

Status of fiducial study

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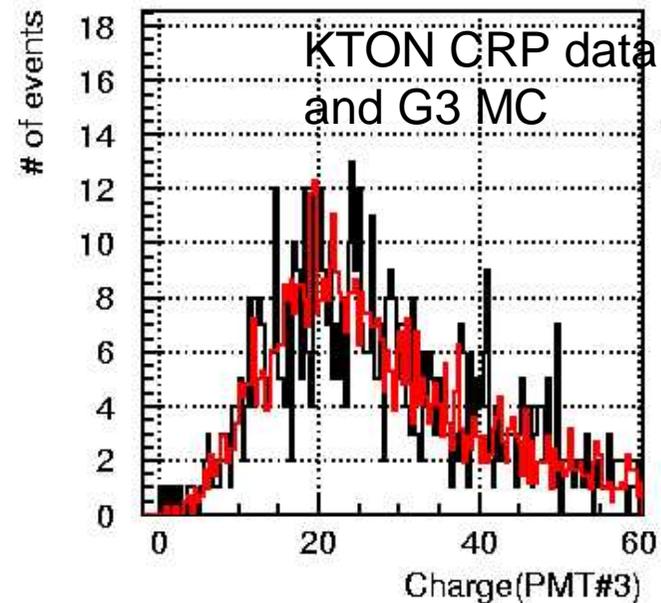
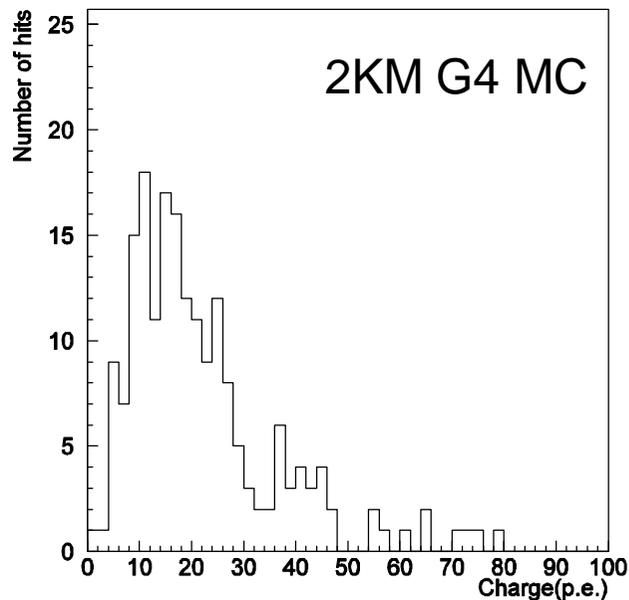
2km video meeting

fiducial study update

- We just showed very preliminary simulation result in previous T2K meeting
 - only $\nu\mu$ QE events, no event reconstruction, i.e. true vertex was used for analysis
- We need to update fiducial study
 - considering 2km $\nu\mu$ flux, all neutrino interactions (including non-QE), fitted vertex
 - need to add simulation results for revised 2KM proposal
- We've started simulation process (event generation, reconstruction) with fiducial PMT (FVPMT) detector condition

Chang in simulation code

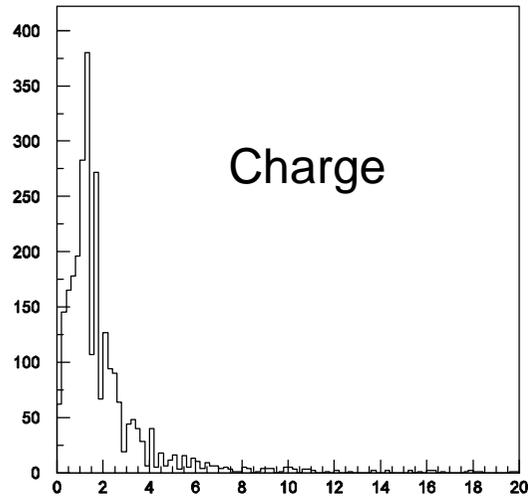
- bug fixed
 - we found a bug in G4 simulation code related to FVPMTs (no bugs in standard version), which was caused by wrong placement of fiducial logical volume in G4
 - in bug version, only Cherenkov photons which are produced closely were sensitive to FVPMTs.
 - checked with kton CRP configuration, seem to be OK



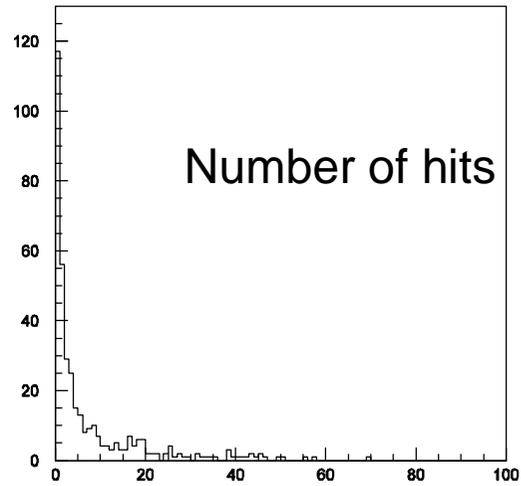
MC process w/ FVPMTs

- same MC tools as used in previous T2K analysis
 - 2km flux, detector tuning, event reconstruction
 - generated only $\nu\mu$ events
 - FVPMT condition: same as T2K meeting's
 - total 464 2-inch PMTs (top 52 + bottom 52 + barrel 360)
 - 50cm spacing, placed on fiducial edge, inward and outward alternately
- added ZBS interface for FVPMT analysis
 - modified root2zbs locally to add TQ bank for FVPMT hits
 - created analysis subroutines for reading TQ bank and PMT geometries in ZBS

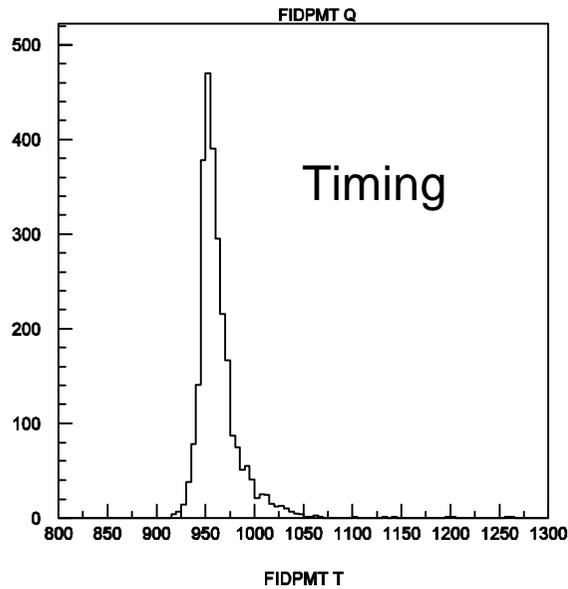
FVPMT hits



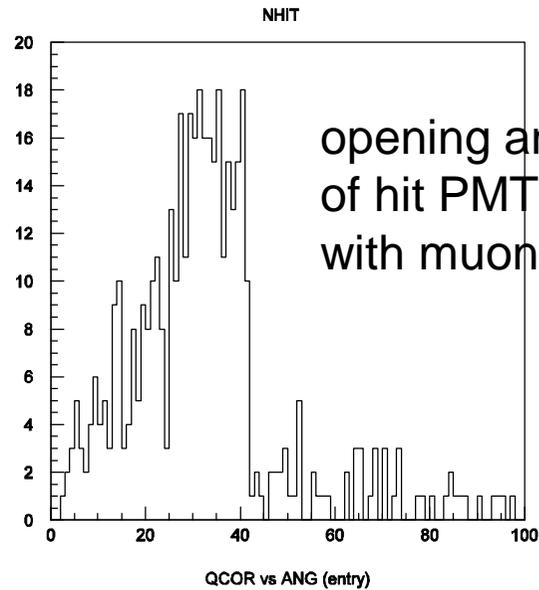
Charge



Number of hits

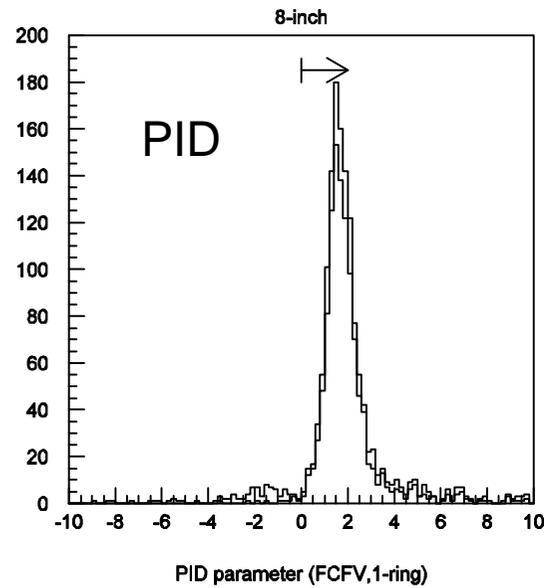
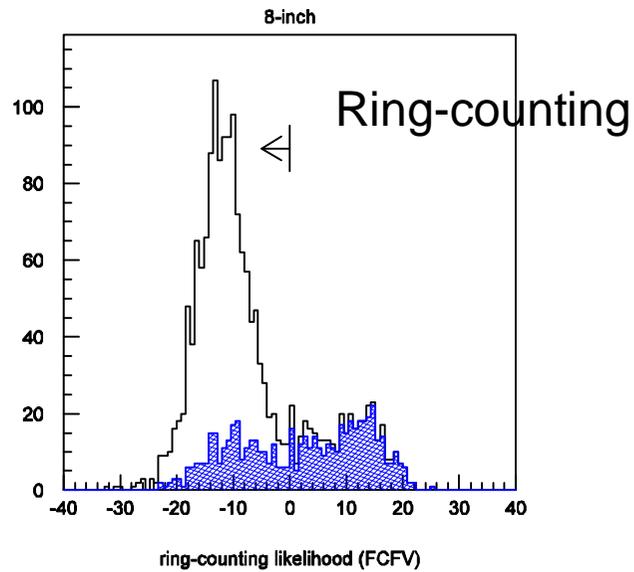


Timing

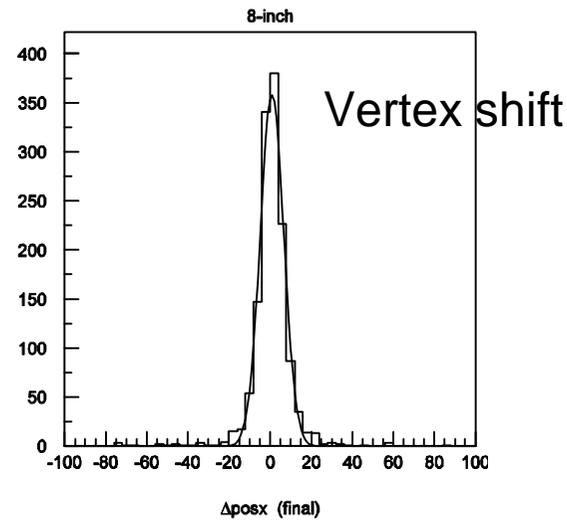
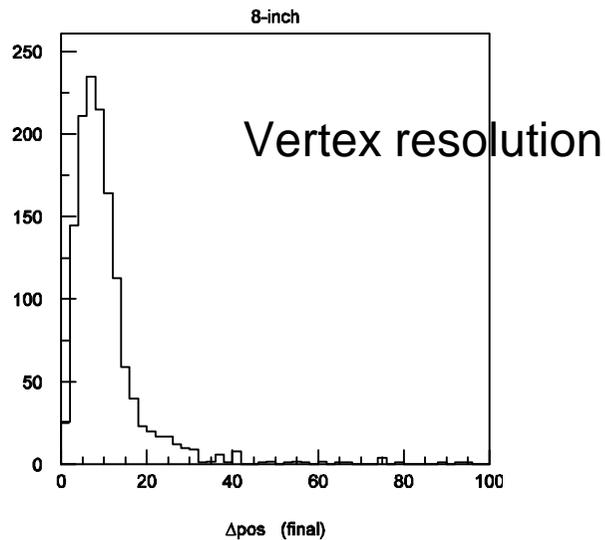


opening angle
of hit PMTs
with muon direction

Event reconstruction w/ FVPMT



reconstruction performance
seems to be good
even with FVPMT



Plan

- MC process (event reconstruction) :
1week~10days
 - aiming at processing 1.5M $\nu\mu$ events
 - processed on ICRR computer system, but now many jobs are running
- Mituka-san will improve his fiducial study using fitted dataset
- Cost estimate (FVPMT, support frame, electronics, etc.) will also be needed