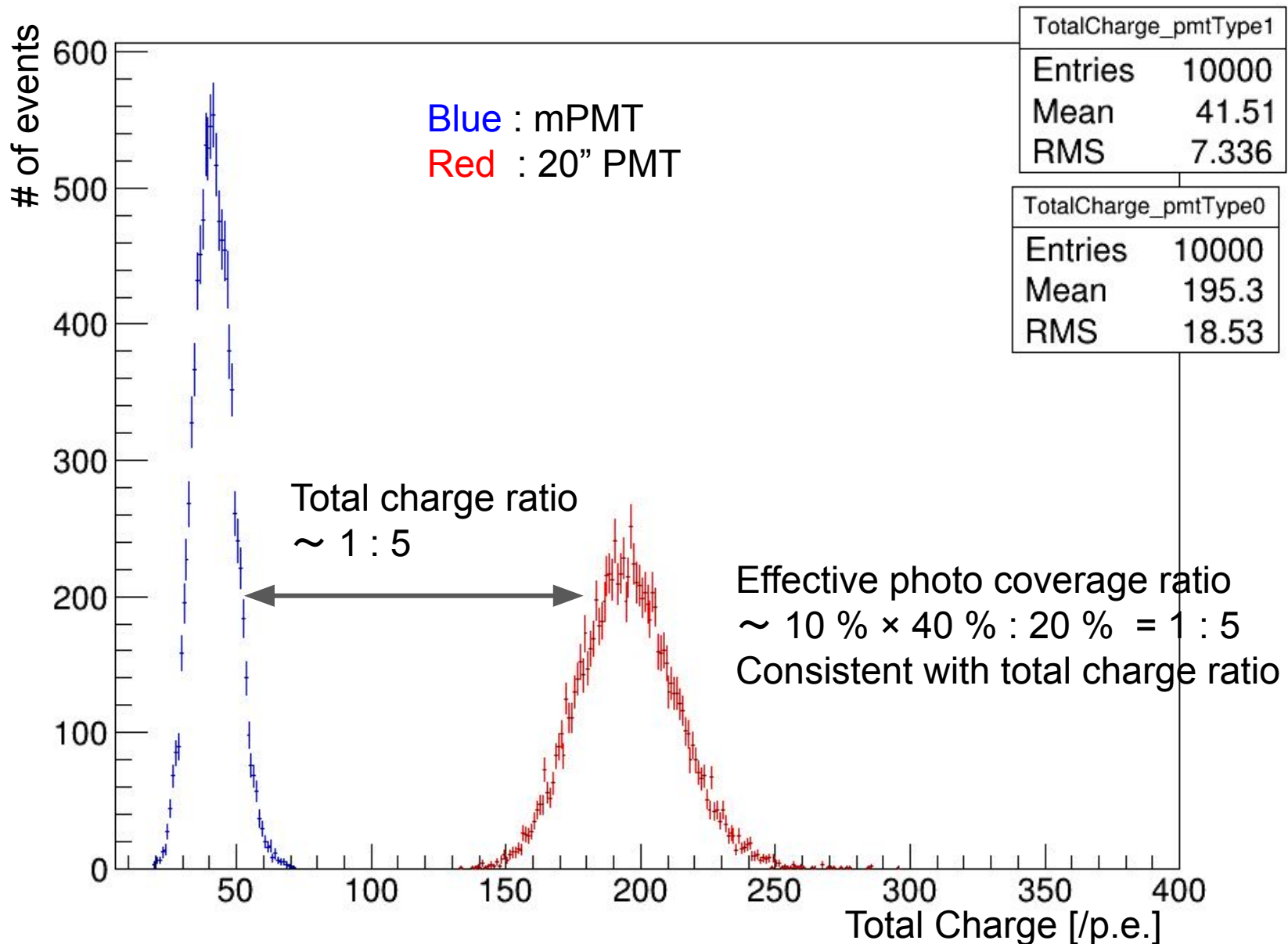
Low energy events and neutron tagging

- My interests: low energy neutrinos
 - Supernovae neutrinos (diffused or not), solar etc.
- mPMT has some advantages
 - Lower dark rate
 - Better timing resolution
 - Angle information of incoming Cherenkov photons
- Disadvantages
 - Smaller photo coverage
- Lower energy events have fewer hits
 - There is potential to get better performance of mPNT
- There are little study about performance of neutron tagging with using mPMT

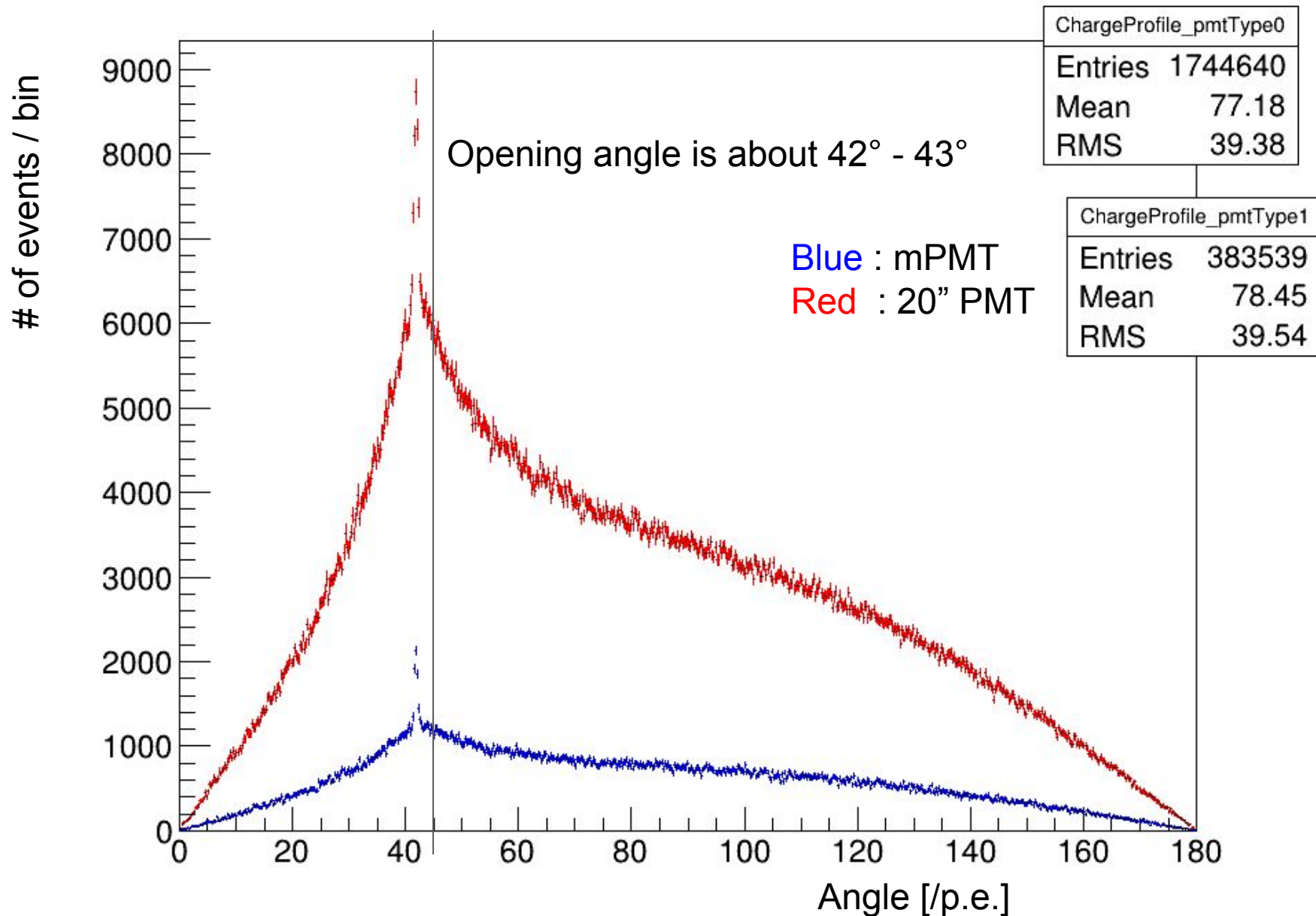
Simulation condition

- Detector: Hyper-K with 20" PMTs and mPMTs
 - Photo coverage: 20" PMT = 20 %, mPMT = 10 %
- Particle gun:
 - 10 MeV electrons
 - Uniform in detector
 - 10,000 events

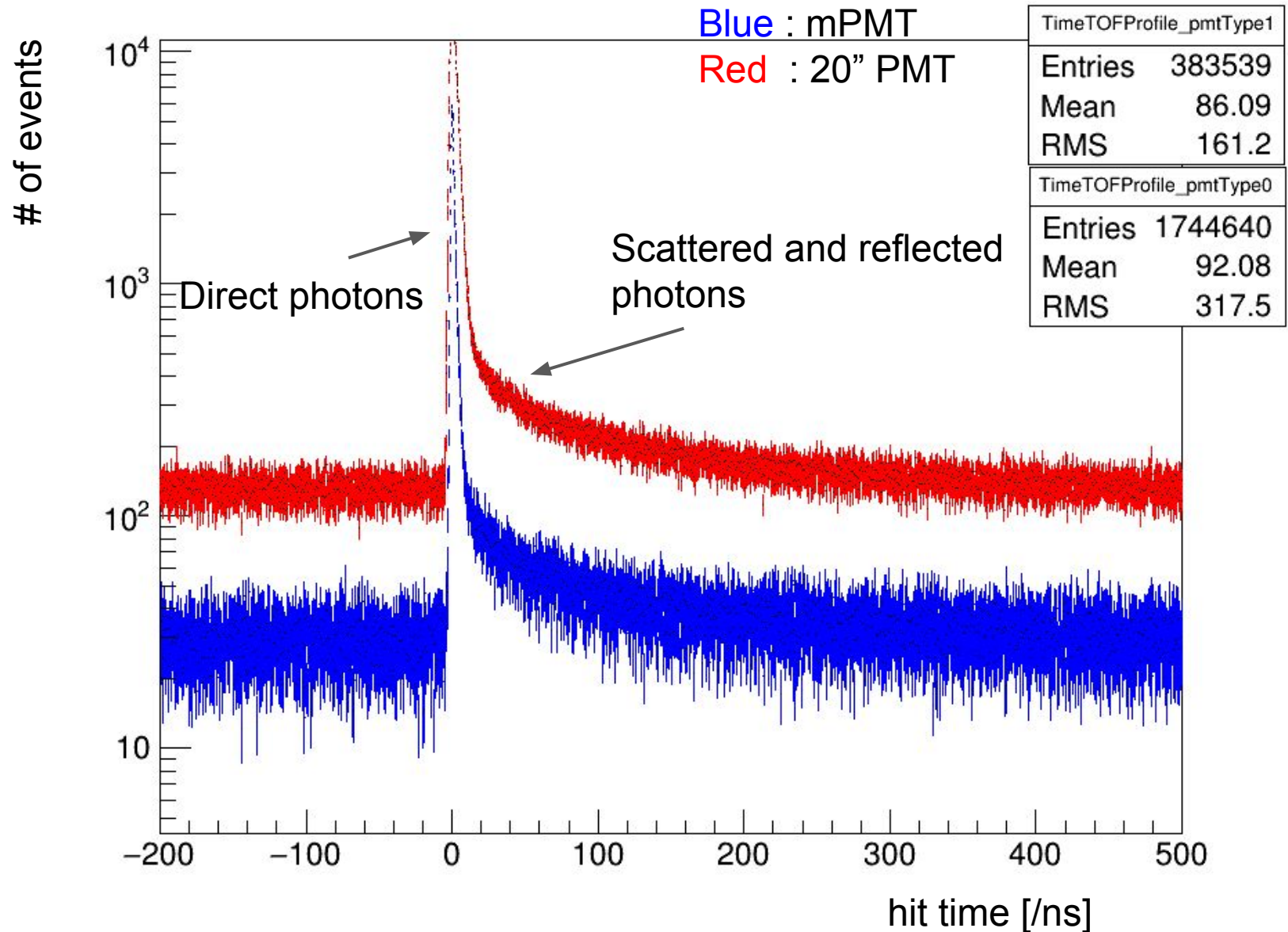
Total Charge



Charge Profiles



Time distribution (TOF substructed)



Summary

- Basic plots looks good
- Total charge of mPMT is about 1 / 5 of 20 in PMT
- Opening angle of Cherenkov ring $\sim 42^\circ$
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Plans

- Check ring reconstruction performance with BONSAI and a method of Benjamin-san
 - Distance from wall to vertex
- Improve WCSim with detailed property of 3 inch PMT
- Try neutron tagging with mPMT
- Check effects due to Rn abundance