



EM physics validation results for for
geant4-11-02-patch-02 & geant4-11-
03-beta_cand00

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Modifications in EM for 11.2.2

- **materials-V11-01-15:**
 - Addressing problem report #2601 by the fix in `G4NistMaterialBuilder::HepAndNuclearMaterials()`: `G4_BRASS`, `G4_BRONZE` and `G4_STAINLESS_STEEL` are now defined using mass fractions of components instead of number of atoms, in order to have more natural description. Results may be changed on level of 10^{-5} due to numerical differences.
- **emutils-V11-01-27:**
 - Fix for C++20 Standard on Windows for `G4EmConfigurator`
- **emutils-V11-01-28:**
 - `G4EmUtility`: simplified computation of cross-section maximum for discrete processes to fix FPE issues on alma9 when `-O3` compiler option is used.
 - `G4BetheHeitler5DModel`: fixed computation of `sinTheta` sampling and added checks on arguments of `G4Exp` in `SampleSecondaries(..)` method, to avoid FPE problems in the case of `-O3` optimization on alma9.
- **emdna-V11-01-26:**
 - Fixed compilation error on macOS/clang with C++23 enabled, for the use of `std::function` in `G4OctreeFinder`.
 - Fixed compilation error on Windows VC++ with C++20 Standard enabled. Added missing declarations for `TG4MoleculeShoot` specializations on `G4Track`. Based on [GitHub PR#69](#).

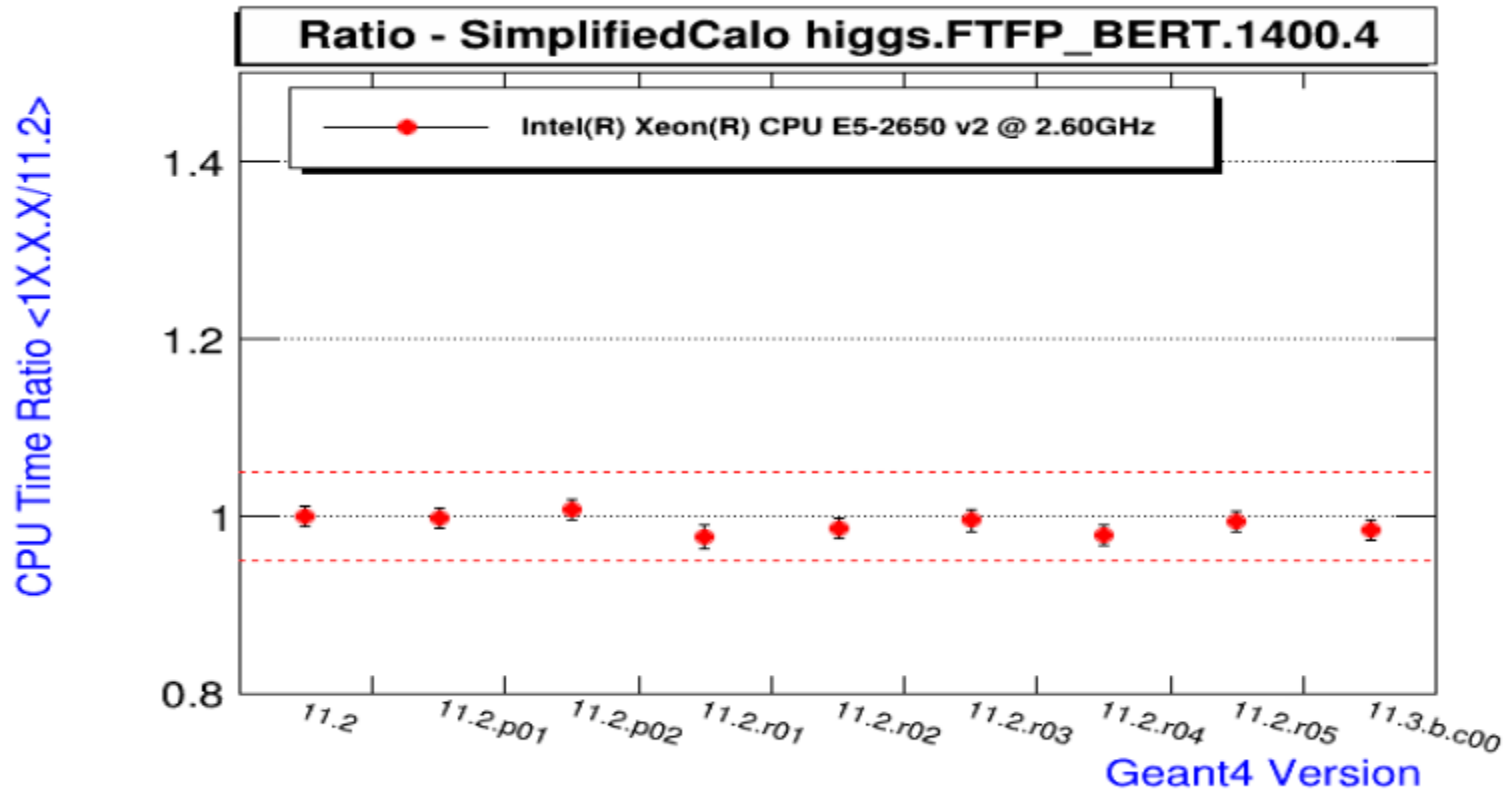
Modifications in EM utils for 11.3beta

- ## 2024-06-19 S.Johnson (emutils-V11-02-10)
 - G4EmParameters - fix segmentation fault when data is unavailable
- ## 2024-06-06 I.Semenioug & D.Bernard (emutils-V11-02-09)
 - G4EmParameters, G4EmParametersMessenger - added orto Positronium fraction flag

Modifications in EM standard for 11.3beta

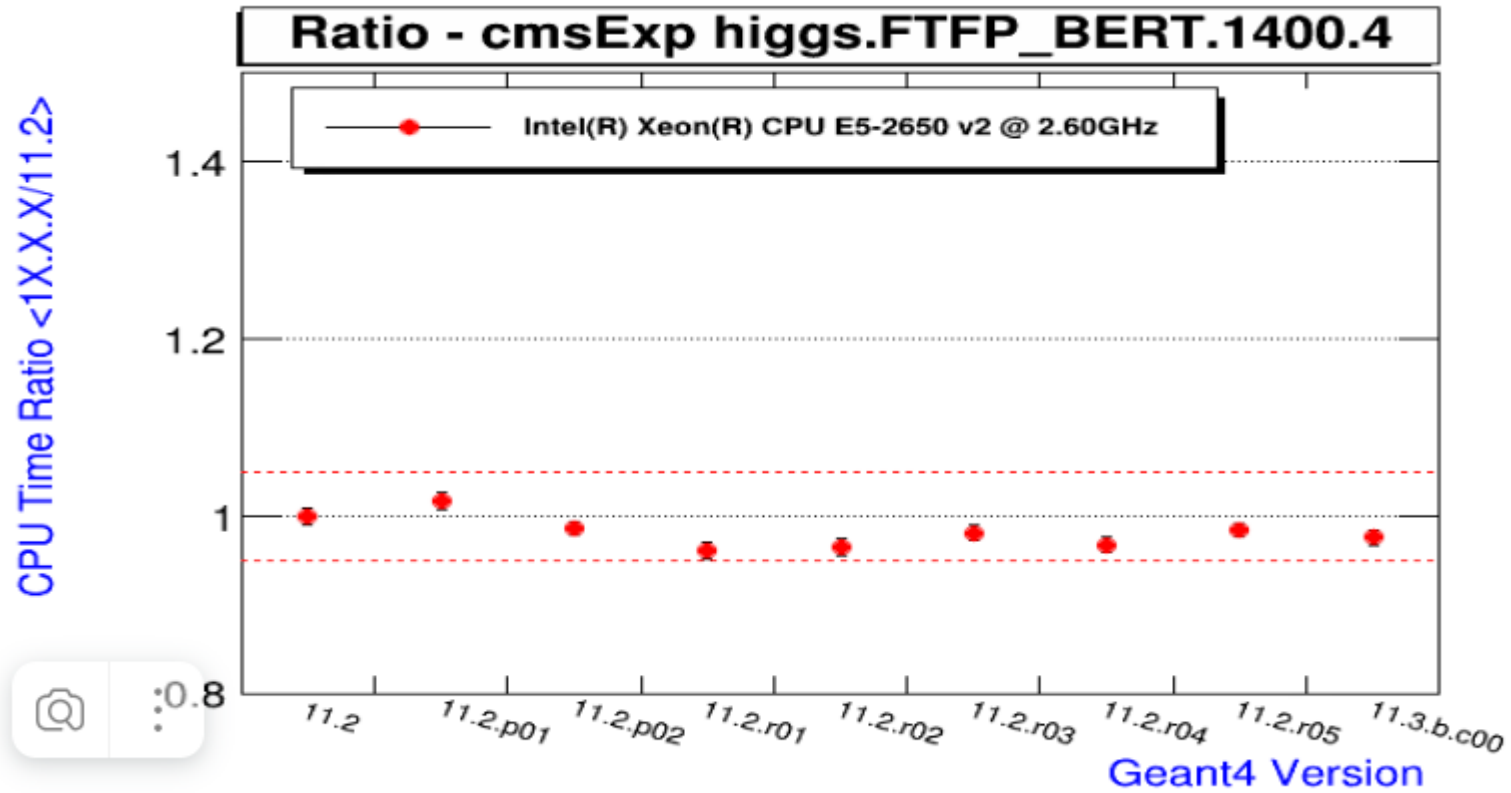
- ## 2024-06-06 I.Semeniuk & D.Bernard (emstand-V11-02-09)
 - new G4OrePowellAtRestModel - Ore & Powell orto positronium decay model AtRest
 - new G4SimpleoPsAtRestModel - simple orto/para positronium chooser
- ## 2024-06-06 V.Ivanchenko (emstand-V11-02-08)
 - G4BetheHeitler5DModel - fixed computation of sinTheta
- ## 2024-06-04 Gabriele Cosmo (emstand-V11-02-07)
 - Fixed compilation warning on macOS/XCode for implicit type conversion on G4eplusAnnihilation.
- ## 2024-05-28 V.Ivanchenko (emstand-V11-02-06)
 - G4BetheHeitler5DModel - added checks on arguments of G4Exp in SampleSecondaries(..) method to avoid FPE problems in the case of -O3 optimization
 - G4eplusAnnihilation - use more const class members, changed model ID definition for produced tracks

FNAL Geant4 Profiling (J. Yarba)



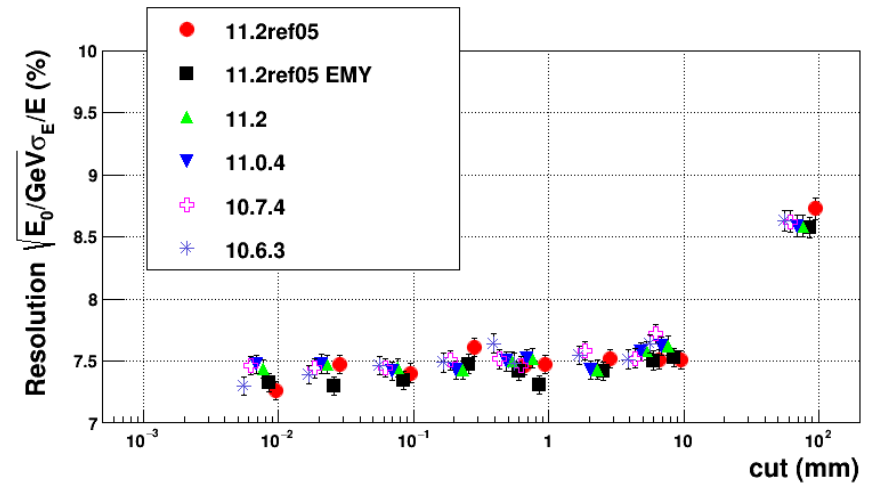
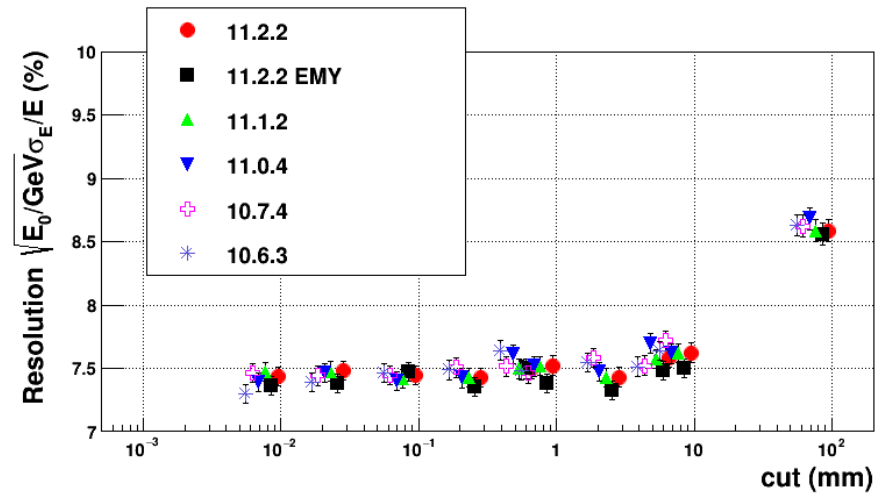
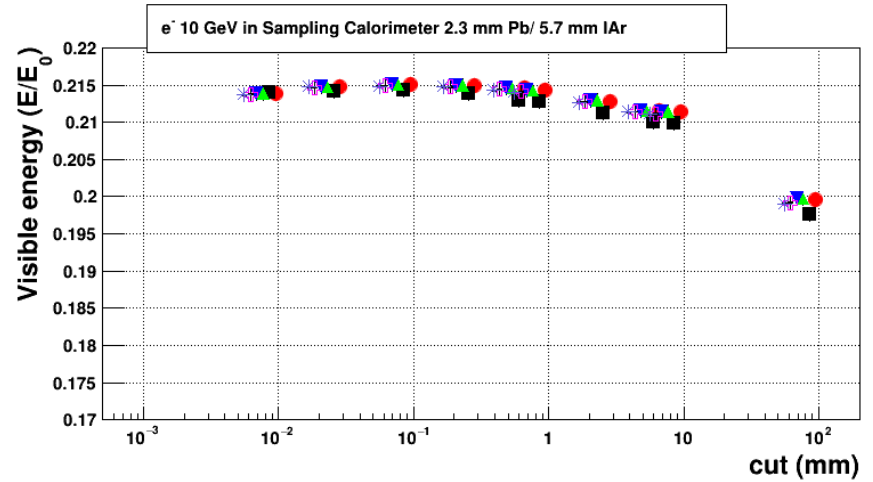
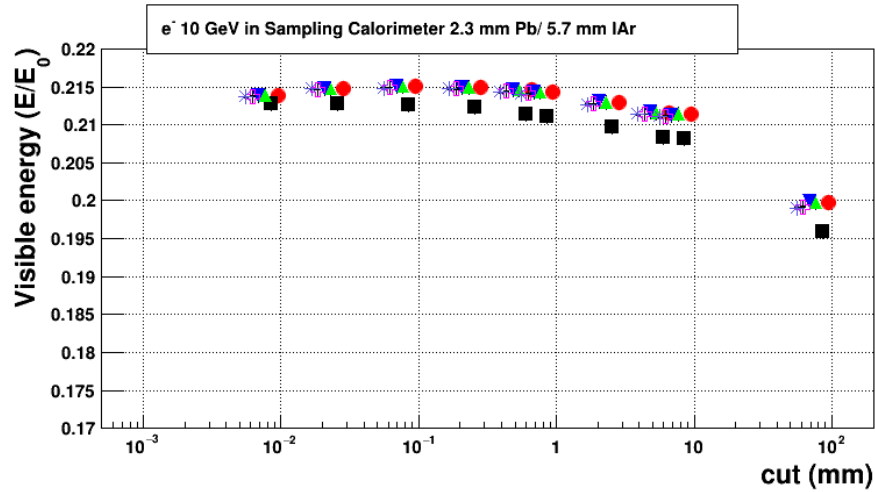
It seems that CPU is stable

FNAL Geant4 Profiling (J. Yarba)

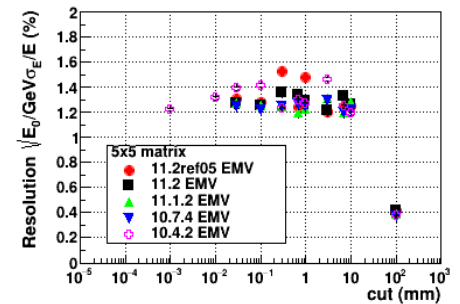
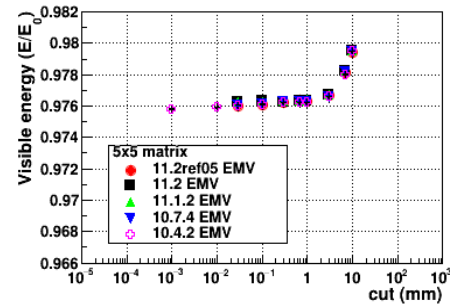
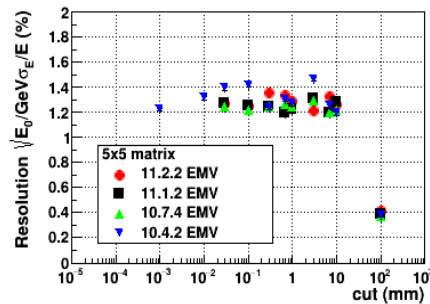
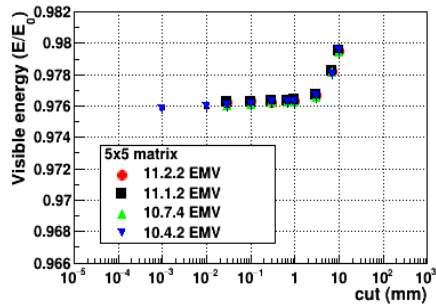
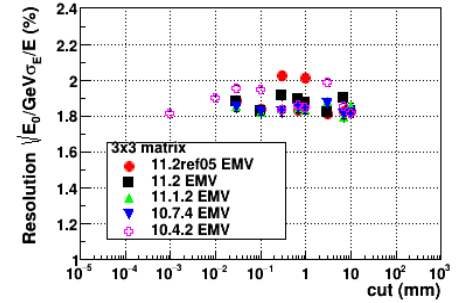
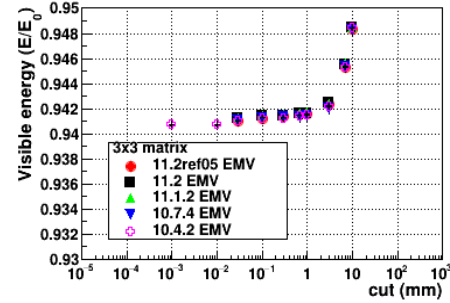
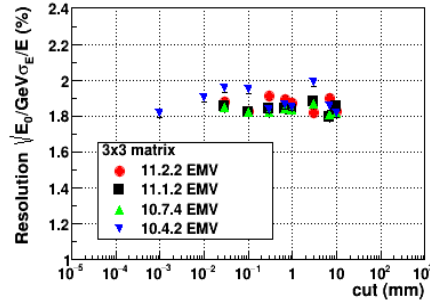
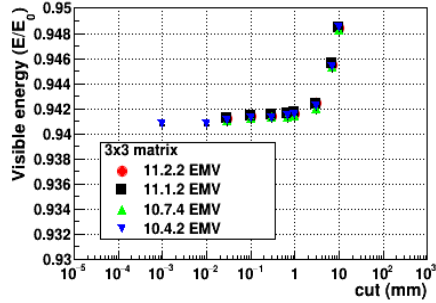
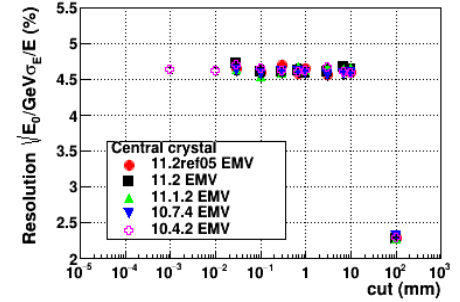
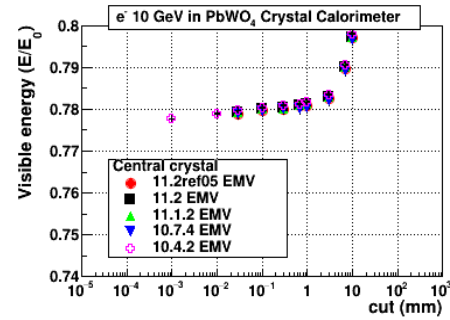
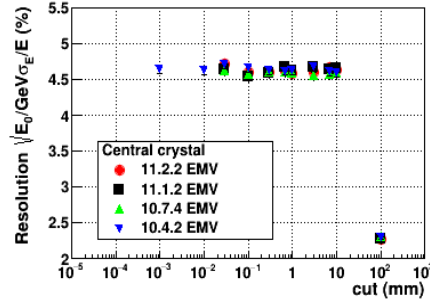
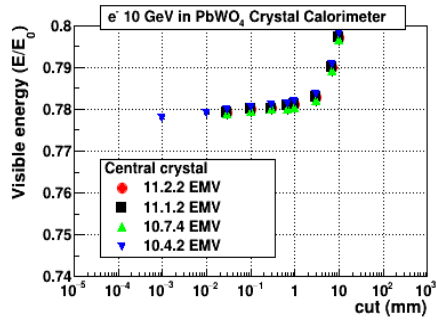


A small CPU improvement 1-2% likely achieved in 13.3beta

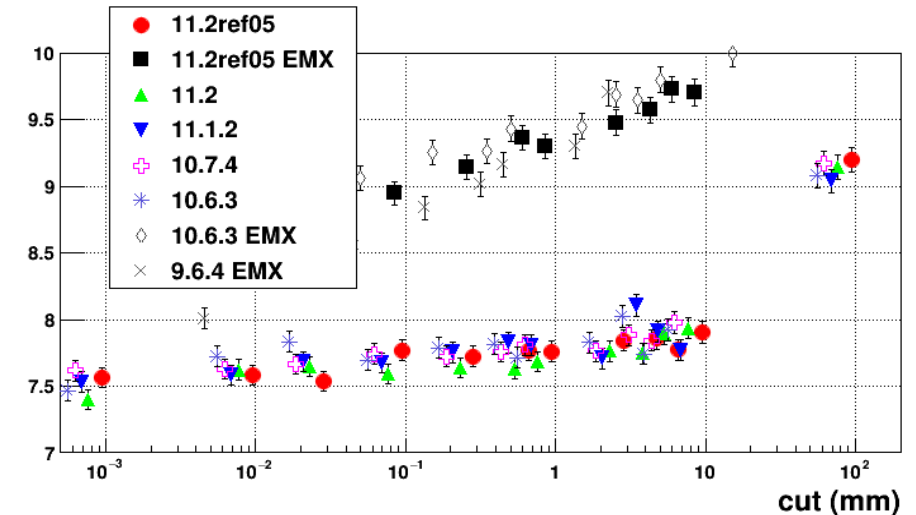
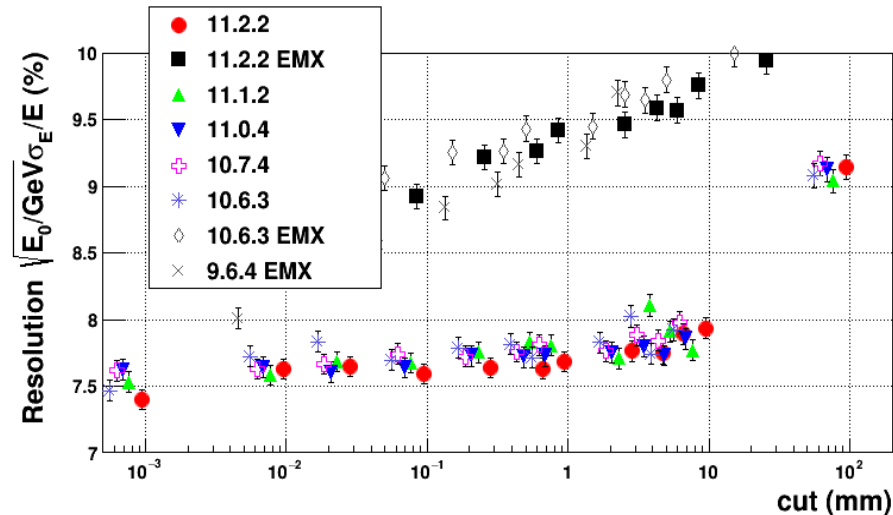
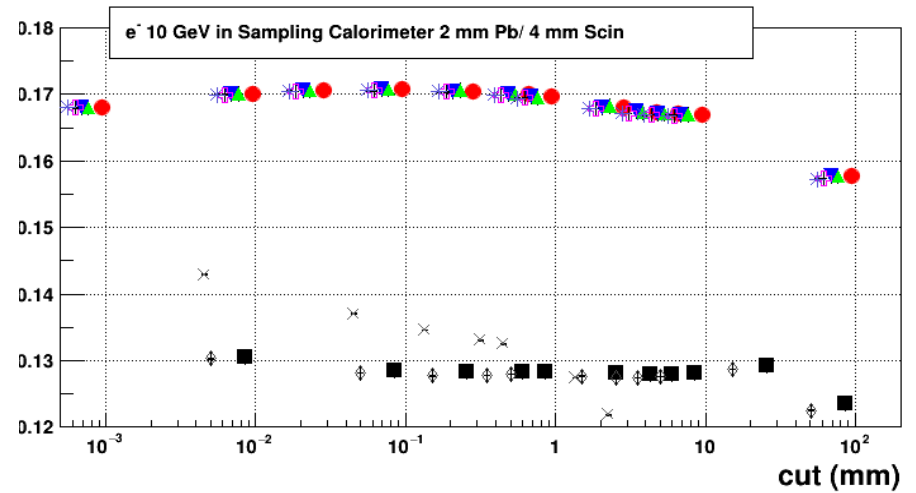
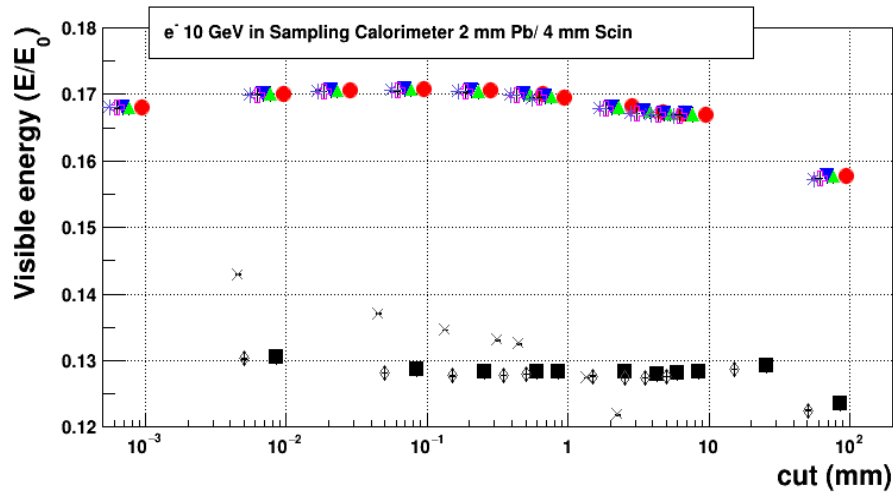
Simplified ATLAS barrel 11.2.2/11.2ref05



Simplified CMS barrel 11.2.2/11.2ref05



Simplified LHCb calorimeter 11.2.2/11.2ref05



Test Results

- Testing results will be available:
 - <https://ivanchenko.web.cern.ch/electromagnetic/>
 - <https://geant4-tools.web.cern.ch/geant4-tools/emtesting/>
- EM results are stable since 11.1.X except Opt3