EM validation results for ref-07

V.Ivanchenko

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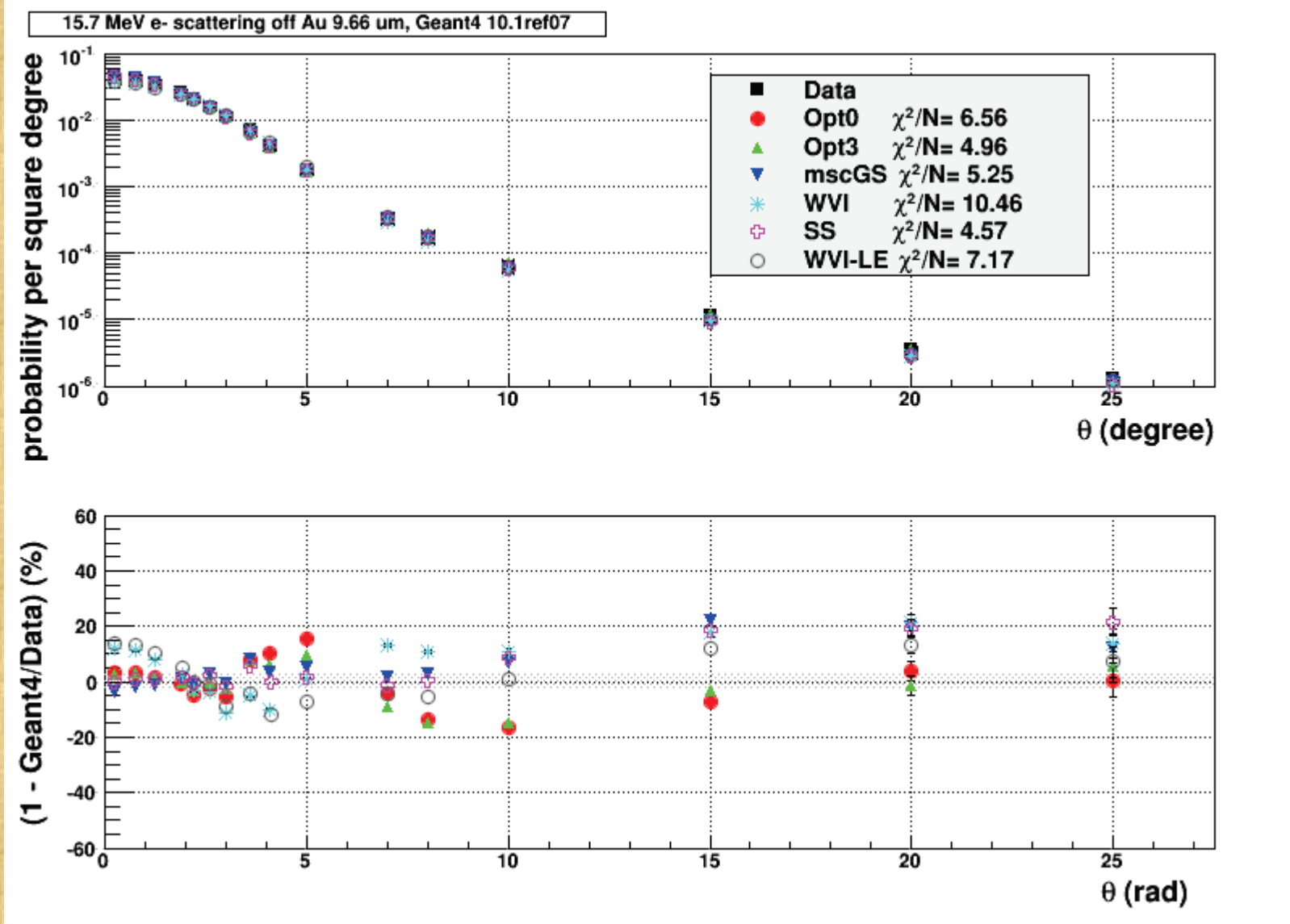
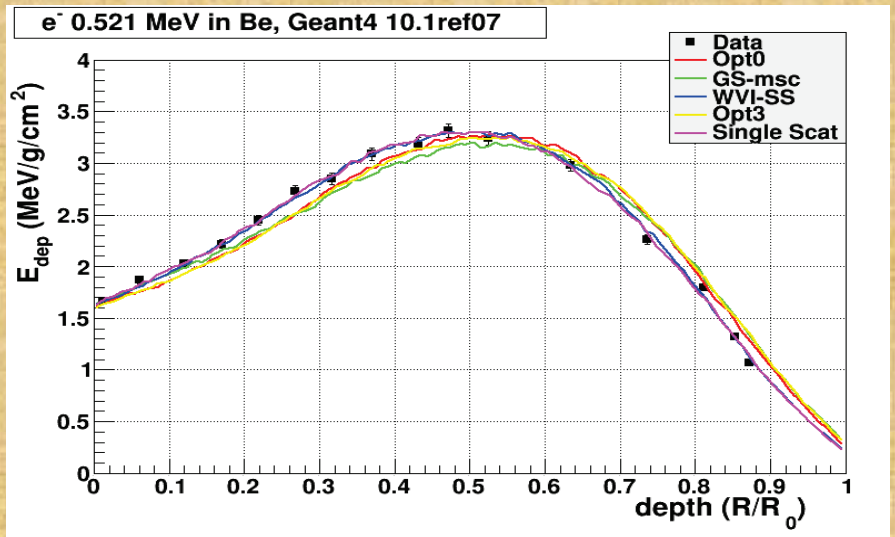
EM modifications for ref-07

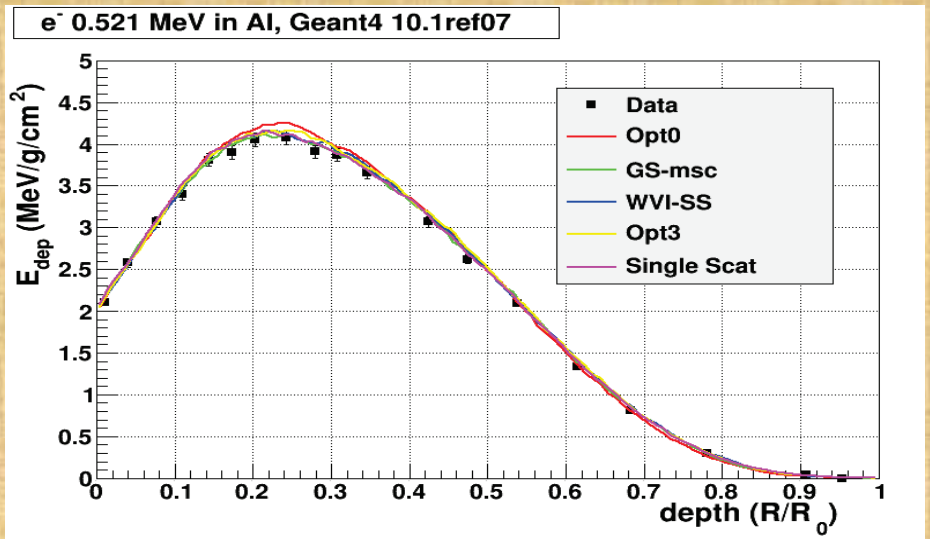
- G4EmParameters updated
  - Fixed initialisation (Daren Sawkey)
  - Added lowest energy limits for e+- and muons/hadrons
  - Add usage of lowest limits in energy loss processes
  - Removed hidden lowest limits from Coulomb scattering
- Fixed problems:
  - 1763 – correct recoil kinematics for single scattering
  - 1767 (M.Novak) initialisation of GS model
  - 1771 – non-reproducibility in ion ionisation
- G4hCoulombScatteringModel (K. Mashtakov)
- G4UrbanMscModel
  - Fixed rare long running events
  - Apply positron correction for any energy
    - In 10.2beta was 1 MeV upper limit
    - Only this modification may affect test results

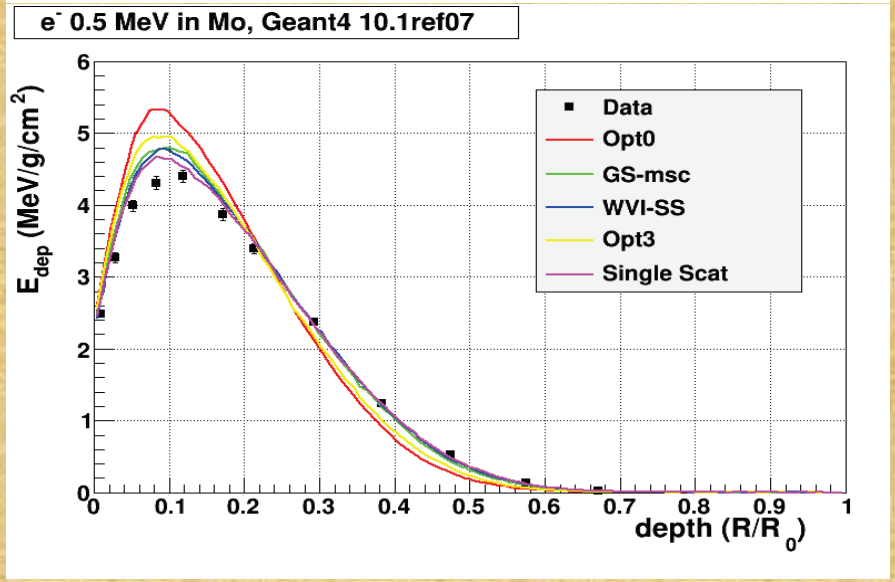
Hanson data for e- scattering off thin foil

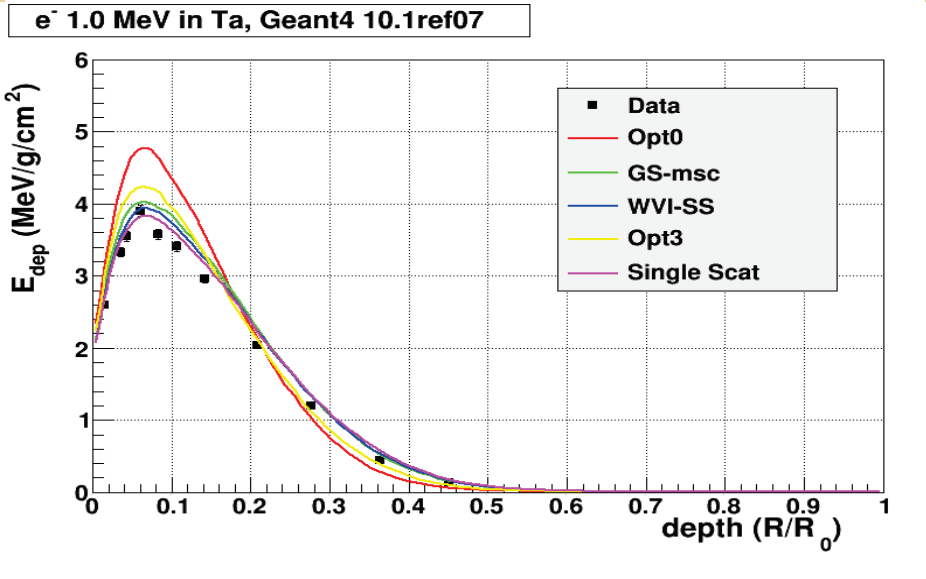


Sandia data - backscattering

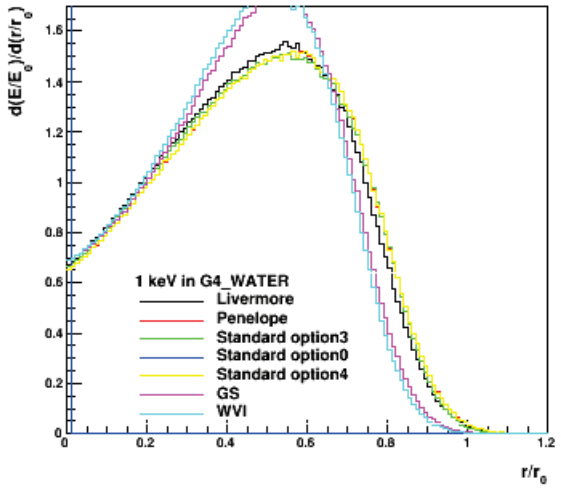


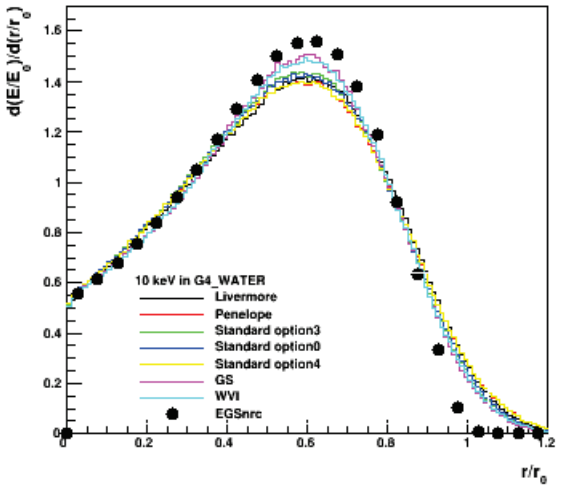


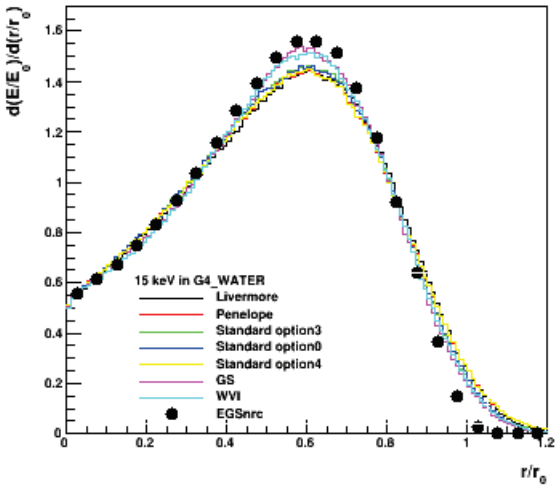


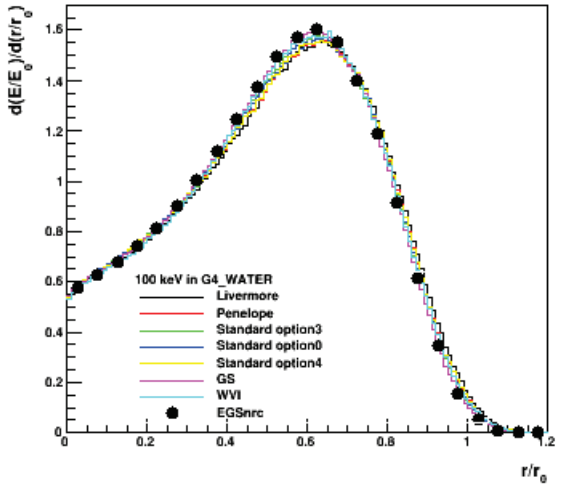


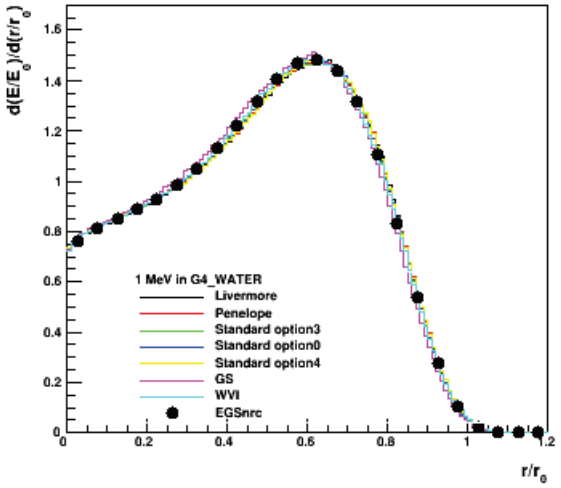
Dose point kernel (S.Incerti)





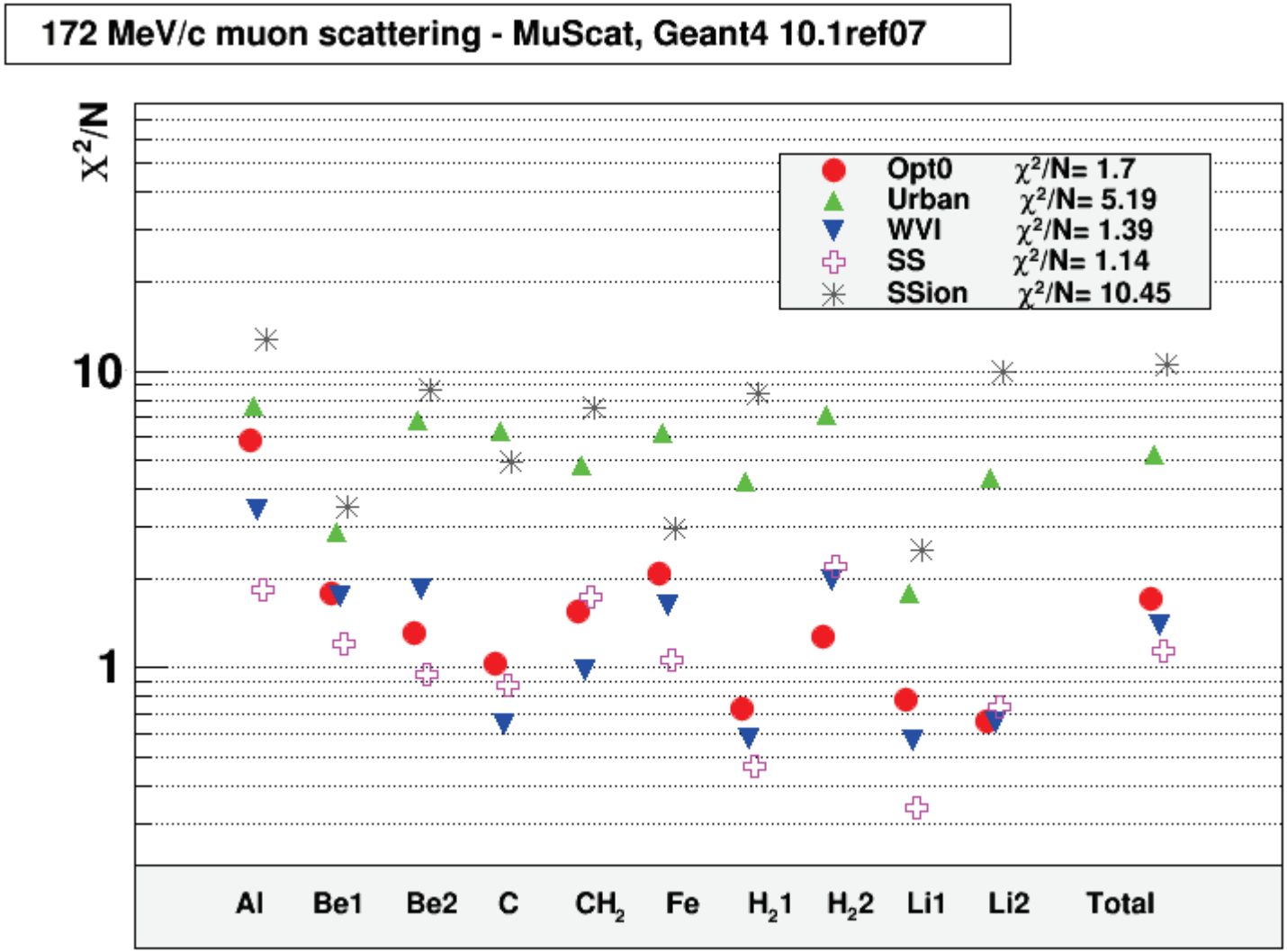




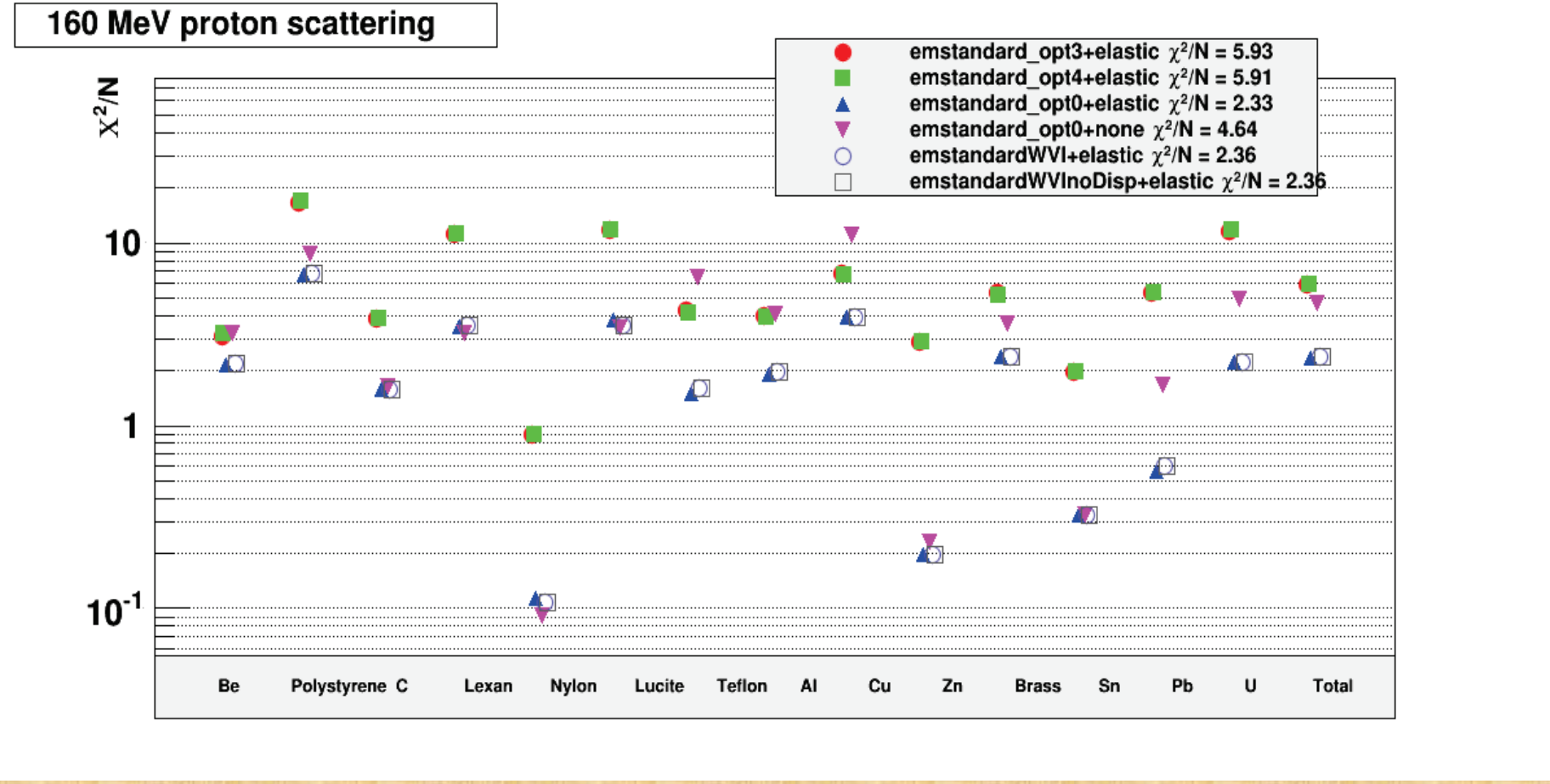


GS and WVI are closer to EGS than Urban

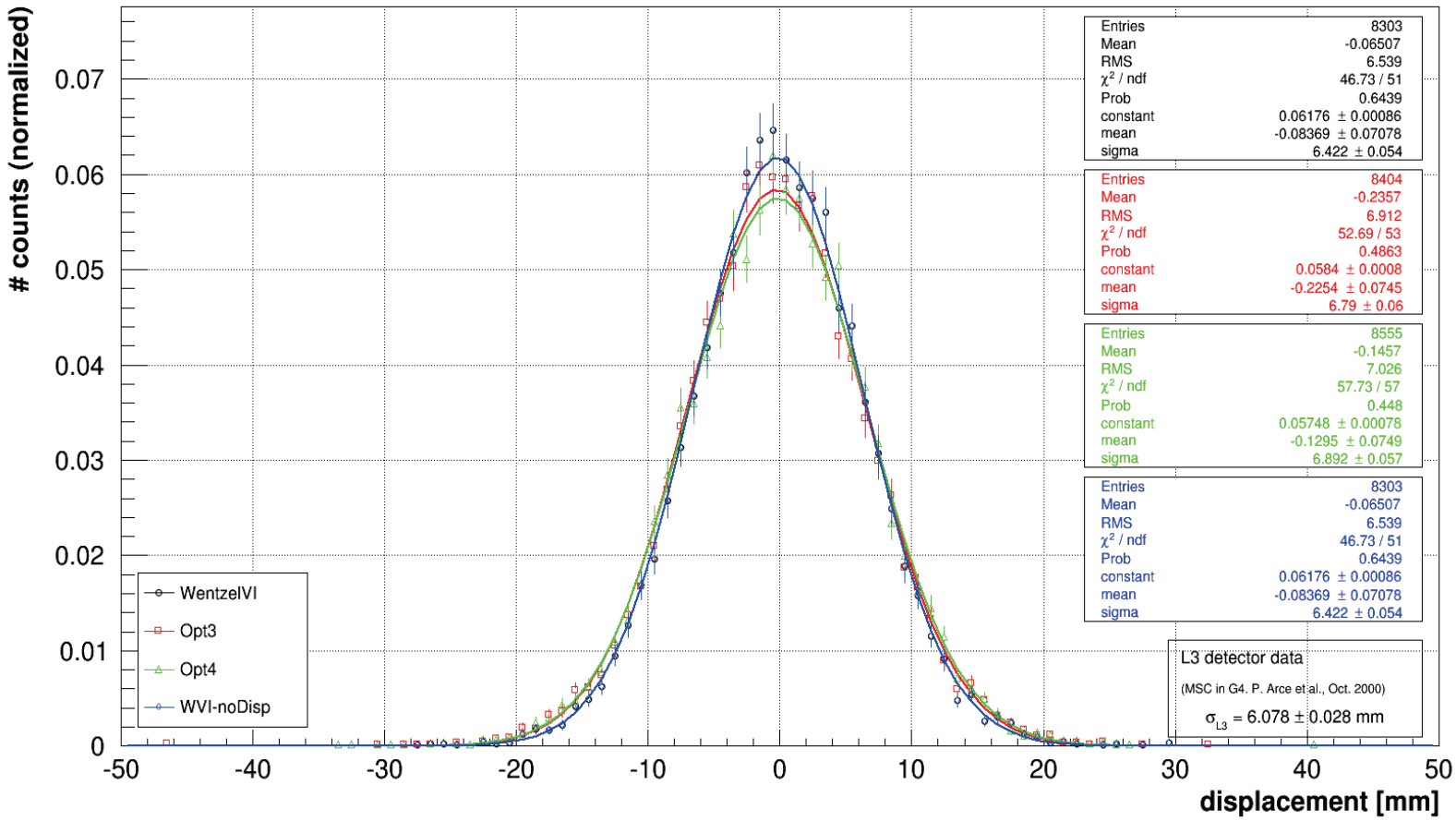
MuScat data – muon scattering off thin targets



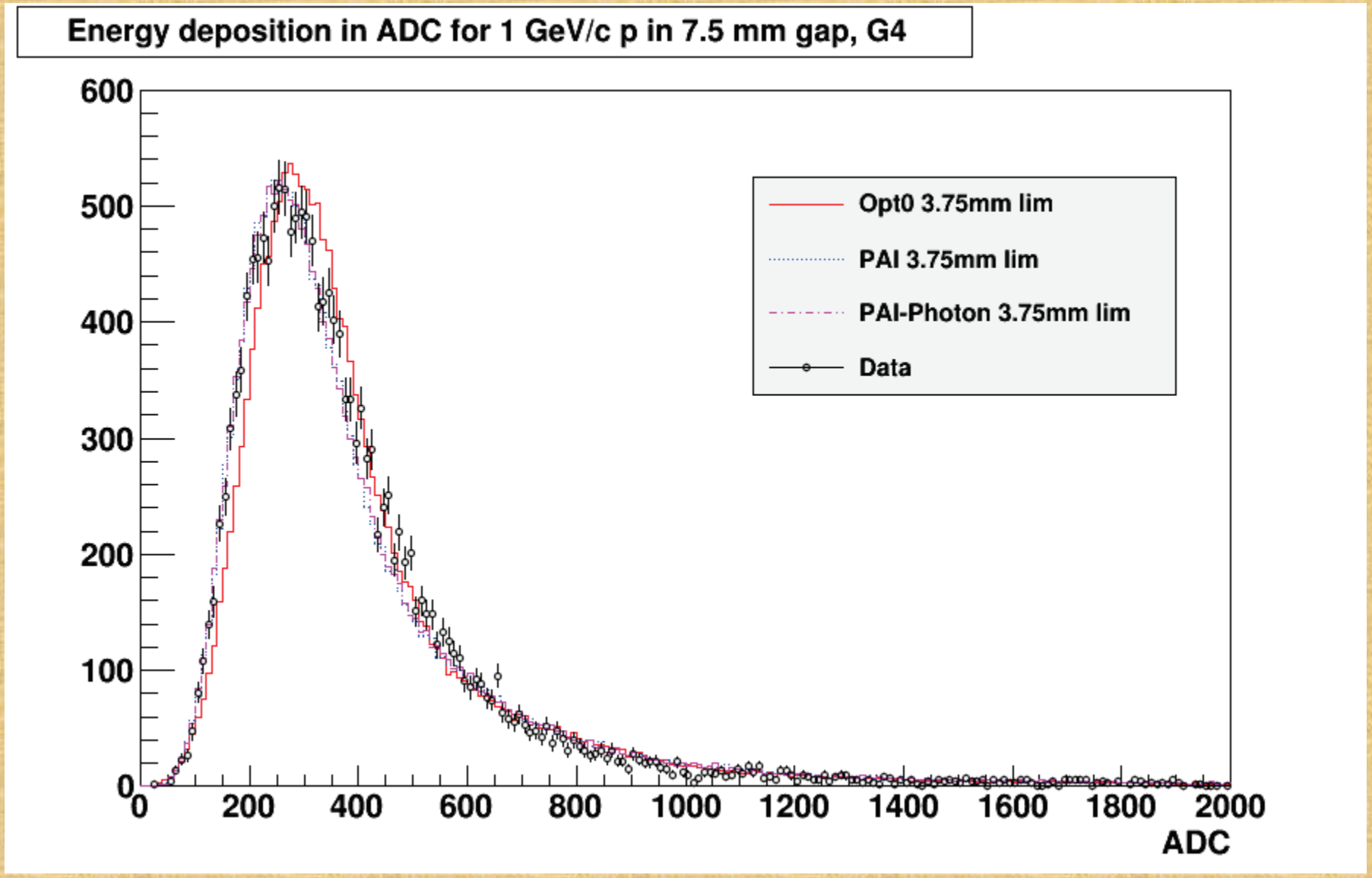
Thick proton scattering benchmark



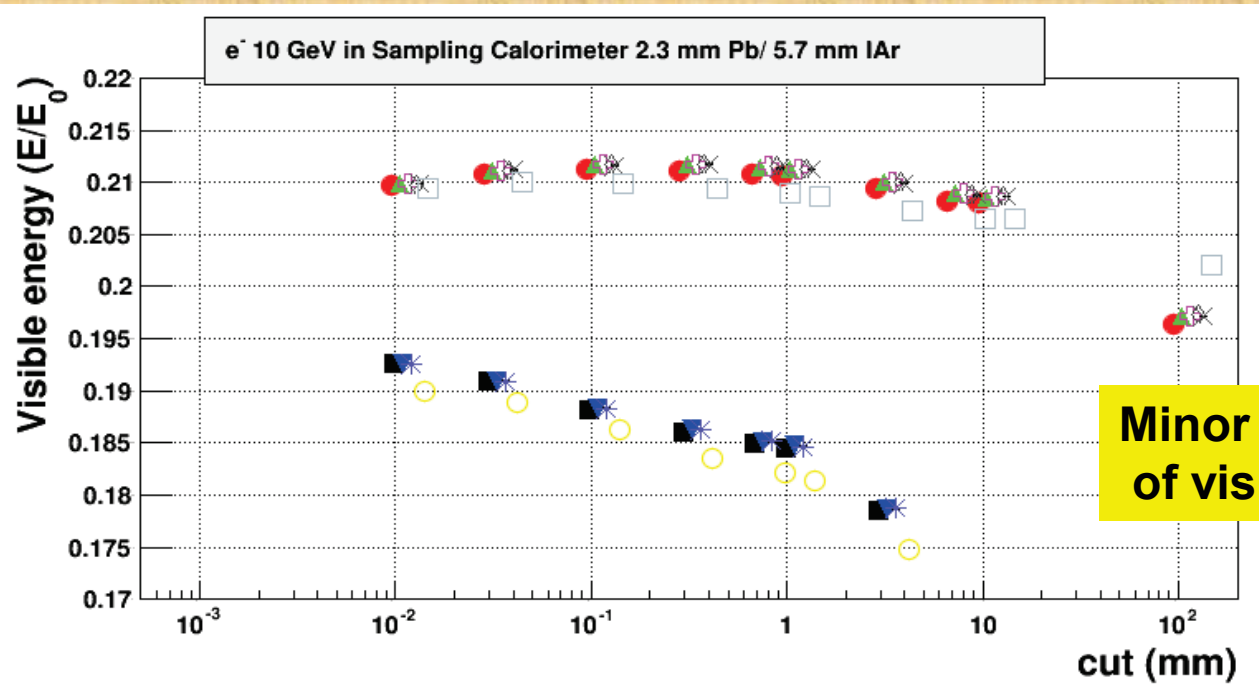
L3 muons from Z->μ+μ–



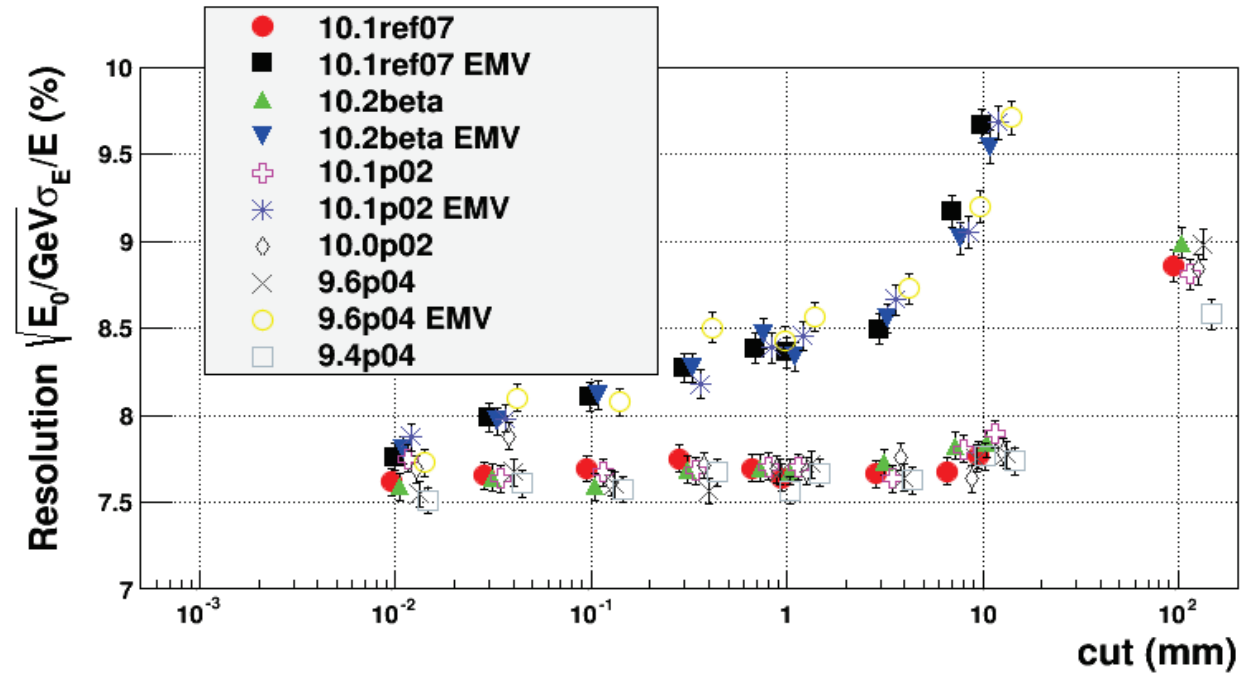
ALICE test beam for ionisation in TPC gas



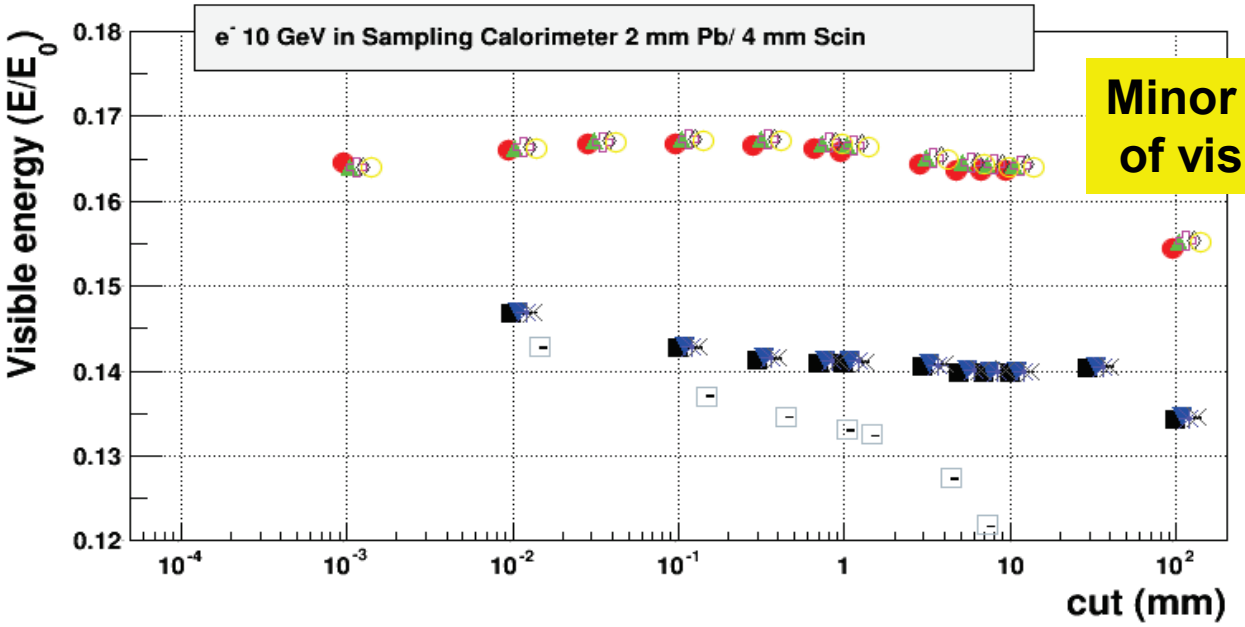
ATLAS barrel type simplified calorimeter results



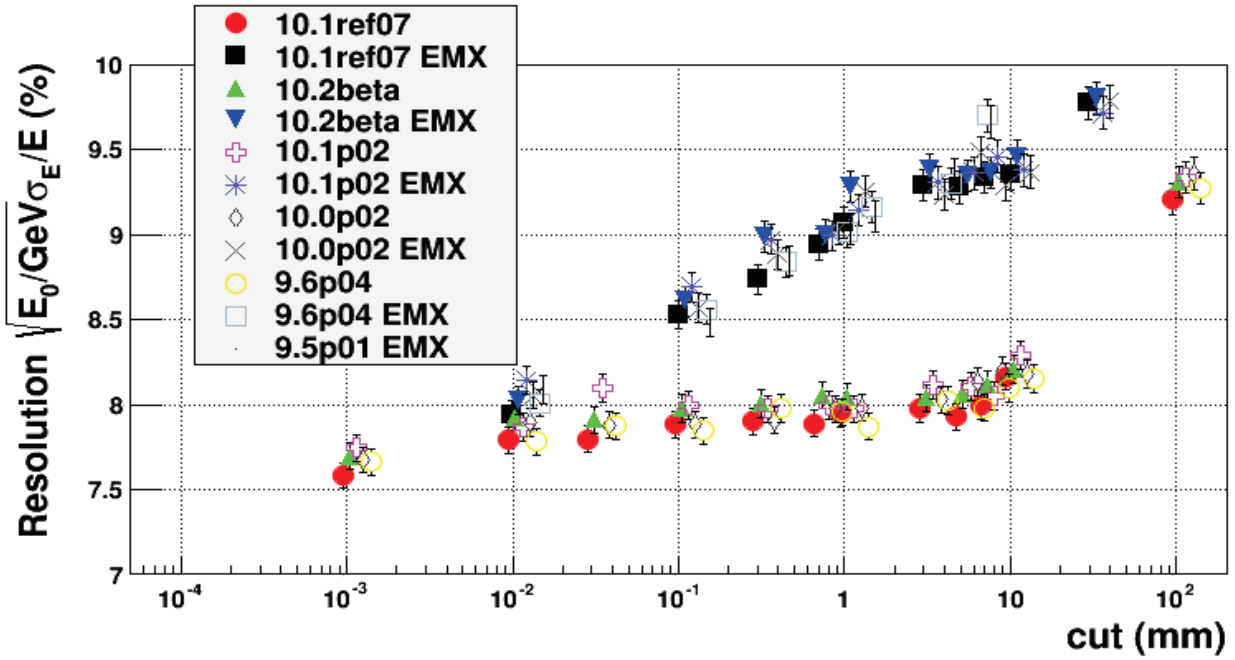
Minor decrease of visible energy



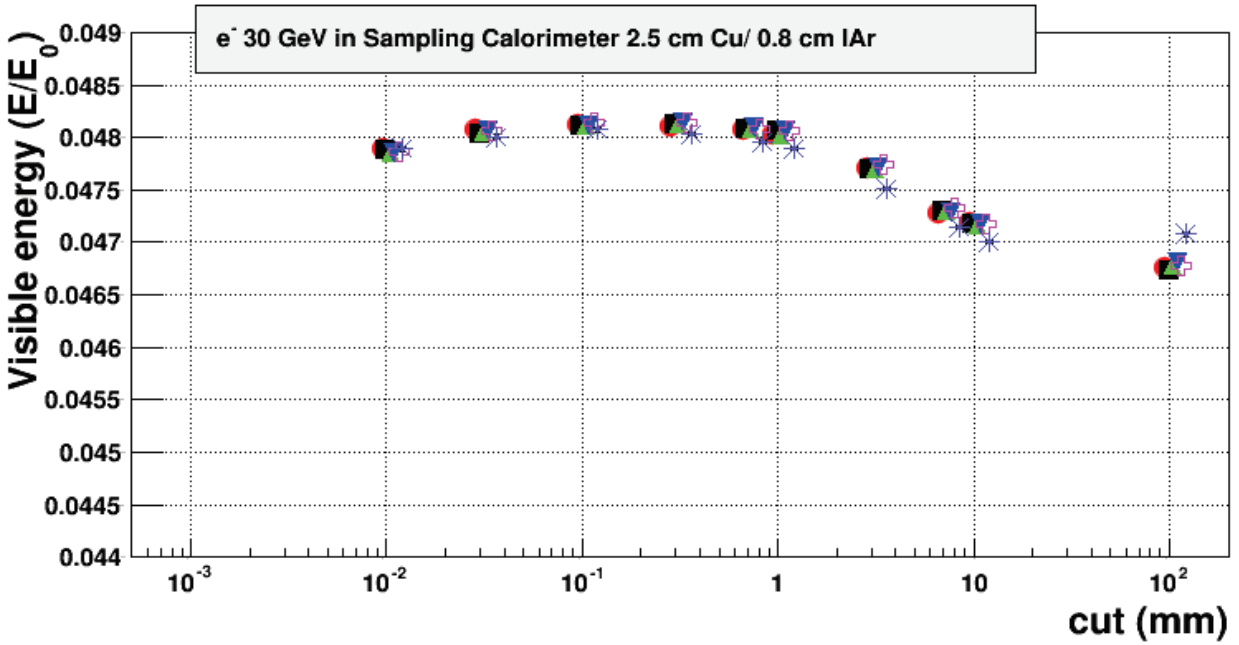
LHCb type simplified calorimeters

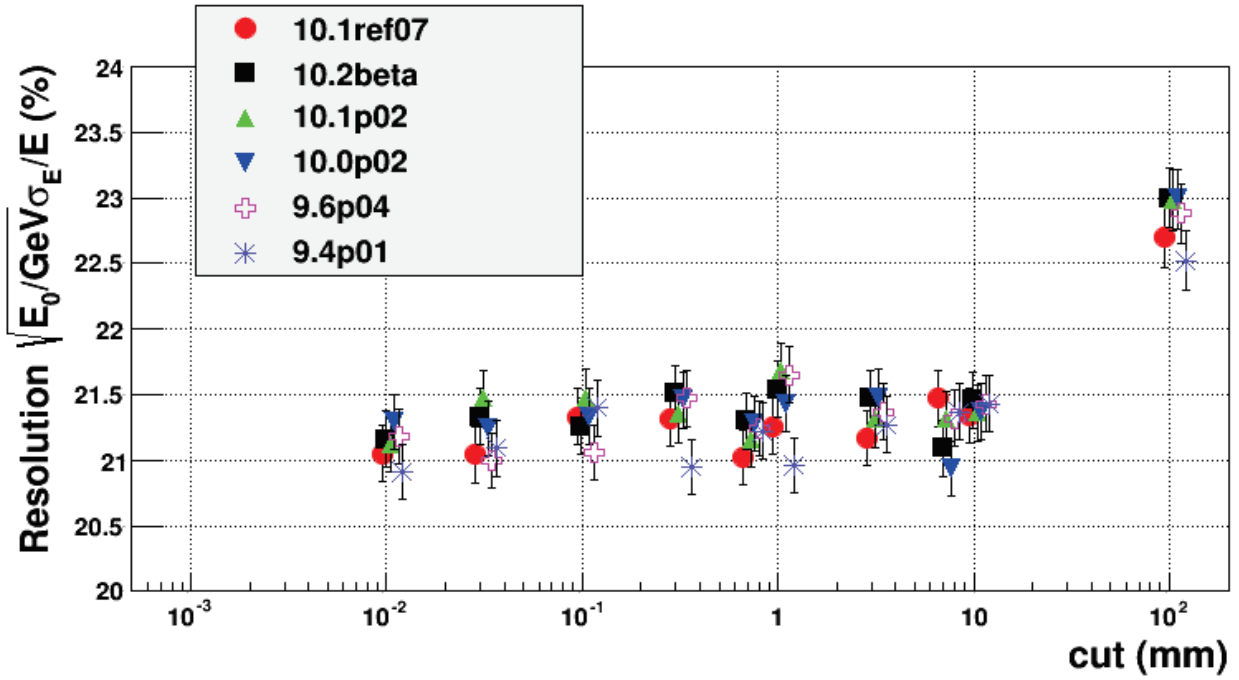


Minor decrease of visible energy

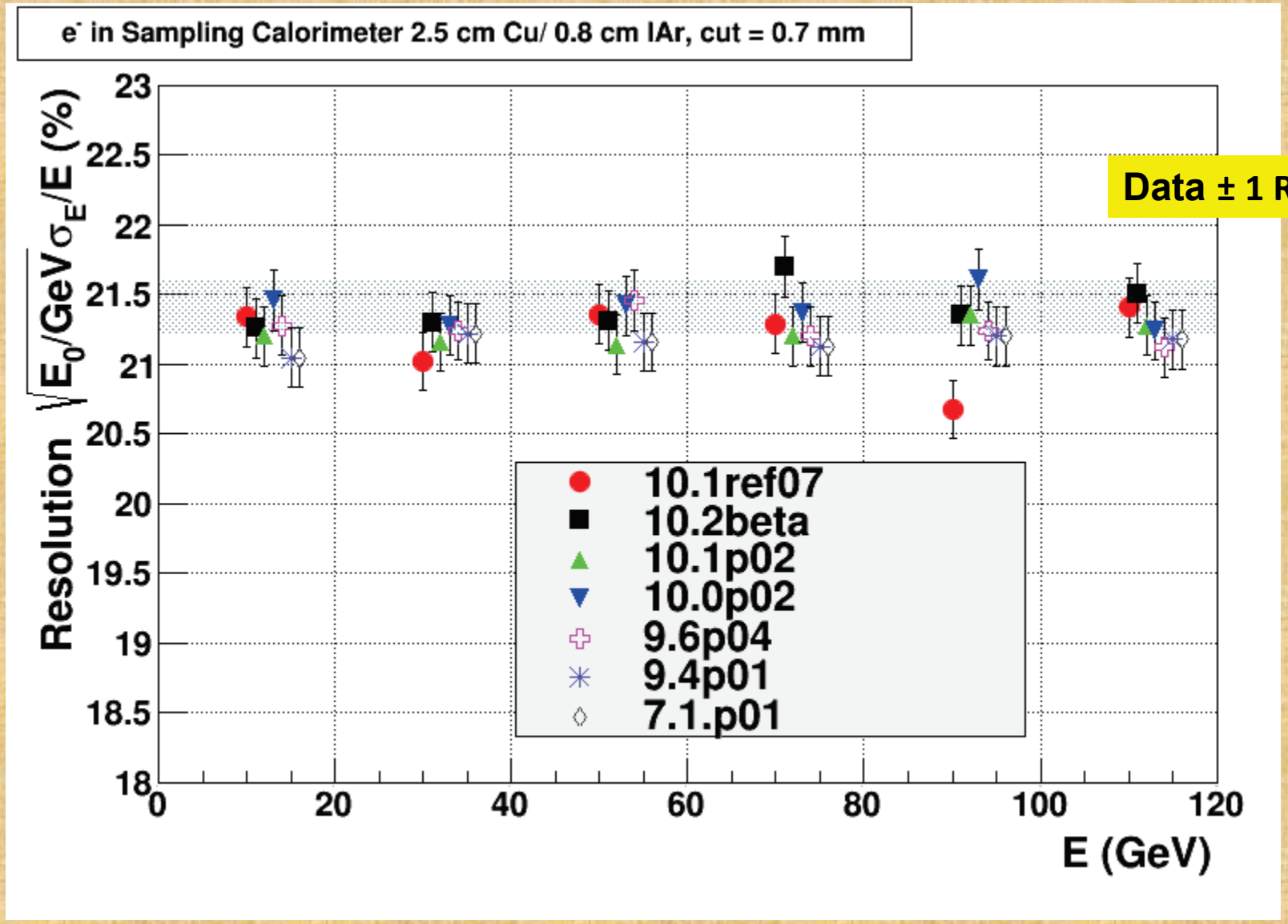


ATLAS HEC type simplified calorimeter

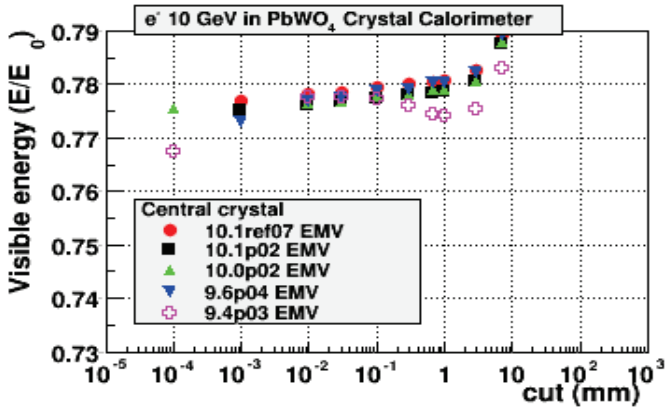


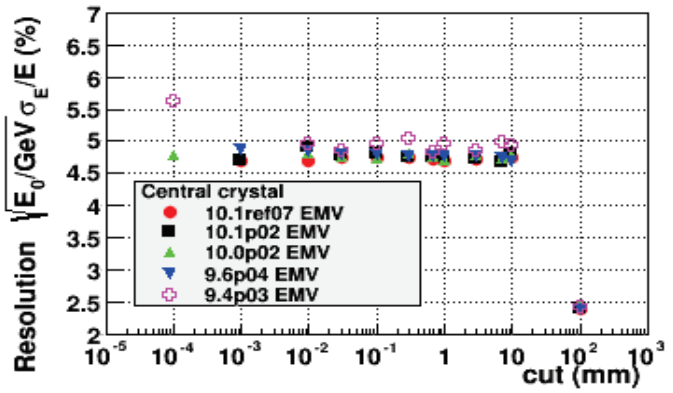


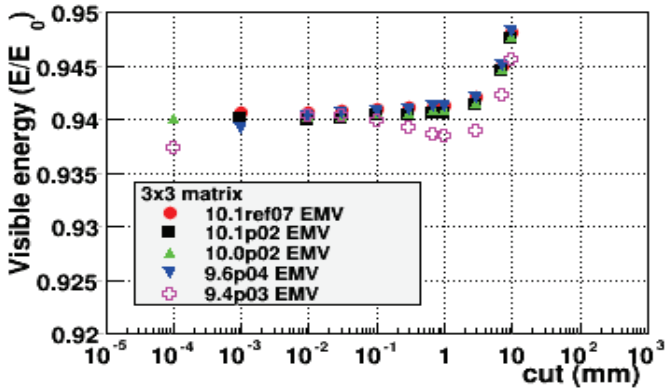
Resolution of simplified ATLAS HEC calorimeter versus test beam data

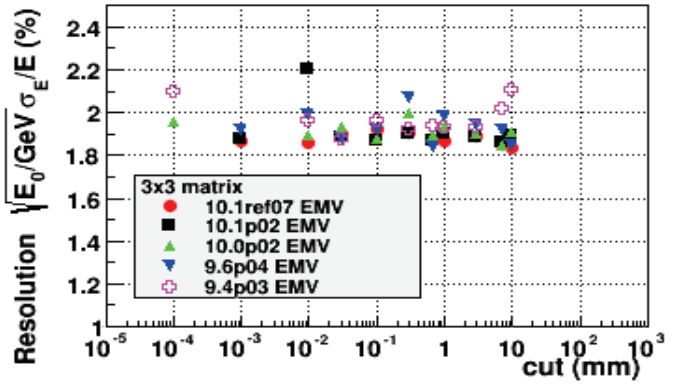


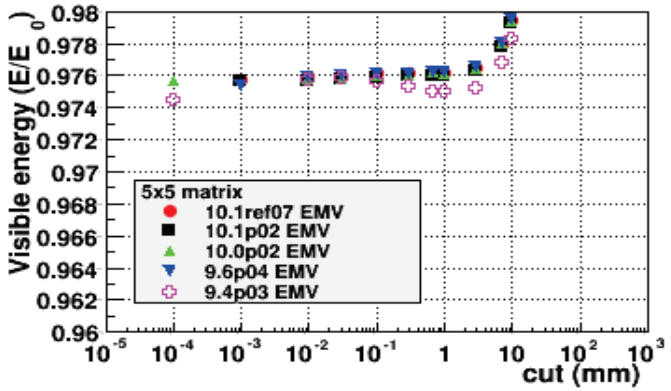
CMS type crystal calorimeter

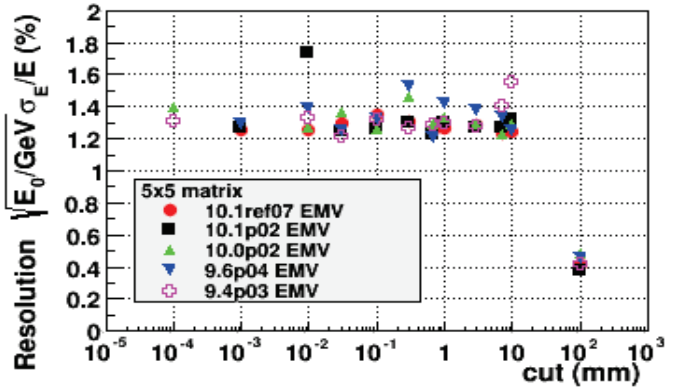










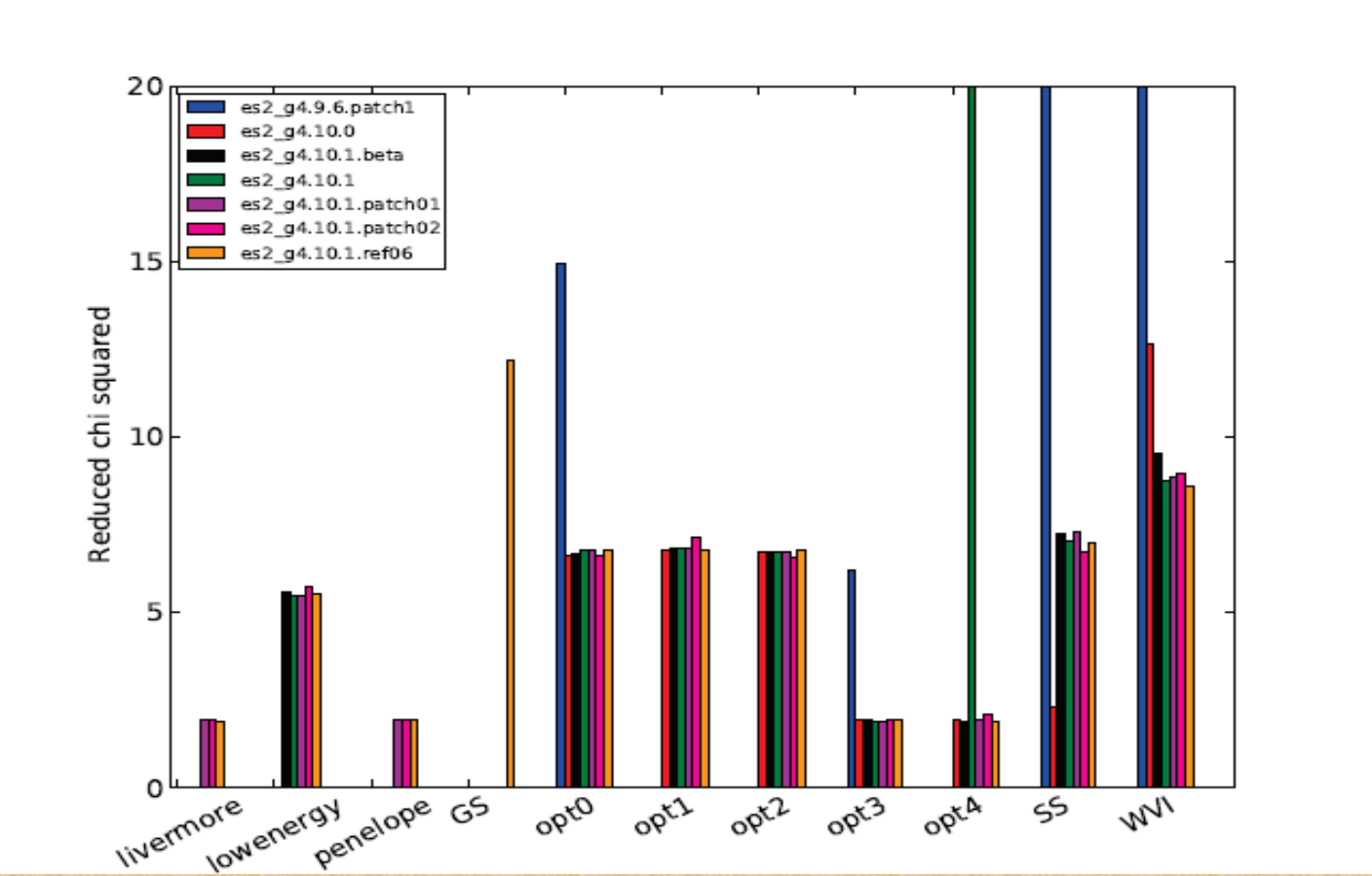


The shower become slightly narrower for low cuts

Summary

- EM testing suite for 10.1ref07 show stability of results in general compared with 10.2beta
- Pb/lAr and Pb/scint calorimeter responses are lower (difference < 0.1%)
- Crystal calorimeter shows a bit narrower shower

Electron scattering benchmark for 10.2beta (Daren Sawkey)



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