



# EM physics validation results for geant4-11-02-ref-08

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# Modifications in materials for 11.2ref08

- **## 2024-09-17 Vladimir Ivanchenko (materials-V11-02-04)**
  - G4IonisParamMat, G4Material - fixed Coverity warnings
  - G4Element - use `std::size_t`
- **## 2024-08-31 Vladimir Ivanchenko (materials-V11-02-03)**
  - G4IonisParamMat - added parameter - fraction of Orto positronium at rest
  - G4NistMessenger - added extra UI command for Orto-positronium fraction,
  - updated all commands for multi-threading

# Modifications in EM utils for 11.2ref08

- ## 2024-09-17 V.Ivanchenko (emutils-V11-02-15)
  - G4EmSaturation, G4EmCalculator, G4EmLowEParameters - fixed Coverity warnings
- ## 2024-09-04 V.Ivanchenko (emutils-V11-02-14)
  - G4EmParameters, G4EmParametersMessenger - removed parameter defining fraction of ortho positronium for all materials

# Modifications in EM standard for 11.2ref08

- ## 2024-09-17 V.Ivanchenko (emstand-V11-02-16)
  - G4WentzelVIModel - fixed Coverity warning
- ## 2024-09-04 V.Ivanchenko (emstand-V11-02-15)
  - G4eplusAnnihilation - use orto positronium fraction from material property and not from EM parameters

# Modifications in EM highenergy for 11.2ref08

- ## 2024-08-23 Vladimir Ivanchenko  
(emhighenergy-V11-02-00)
  - Added new processes G4DynamicParticleIonisation, G4DynamicParticleMSC, G4DynamicParticleFluctuation, which perform computations on fly using only G4DynamicParticle data, G4ParticleDefinition is not used.

# Modifications in EM lowenergy, highenergy, and xrays for 11.2ref08

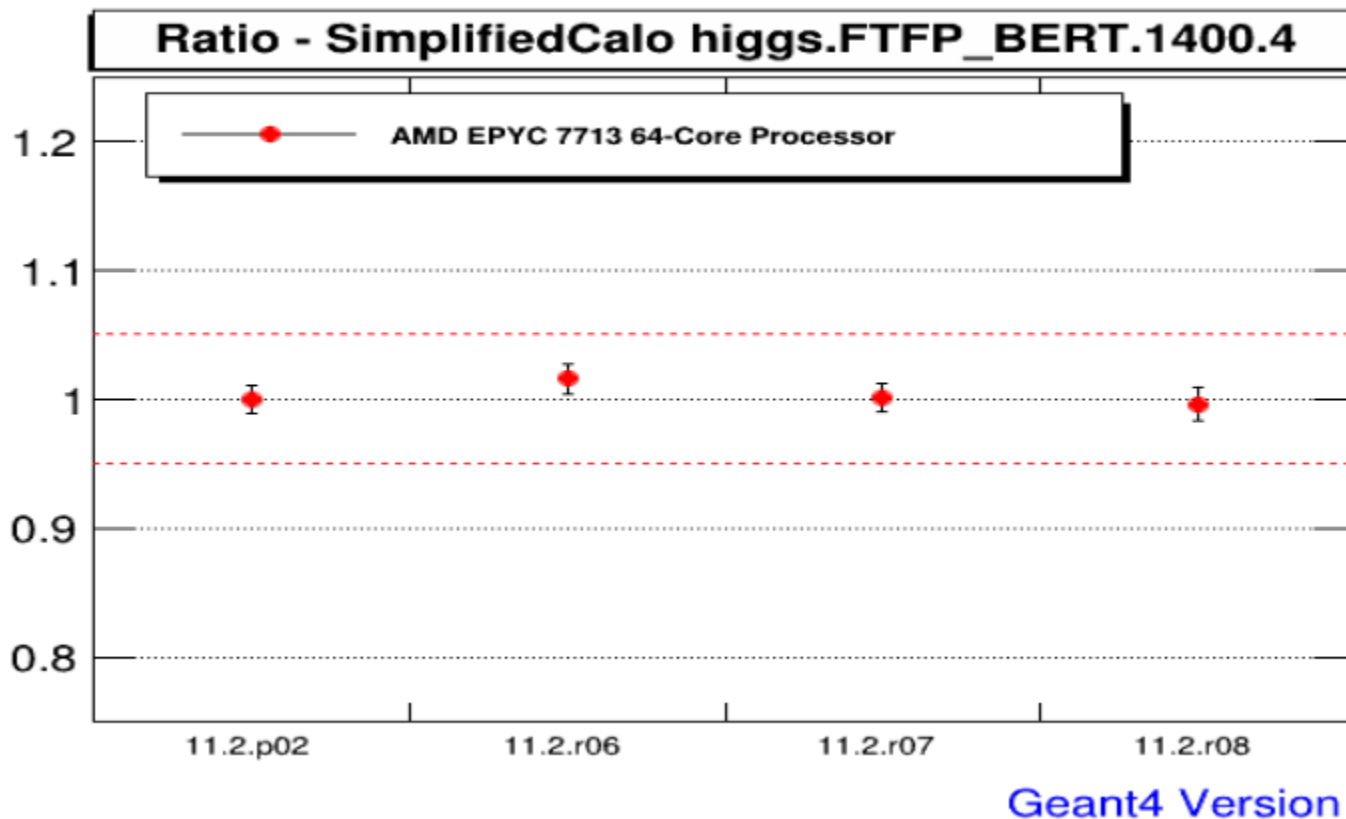
- **## 2024-09-17 V. Ivanchenko (emlowen-V11-02-05)**
  - G4hlonEffChargeSquare - fixed Coverity warning
- **##2024-09-03 Dmitri Konstantinov (xrays-V11-02-04)**
  - G4VTRModel: Added empty implementation to GenerateSecondaries(..) method to resolve linker error encountered when compiling against Geant4 with clang
- **## 2024-09-10 Alberto Ribon (emhighenergy-V11-02-01)**
  - G4DynamicParticleIonisation, G4DynamicParticleMSC : added missing methods (GetMeanFreePath(..) and GetContinuousStepLimit(..)) to make them concrete classes.

# Modifications in EM constructors for 11.2ref08

- **## 2024-09-10 Alberto Ribon (phys-ctor-em-V11-02-09)**
  - G4ChargedUnknownPhysics : replaced G4hIonisation and G4hMultipleScattering (which use G4ParticleDefinition) with the corresponding new classes G4DynamicParticleIonisation and G4DynamicParticleMSC (which use only G4DynamicParticle), respectively.

# FNAL Geant4 Profiling (J. Yarba)

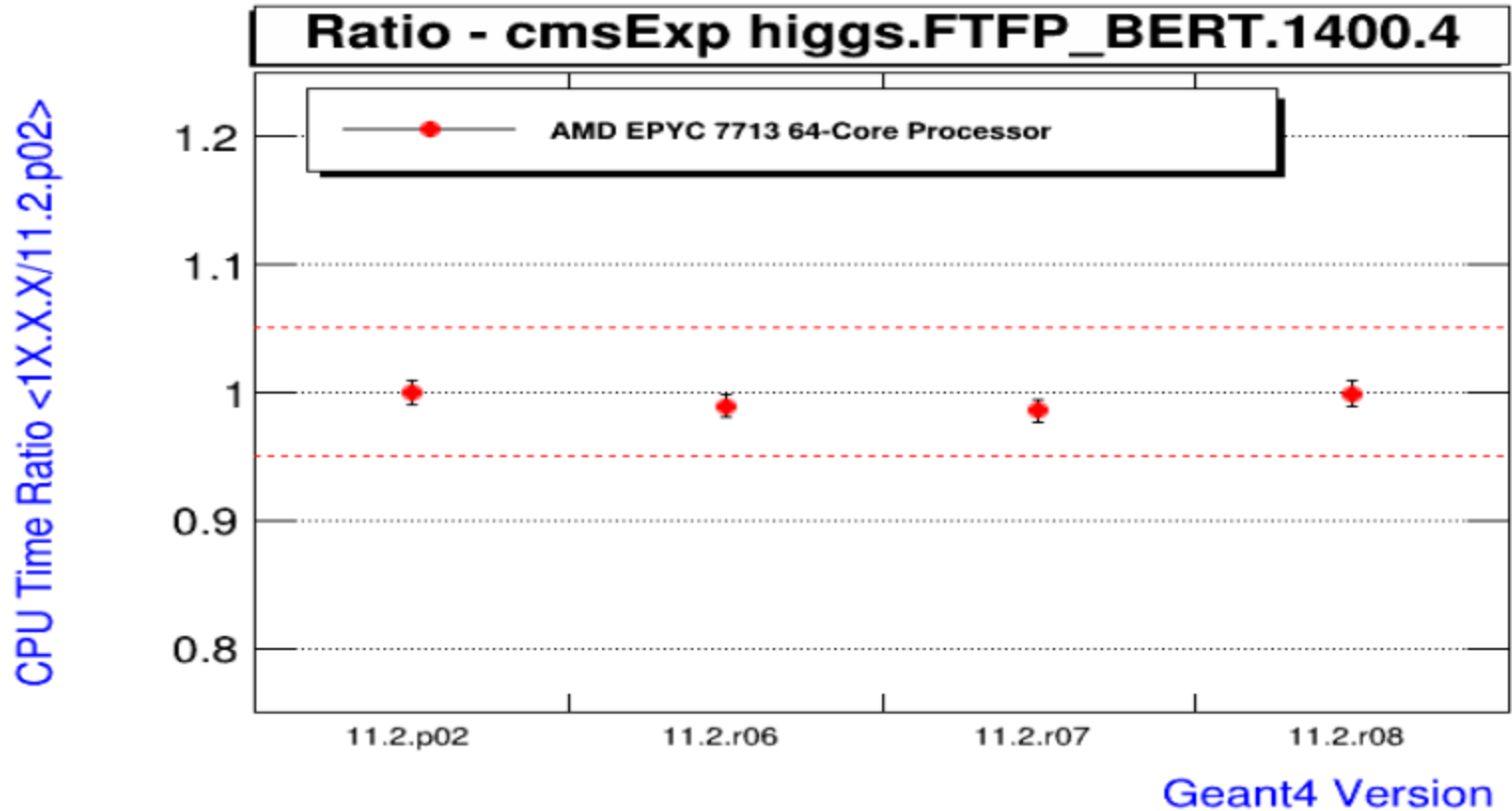
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Previous validations were carried out at different hardware

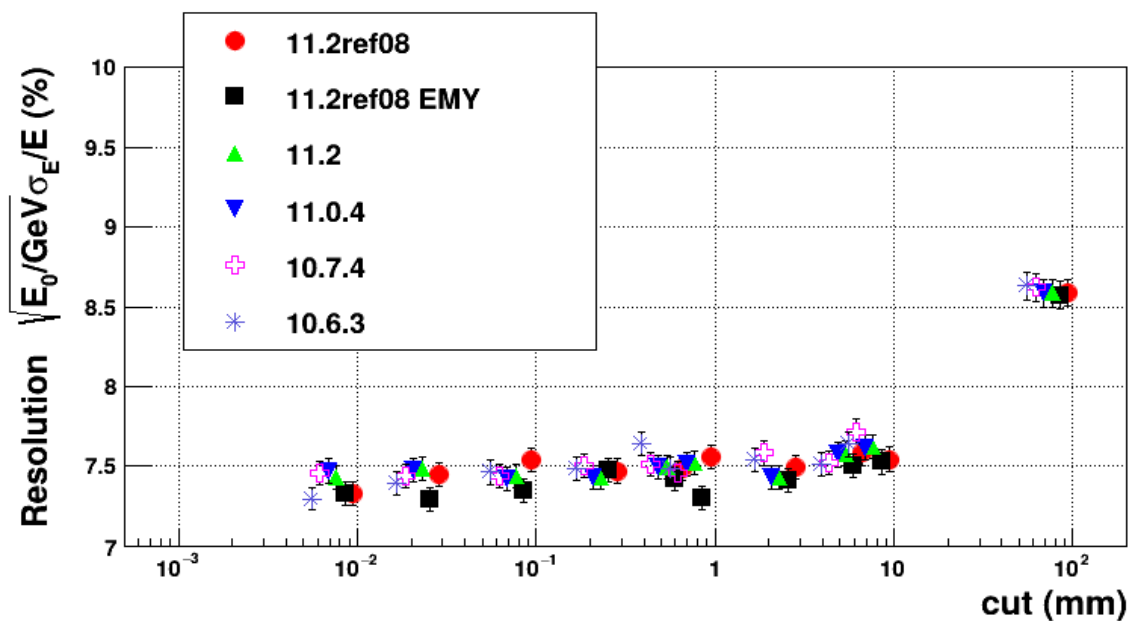
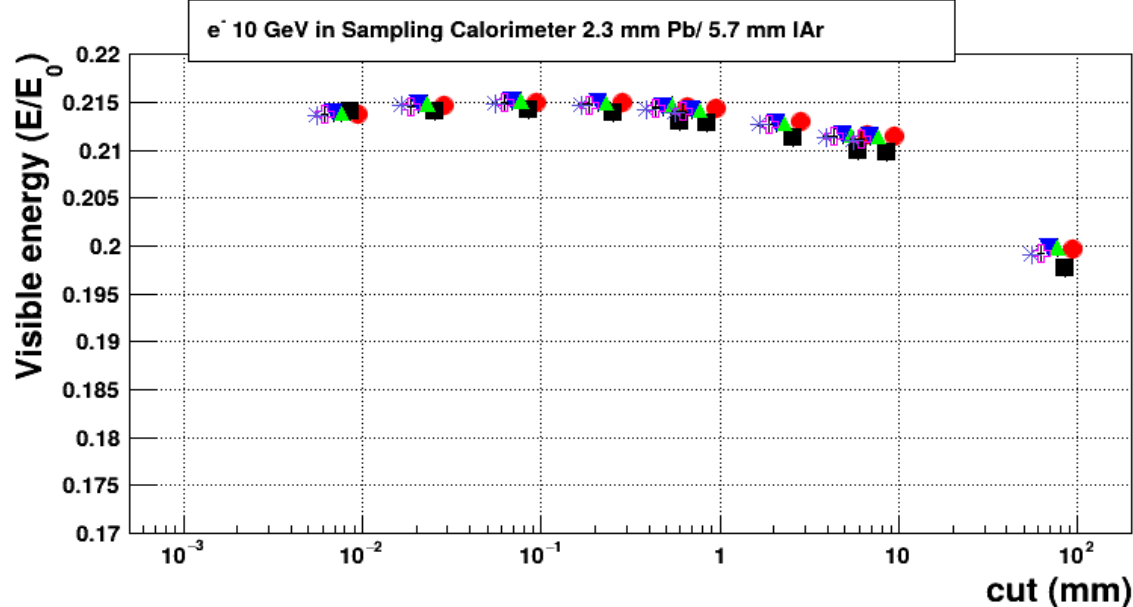


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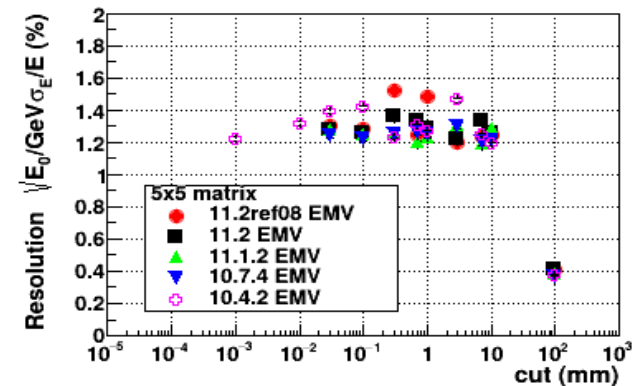
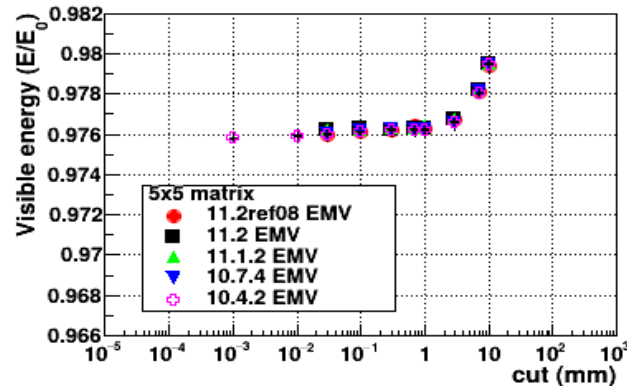
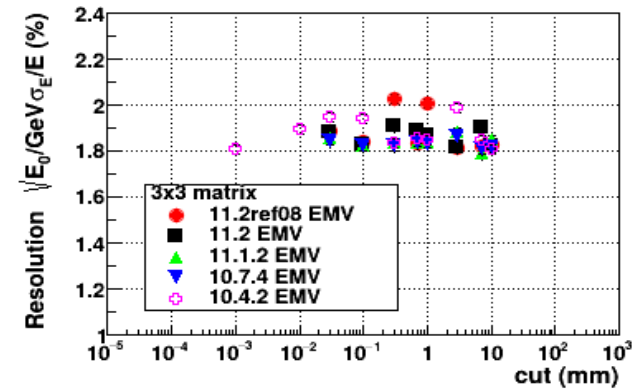
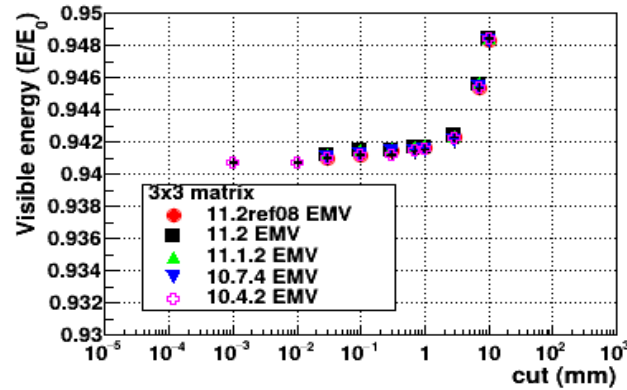
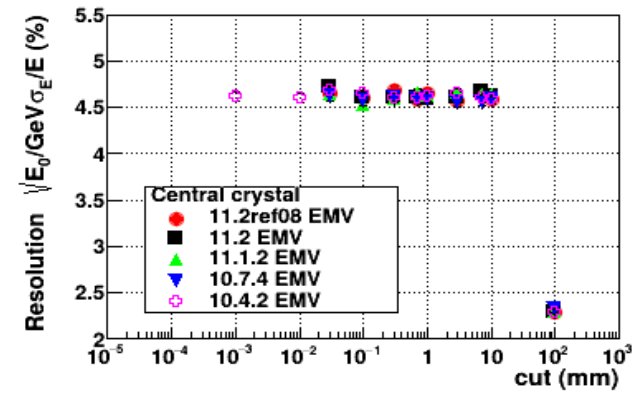
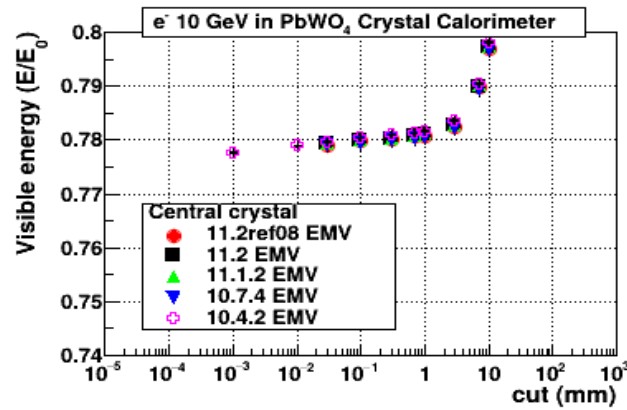


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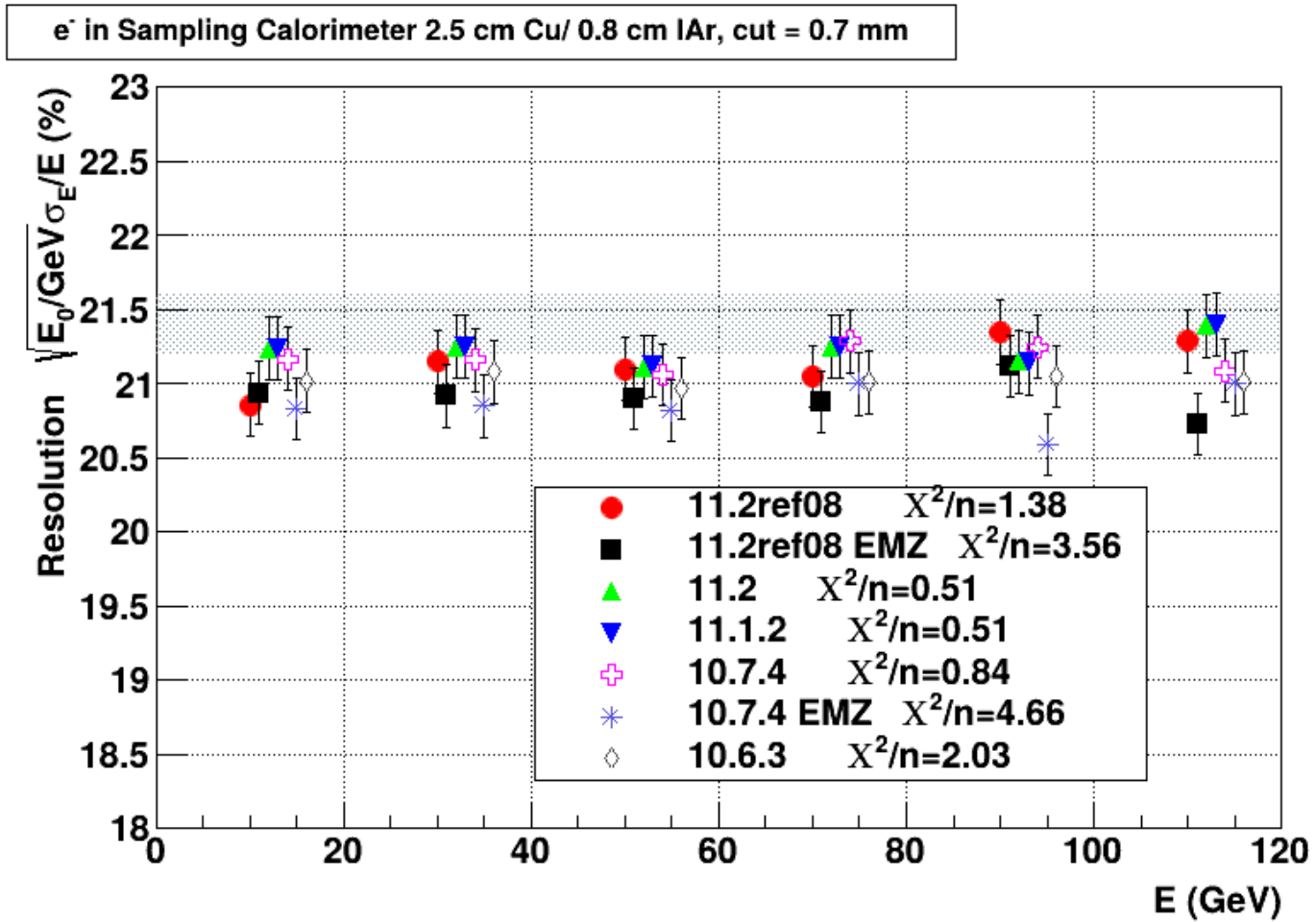
# Simplified ATLAS barrel



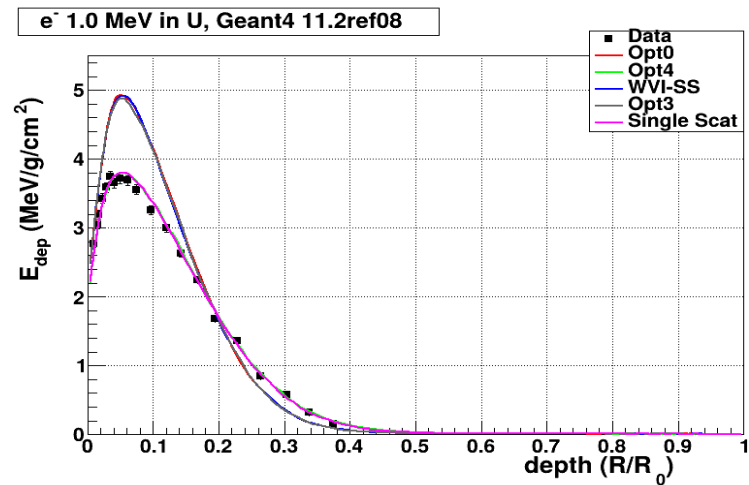
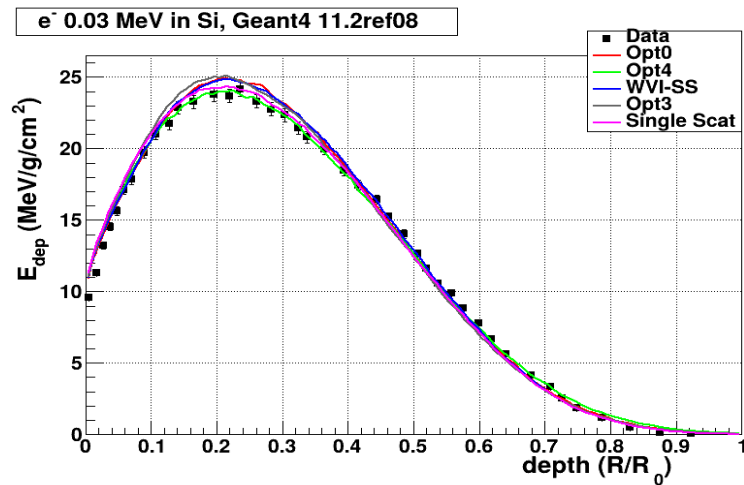
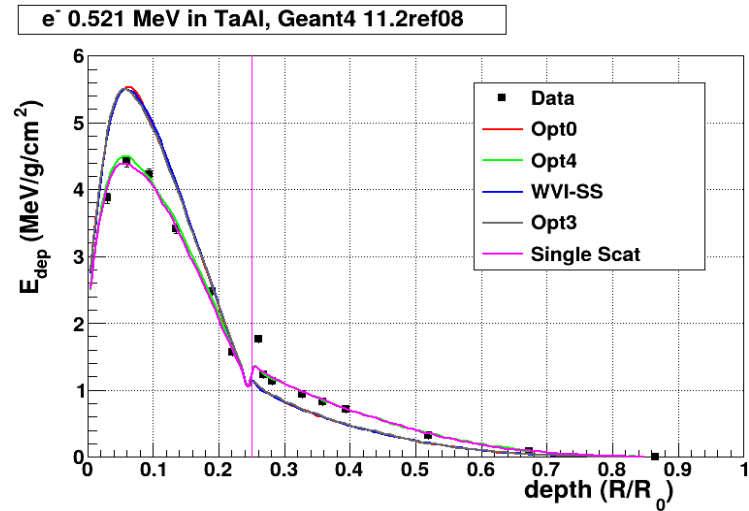
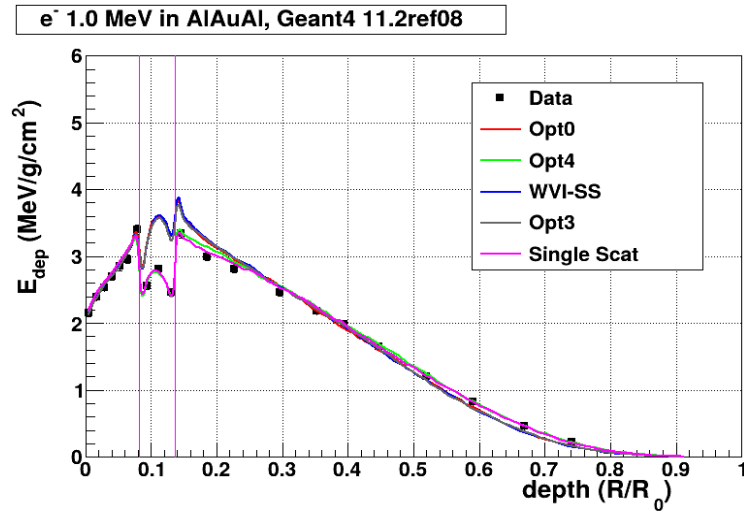
# Simplified CMS barrel



# Simplified ATLAS HEC calorimeter



# Energy profiles in various targets



# Test Results

- Testing results will be available:
  - <https://ivanchenko.web.cern.ch/electromagnetic/>
- EM results are stable since 11.1.X