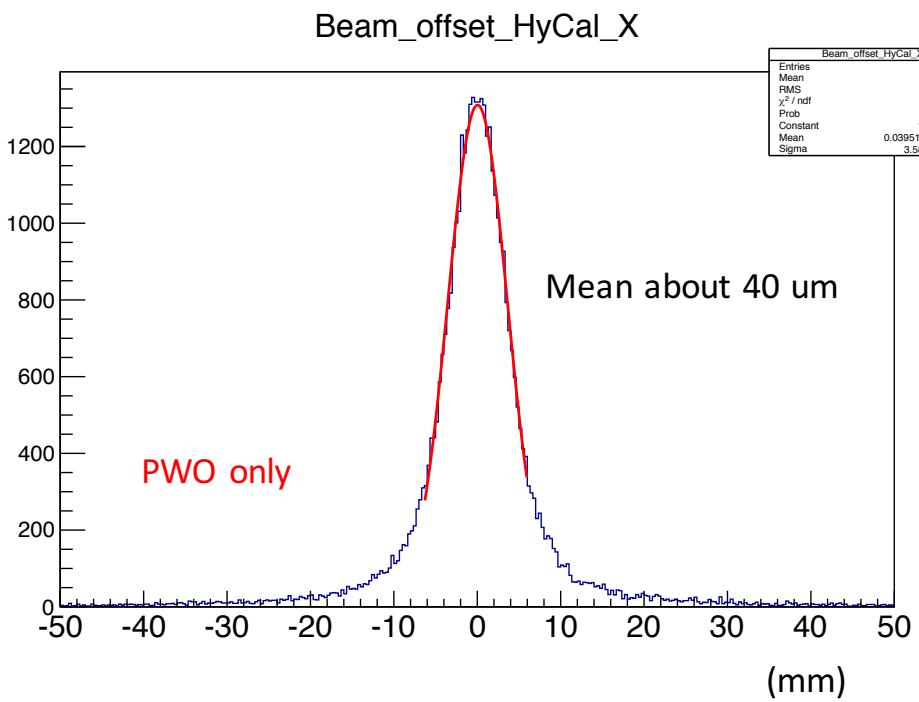
Progress of the Week

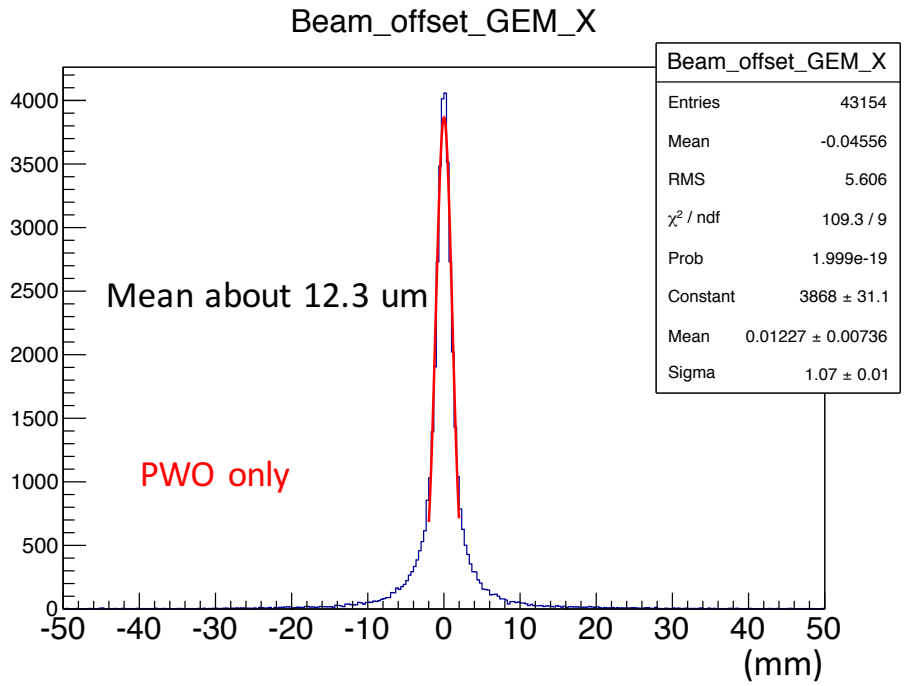
- Working on physics calibration for 2.2 GeV
  - Run 1443 ~ 1516
  - 477M events (>60% of all 2.2 GeV data)
  - Enough statistics for both ep and ee except for a few modules at the very corner
  - Finished 3rd literation with ep as the calibration energy

- Working on calibrating the inner module with the help of GEMs
  - Need to correct for the offset first, and also shower depth and relative z distance between HyCal and GEM
  - Use GEM hit to determine the shower center, and the tail of the cluster to calibrate inner module

Beam Offset Correction

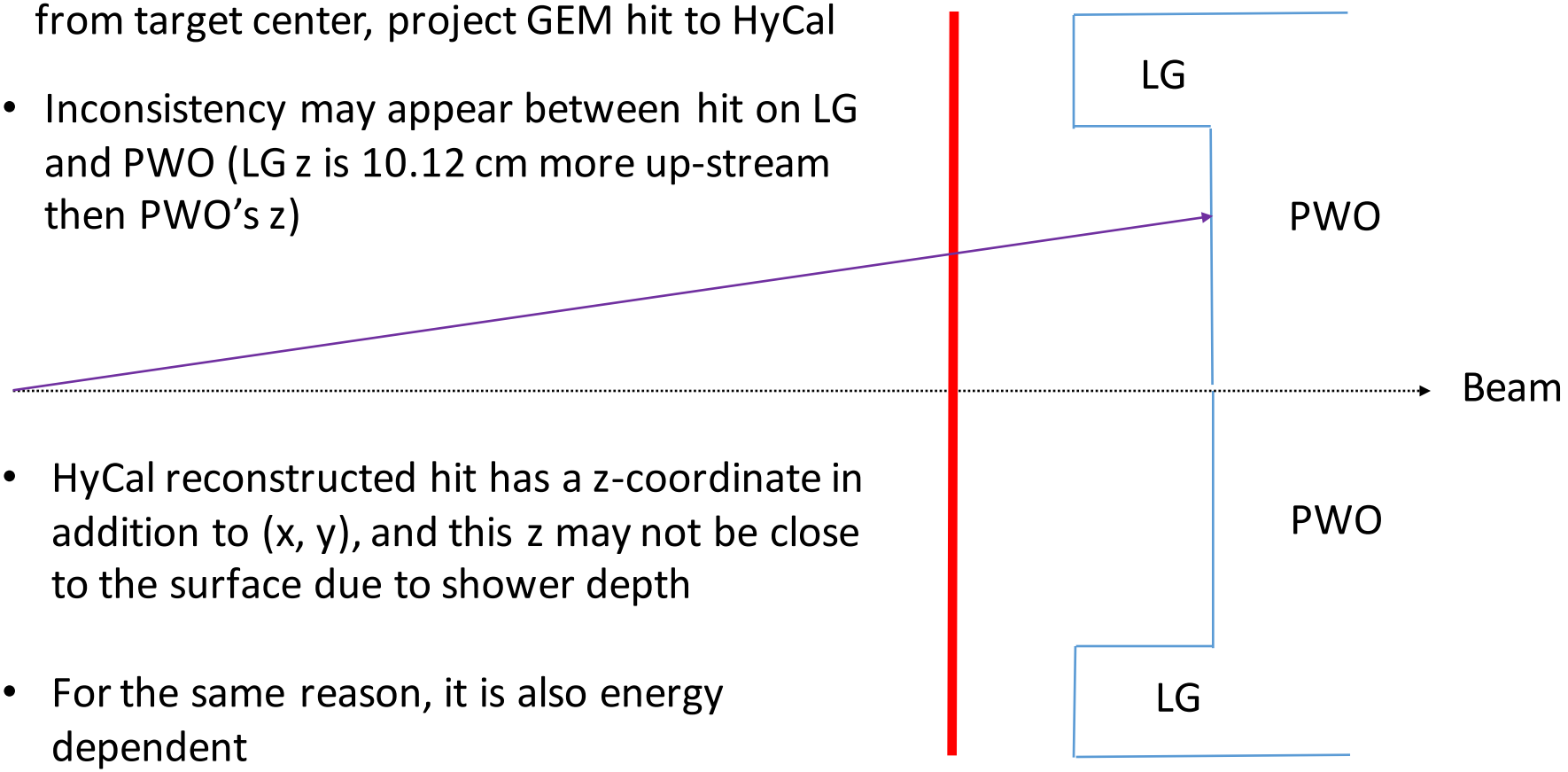
- Relative offset between GEMs provided by Xinzhan
- Beam offset corrected using ee for HyCal and GEM separately
- Both detector in beam coordinate, relative rotation might still exist

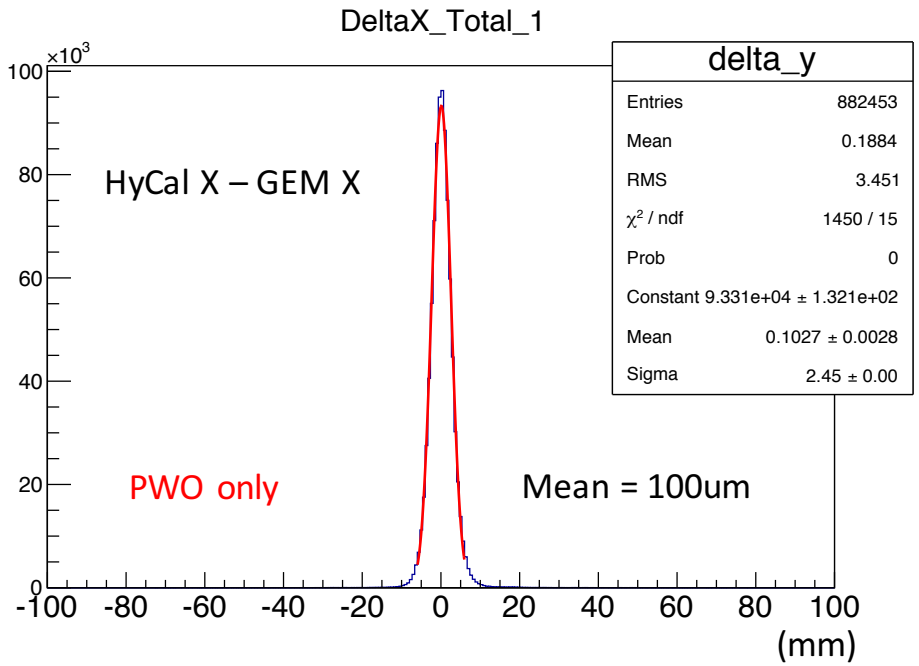


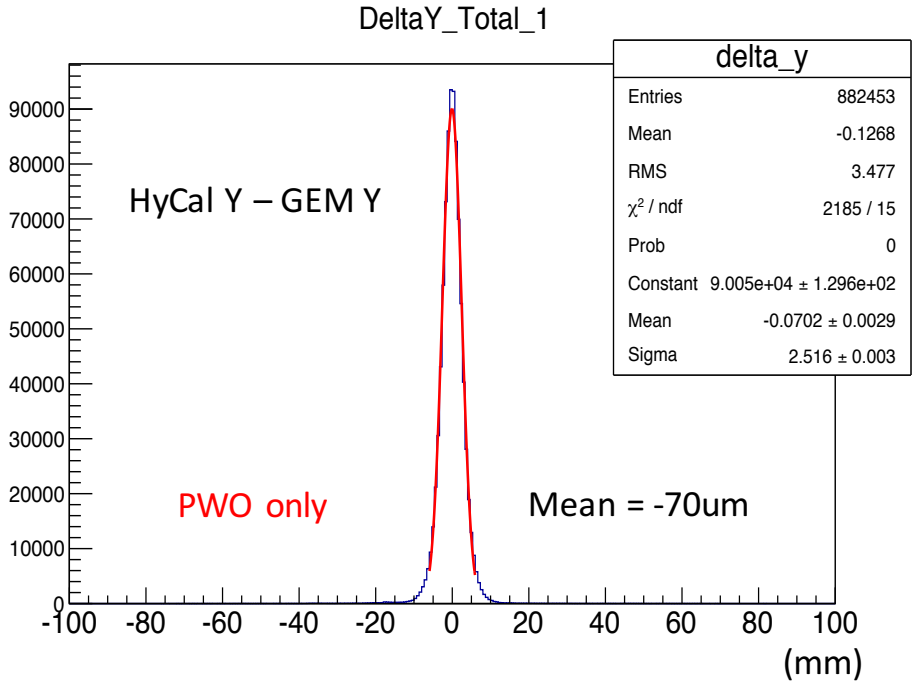


Project GEM hit onto HyCal

- Using surveyed z coordinate of HyCal and GEMs and assume the track comes from target center, project GEM hit to HyCal
- Inconsistency may appear between hit on LG and PWO (LG z is 10.12 cm more up-stream then PWO's z)
- HyCal reconstructed hit has a z-coordinate in addition to (x, y), and this z may not be close to the surface due to shower depth
- For the same reason, it is also energy dependent







- Delta x and y reasonably good, but they may not tell the whole story due to cancellation from positive and negative side
- Delta R and Delta Phi might be better for seeing certain shift and offset

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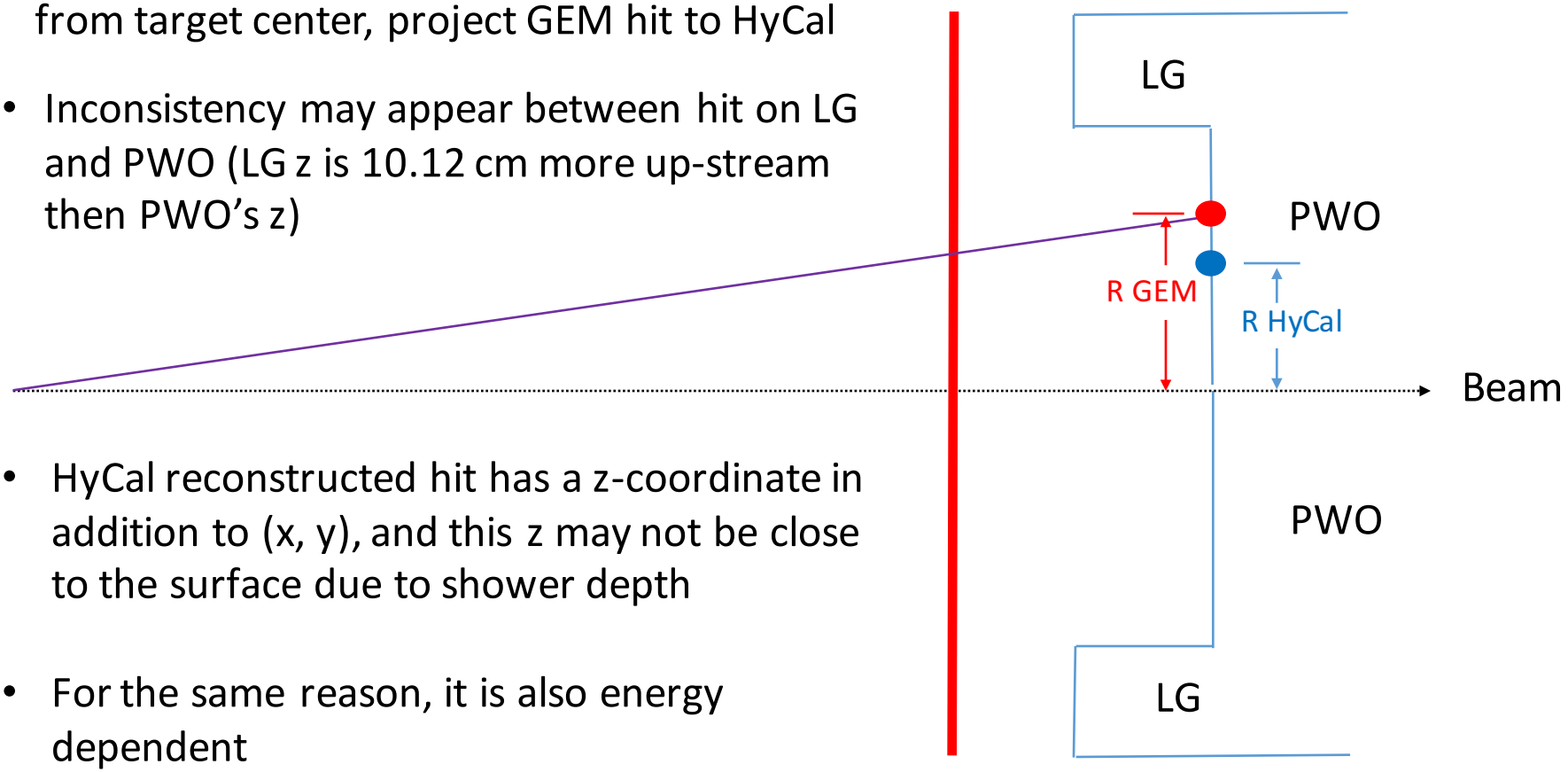

- HyCal reconstructed hit has a z-coordinate in addition to (x, y), and this z may not be close to the surface due to shower depth
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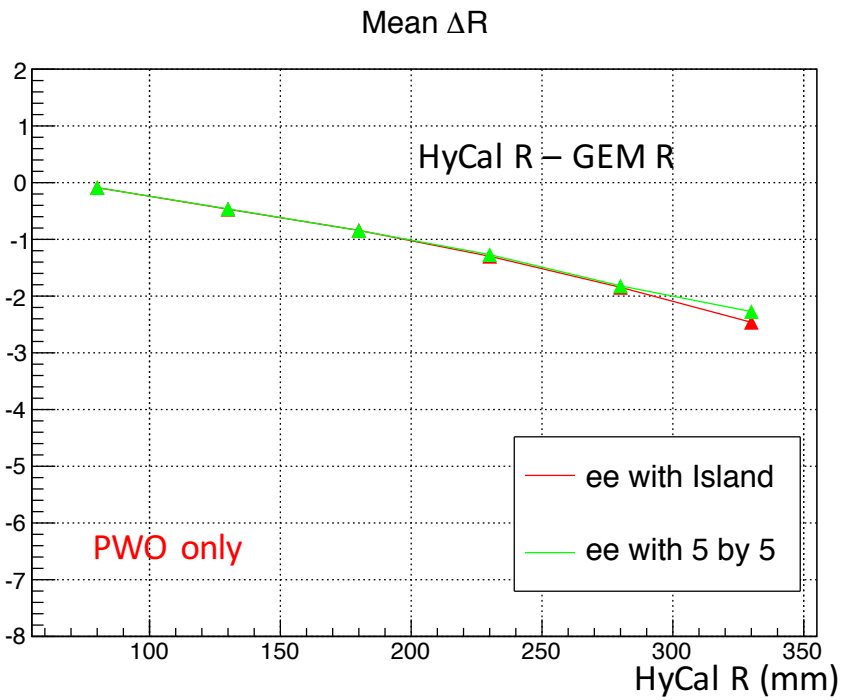
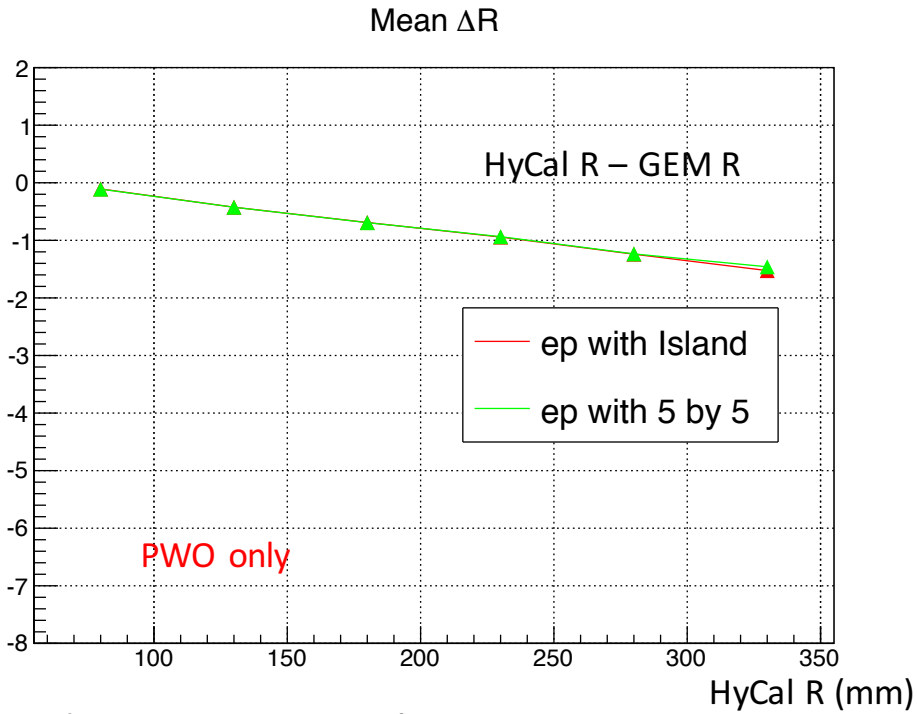
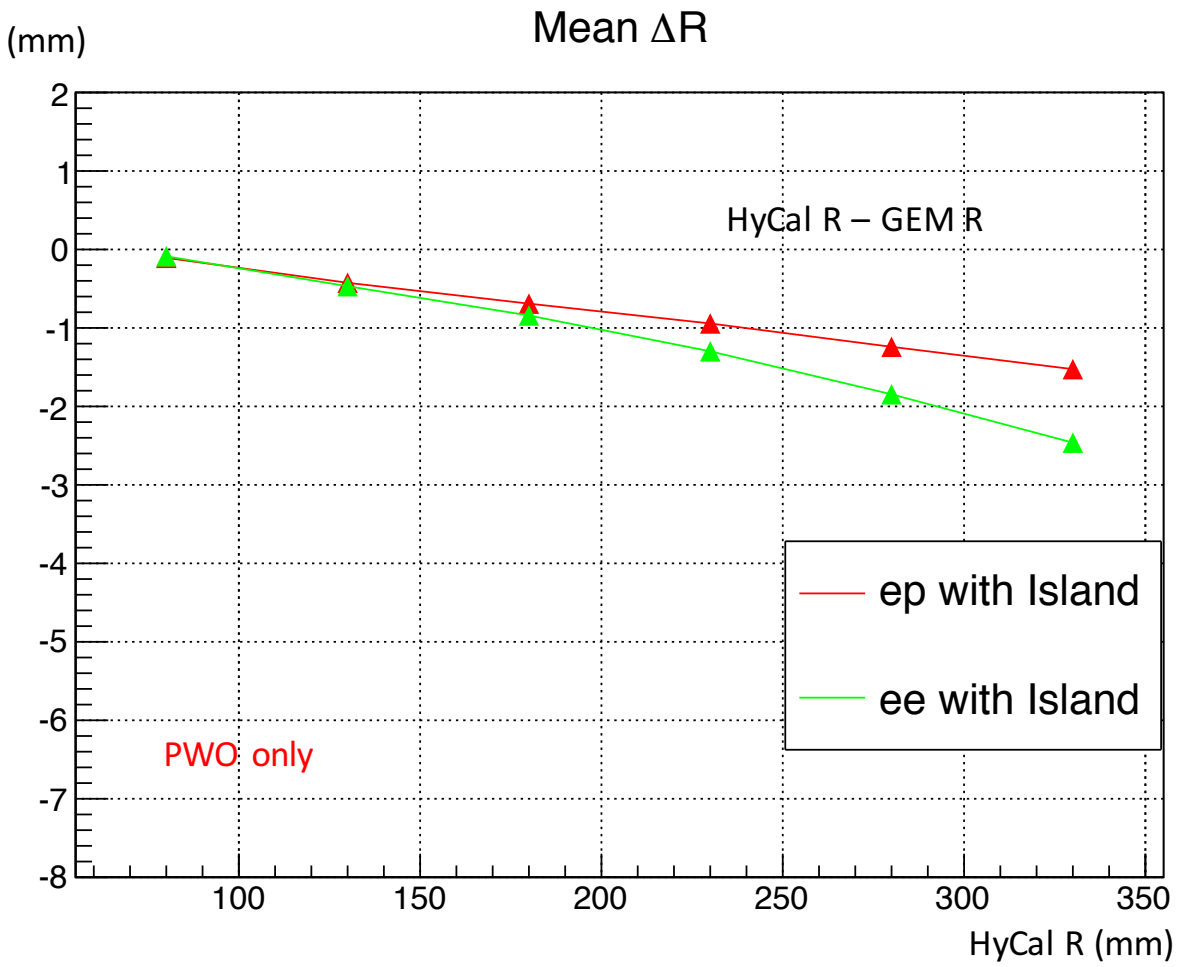
- Compare delta r between GEM and HyCal using both 5 by 5 and PrimEx island reconstruction algorithm



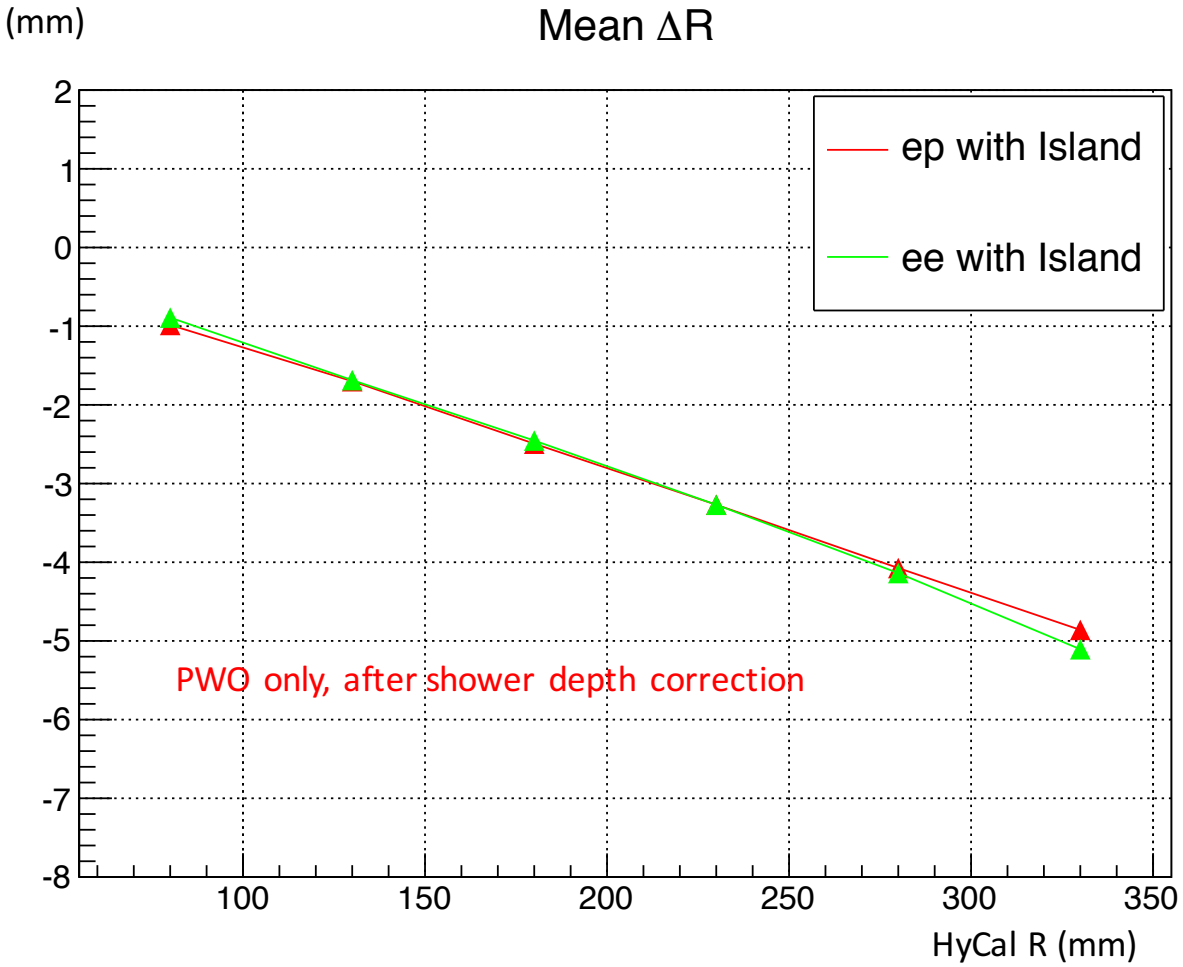


- 5 By 5 and PrimEx island gives pretty close and consistent result

- For each bin, the R or incident angles are the same
- The difference between ee and ep should come from the energy difference
- Is it due to shower depth?



- After applying the shower depth correction from PrimEx
  - All HyCal hit should be at PWO surface after correction (including LG hits)
- Difference between ep and ee largely eliminated but delta R is still non – zero
- Is the correction wrong or what if HyCal PWO surface is not at 5815mm?



Delta R in LG region for ee and ep, without shower depth correction