GEM reco updates

February 6, 2025
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Updated basic approach

- Previously removed first hit from saved GEM hits
  - Attempting to remove bias, as G4 always saves hit when particle enters a new logical volume
- New modifications:
  - Modified position of hit to be randomly located between pre and post step point
  - Only saving hit if the energy deposited is larger than the average ionization energy for 75%/25% Ar/CO2
- No new updates to the digi/reco procedure

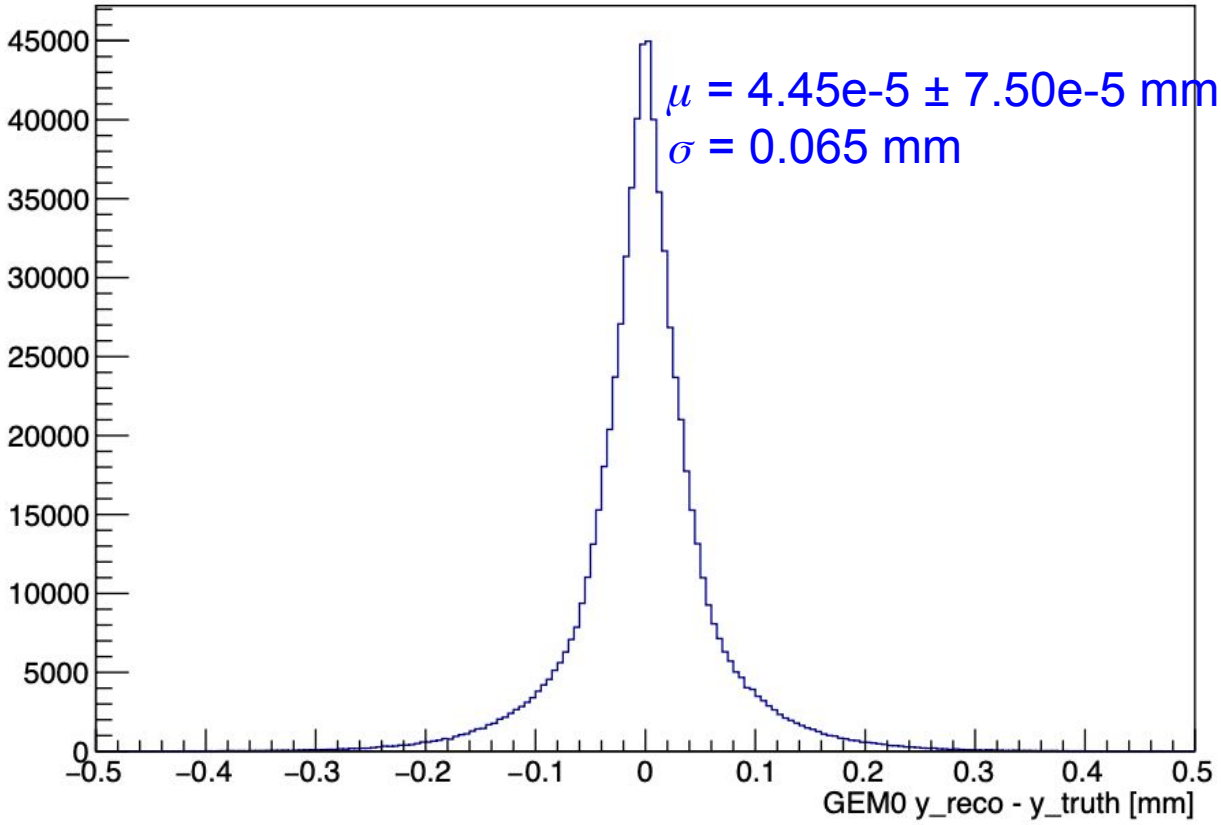
Truth matching

- Currently only looking at GEMs with one G4 track
- For each reconstructed hit, match closest G4 hit within a maximum of 1 mm radius
- If match is successful, add the individual hit to the histograms

Results for non-dispersive direction

- GEM 0 ->
- GEM 1
  - 2.04e-5 ± 1.30e-4 mm
  - 0.111 mm
- GEM 2
  - 7.95e-5 ± 6.70e-5 mm
  - 0.058 mm
- GEM 3
  - 1.59e-5 ± 9.96e-5 mm
  - 0.085 mm

No bias, resolution a bit varied but in the right ballpark



Results for dispersive direction

- GEM 0 ->
- GEM 1
  - 0.0033 ± 0.00022 mm
  - 0.190 mm
- GEM 2
  - 0.0035 ± 0.00022 mm
  - 0.188 mm
- GEM 3
  - 0.0035 ± 0.00022 mm
  - 0.188 mm

Small but consistent bias