



EM physics validation results for geant4-11-02-ref-07

V. Ivantchenko

CERN & Tomsk State University

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Modifications in materials for 11.2ref07

- ## 2024-07-17 Vladimir Ivanchenko (materials-V11-02-02)
 - G4LatticePhysical - fixed Coverity warnings
- ## 2024-07-02 Vladimir Ivanchenko (materials-V11-02-01)
 - G4Material, G4NistElementBuilder, G4IonisParamMat - fixed Coverity warnings

Modifications in EM utils for 11.2ref07

- **## 2024-08-22 V.Ivanchenko (emutils-V11-02-13)**
 - G4EmParameters, G4EmParametersMessenger - added Boolean flag UseEPICS2017-
 - G4EmProcessSubType - added sub-types for dynamic EM processes (G4ParticleDefinition is not used, all computations on fly)
 - G4EmElementXS - new helper class to x-section data
- **## 2024-08-02 V.Ivanchenko (emutils-V11-02-12)**
 - G4EmParameters, G4EmParametersMessenger - added Ore-Powell models to the list of models for positron annihilation at rest
- **## 2024-07-02 V.Ivanchenko (emutils-V11-02-11)**
 - G4EmCorrections, G4EmParameters, G4EmExtraParameters, G4EmLowEParameters, G4EmSaturation - fixed Coverity warnings
- **## 2024-06-19 S.Johnson (emutils-V11-02-10)**
 - G4EmParameters - fix segmentation fault when data is unavailable

Modifications in EM standard for 11.2ref07

- **## 2024-08-26 V.Ivanchenko (emstand-V11-02-14)**
 - G4BetheHeitlerModel - include optional possibility to use EPICS2017 x-section
 - G4SimplePsAtRestModel is removed because other solution is used for positron annihilation at rest
- **## 2024-08-02 V.Ivanchenko (emstand-V11-02-13)**
 - G4eplusAnnihilation - updated configuration of models AtRest, the choice of 2-gamma, 3-gamma final states is implemented in one place
- **## 2024-07-26 I.Semeniounk & D.Bernard (emstand-V11-02-12)**
 - G4SimpleoPsAtRestModel - use base class pointers-
 - G4PolarizedOrePowellAtRestModel - fix spelling in model name- new
 - G4PolarizedOrePowellAtRestModel - Polarized Ore & Powell orto-positronium decay model AtRest, polarisation based on R. M. Drisko
- **## 2024-07-18 V.Ivanchenko (emstand-V11-02-11)**
 - G4BraggModel, G4GSMottCorrection, G4GSPWACorrections, G4SBBremTable, G4WentzelVIModel, G4WentzelVIRelModel, G4eplusAnnihilation - fixed Coverity warnings
- **## 2024-07-07 V.Ivanchenko (emstand-V11-02-10)**
 - G4BetheHeitler5DModel - added extra protection against division by zero

Modifications in EM highenergy for 11.2ref07

- ## 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 for 11.2ref07

- **## 2024-08-29 L. Pandola (emlowen-V11-02-04)**
 - Fix in G4PenelopeBremsstrahlungAngular, causing a crash when the angular generator is used with a bremsstrahlung model other than G4PenelopeBremsstrahlungModel
- **## 2024-08-13 G. Cosmo (emlowen-V11-02-03)**
 - Fixed reported Coverity defects for use of std::move().
- **## 2024-07-21 V. Ivanchenko (emlowen-V11-02-02)**
 - G4MicroElecCapture - fixed Coverity warning about division by zero via modification of the formula to compute MFP and added an upper limit 500 eV for this process.
- **## 2024-07-18 V. Ivanchenko (emlowen-V11-02-01)**
 - G4FluoData, G4hlonEffChargeSquare, G4MicroElecInelasticModel_new - fixed Coverity warnings

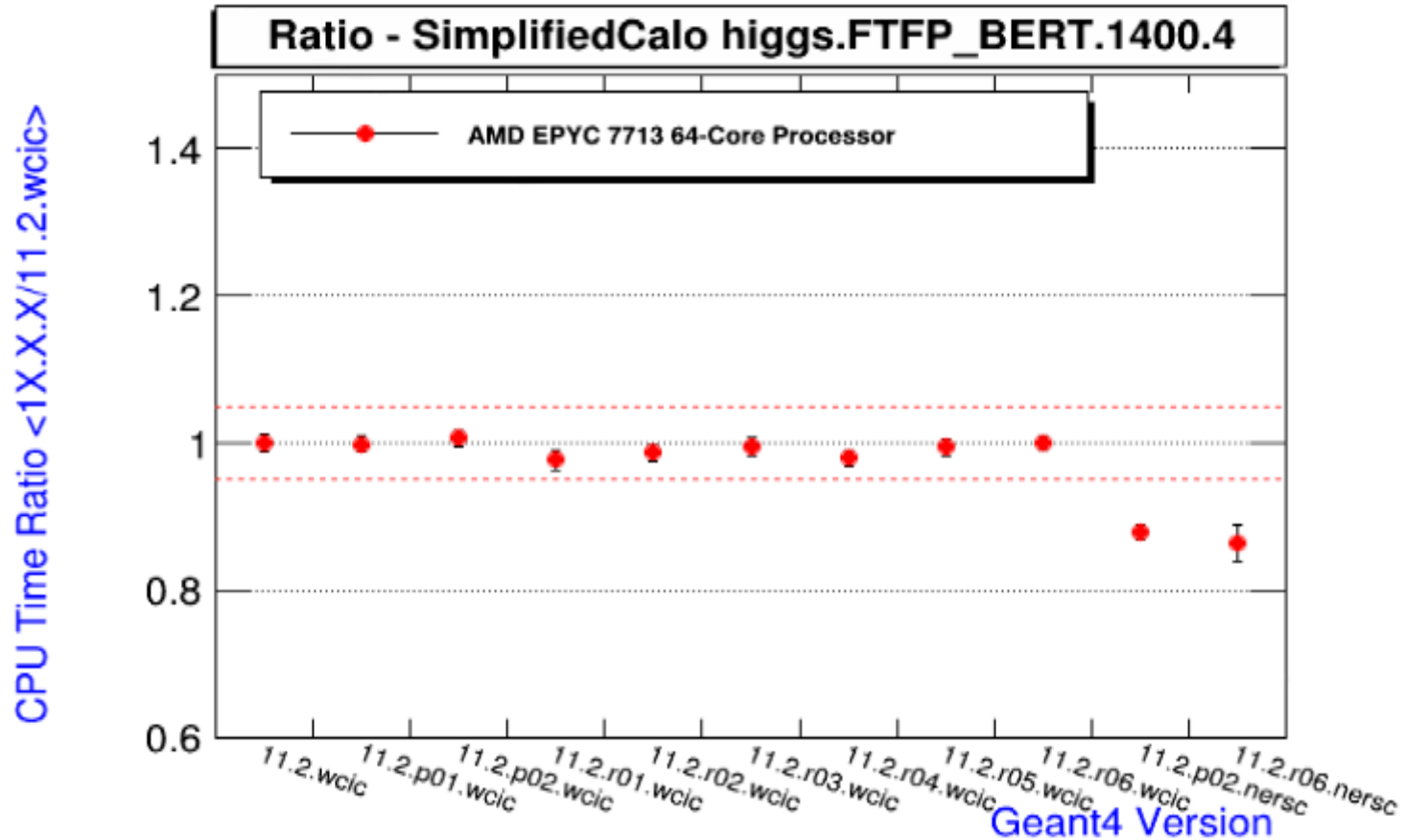
Modifications in EM xrays and DNA for 11.2ref07

- **## 2024-07-18 Vladimir Ivanchenko (xrays-V11-02-03)**
 - G4VXTRenergyLoss - fixed Coverity warning
- **## 2024-08-27 Gabriele Cosmo (emdna-V11-02-15)**
 - Fixed reported Coverity defects for use of `std::move()`, `const auto&` and `const` iterators.
- **## 2024-08-20 Hoang Tran (emdna-V11-02-14)**
 - debug invalid a root node of KDTree
- **## 2024-08-08 Gabriele Cosmo (emdna-V11-02-13)**
 - Fixed reported Coverity defects in G4LEPTSElossDistr and G4LEPTSDistribution for explicit null dereferenced pointer and out-of-bounds reads; minor code cleanup.

Modifications in EM constructors and optical for 11.2ref07

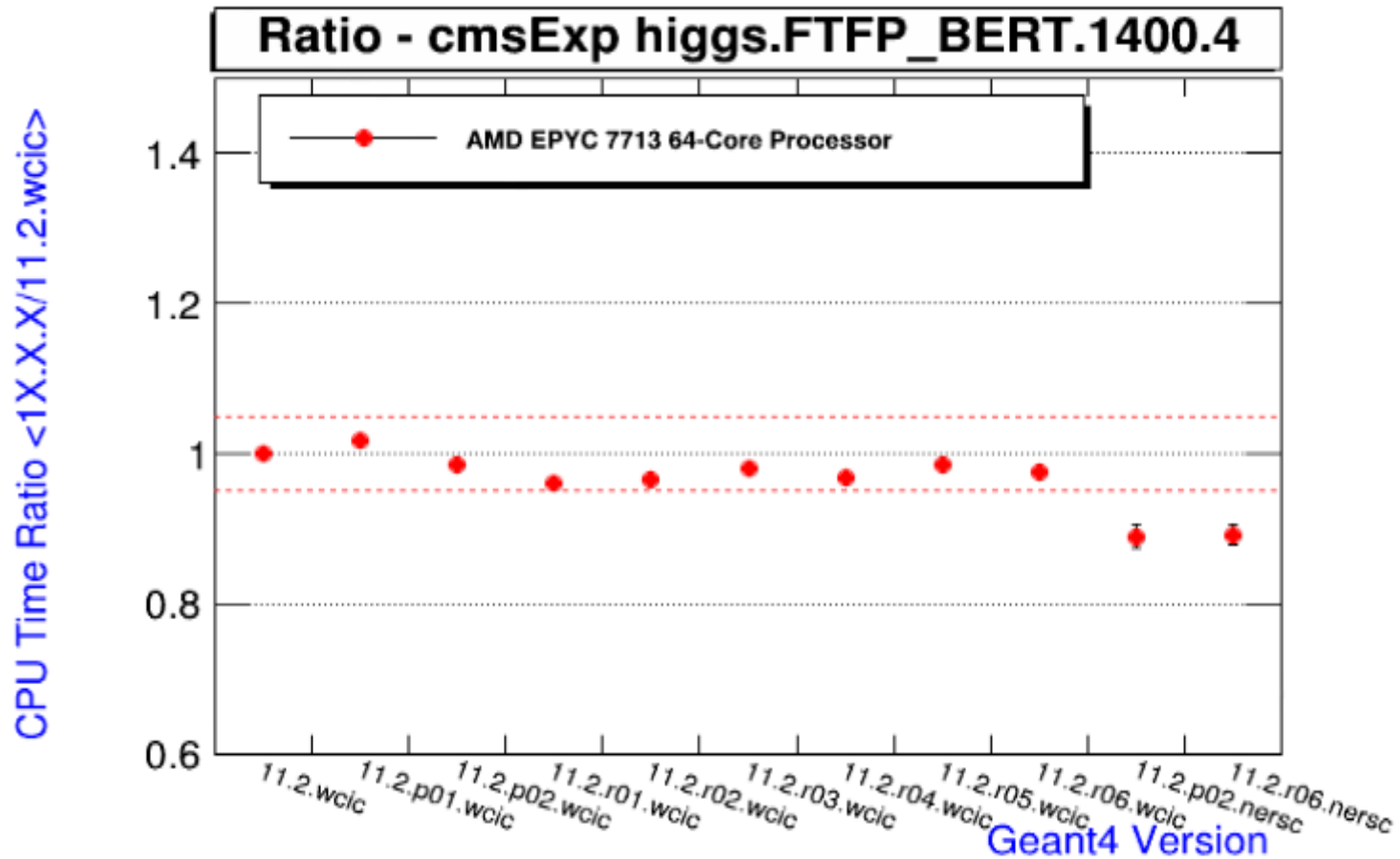
- **## 2024-08-01 Alberto Ribon (phys-ctor-em-V11-02-08)**
 - Created new constructor G4ChargedUnknownParticle, to be used on top on any reference physics list, to assign ionisation and multiple scattering (as well as transportation) processes to charged primary particles with valid PDG code but not known to Geant4. (This was requested by ATLAS and LHCb.)
- **## 2024-07-18 Hans Wenzel (op-V11-02-01)**
 - G4OpWLS2.cc: change SetProcessSubType from fOpWLS to fOpWLS2

FNAL Geant4 Profiling (J. Yarba)



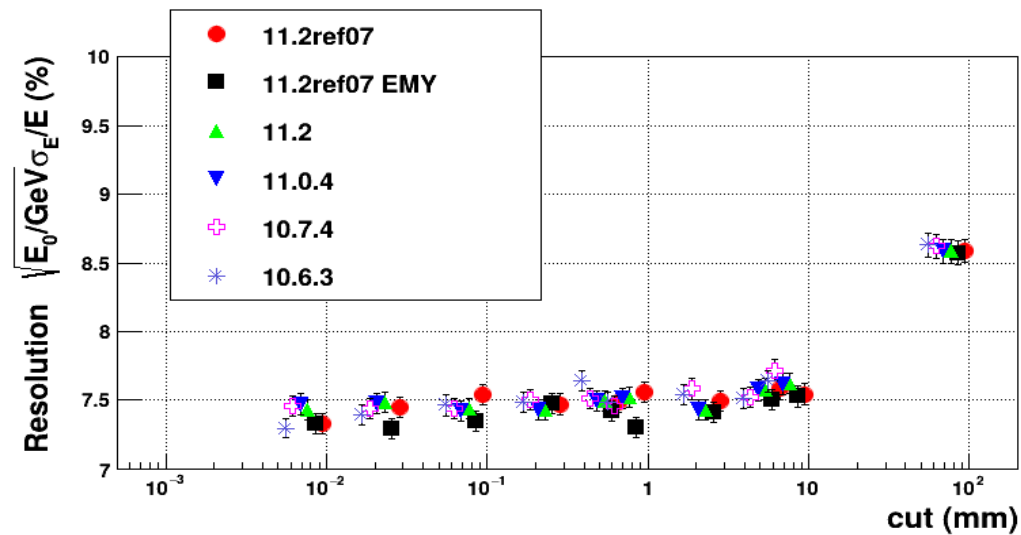
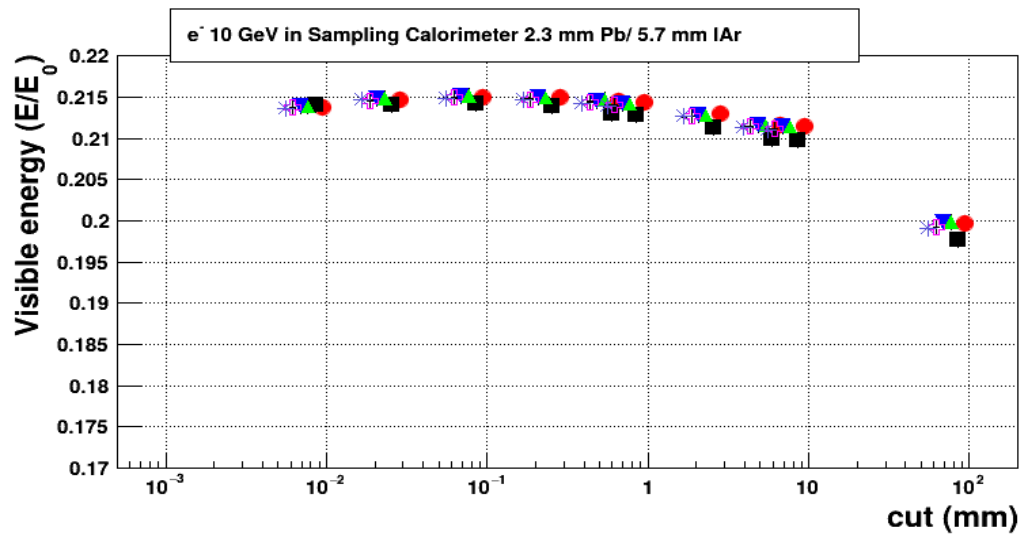
Both 11.2.2 and 11.3beta demonstrate a significant speed-up – is there a bug?

FNAL Geant4 Profiling (J. Yarba)

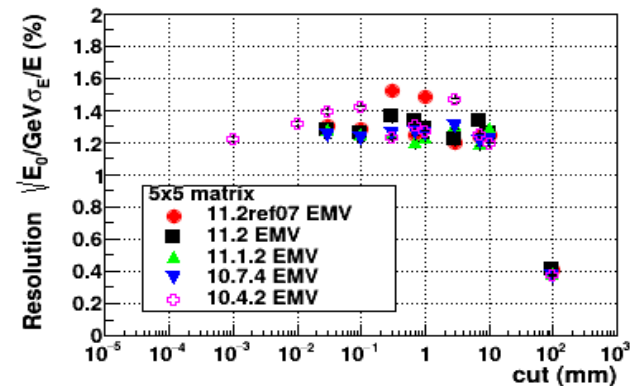
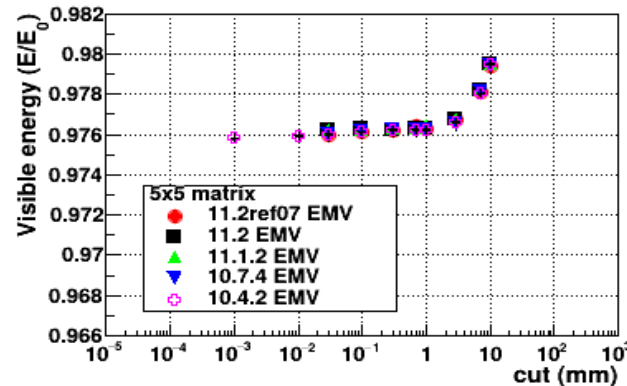
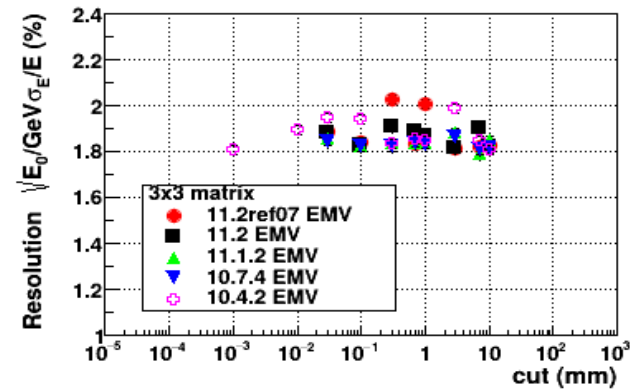
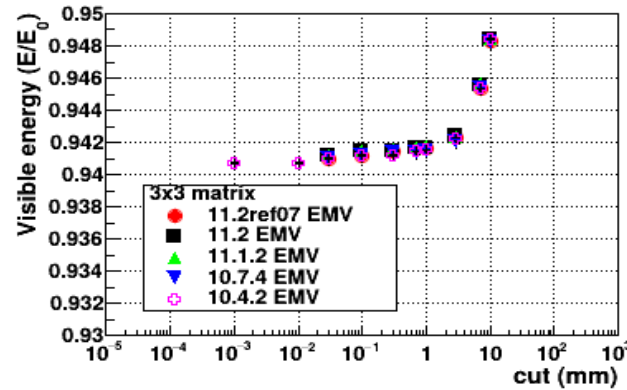
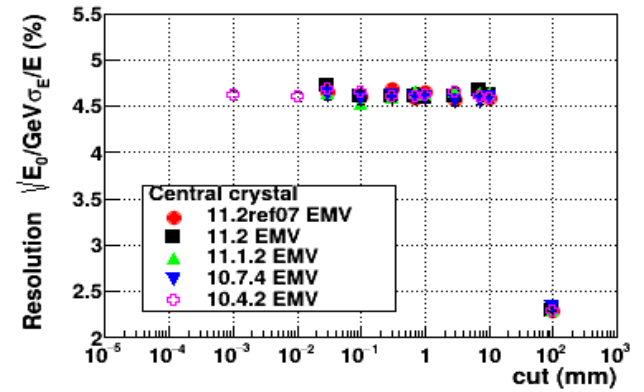
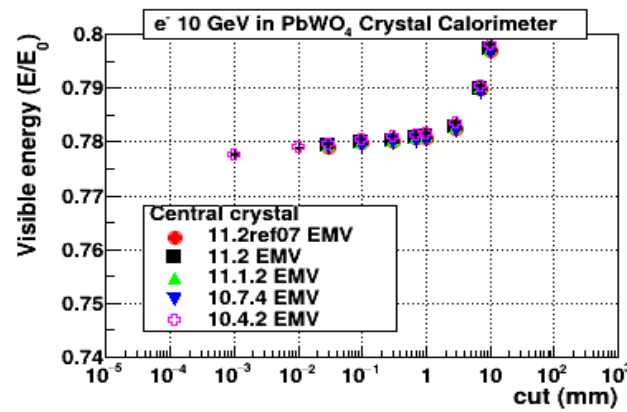


CPU improvement 10% | What it is?

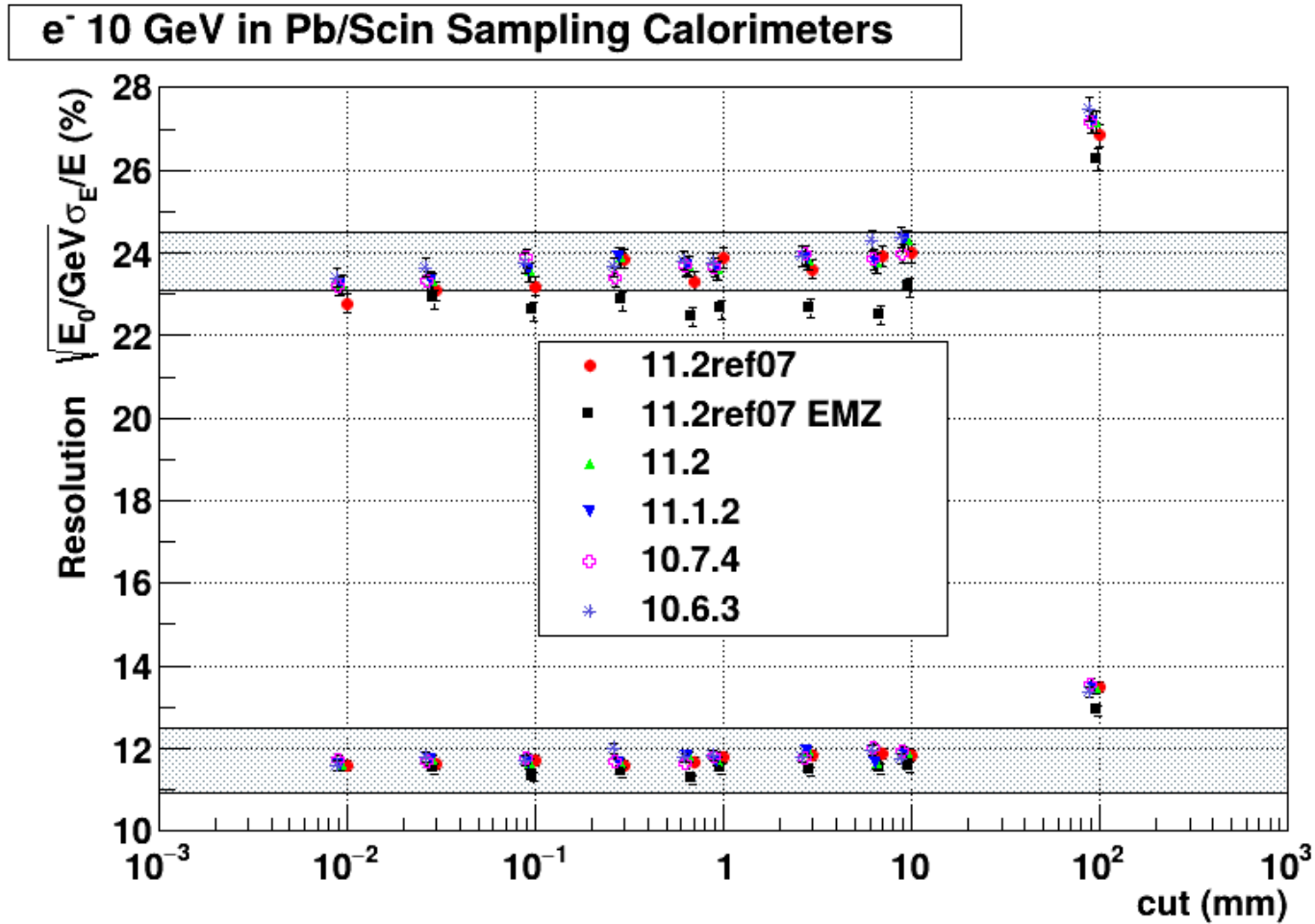
Simplified ATLAS barrel 11.2ref07



Simplified CMS barrel 11.2ref07



Simplified ZEUS calorimeter 11.2ref07



Test Results

- Testing results will be available:
 - <https://ivanchenko.web.cern.ch/electromagnetic/>
- EM results are stable since 11.1.X except Opt3