
Status and open problems for proton/ion simulation

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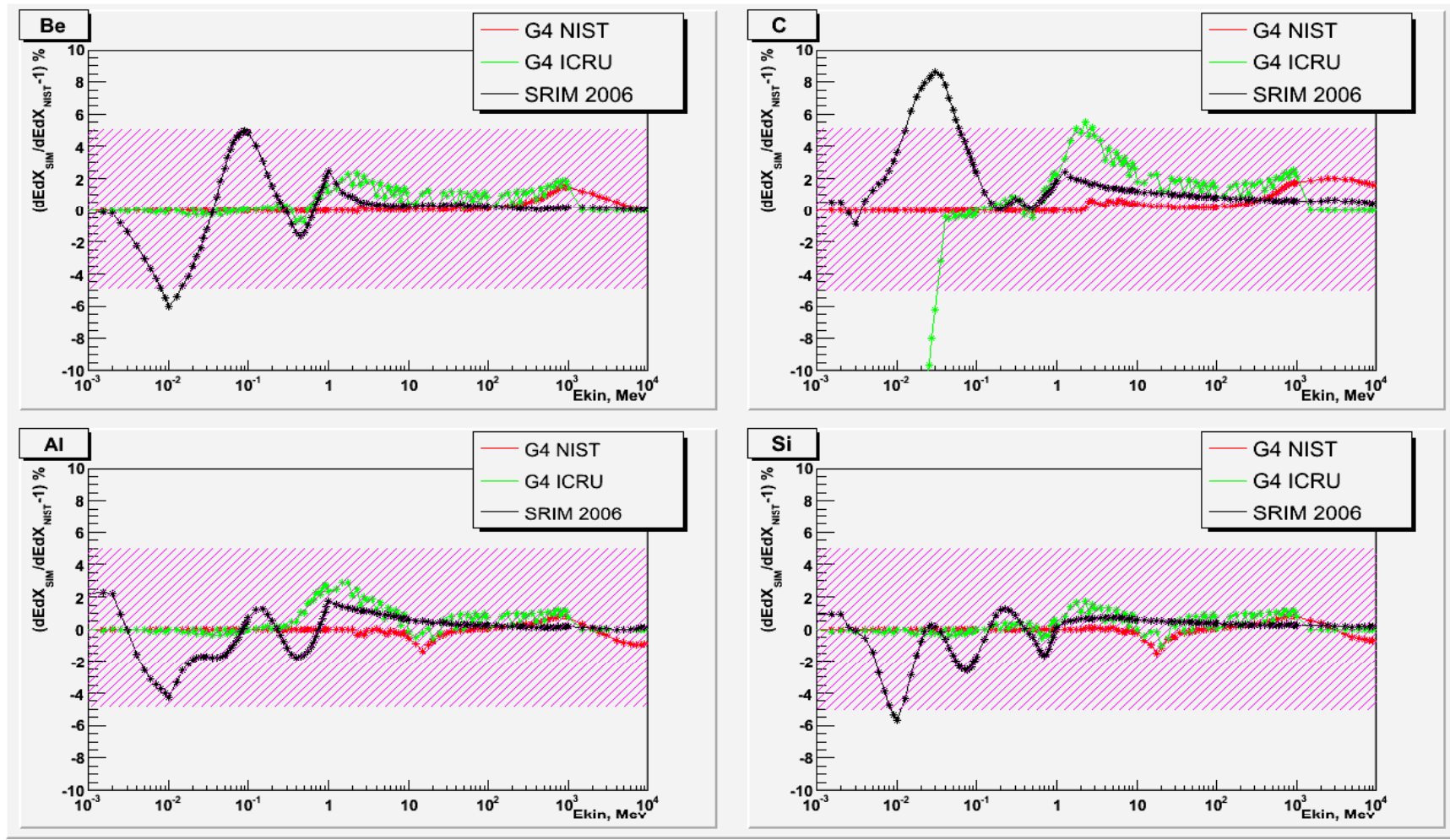
Outline

- Stopping power
- Energy loss fluctuations
- Scattering
- Hadron inelastic

Stopping power

- Proton and He4 stopping:
 - tables from NIST for NIST materials
 - ICRU'49 for the rest
 - Reasonable agreement with SRIM'06
 - To do:
 - Spline of EM tables
 - Mean ionisation potential data needs to be reviewed
 - Precise Si data to be included
- Ions
 - ICRU'73 data for G4_WATER only
 - ICRU'73 should be included
 - Much more validation is needed including comparisons with SRIM'06

Validation of proton stopping (2006)



Energy loss fluctuations

- Available models:
 - G4UniversalFluctuations
 - General model for HEP and other usecases
 - Is valid down to 1 um of solid absorber
 - Is not good for ions
 - G4IonFluctuations
 - Gaussian model – needs low cuts and big steps
 - To do
 - Special verification versus publish data is required to define precision and conditions of validity
 - Extensions of the model likely will be needed
 - PAI model – can be used for comparisons

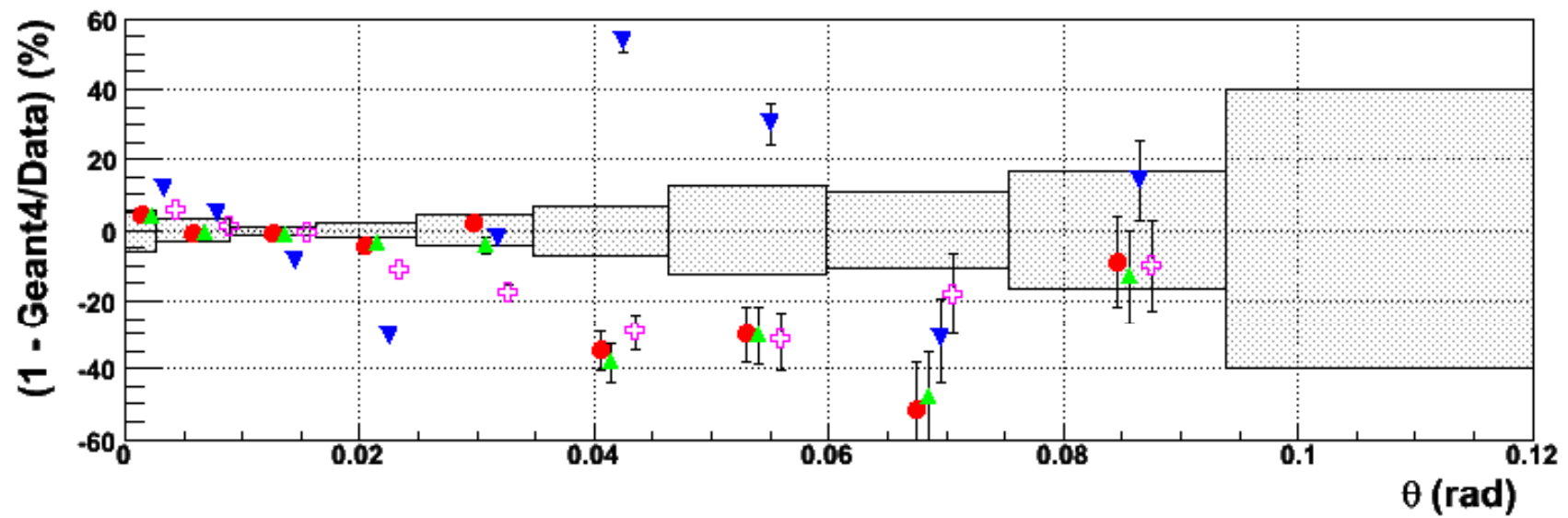
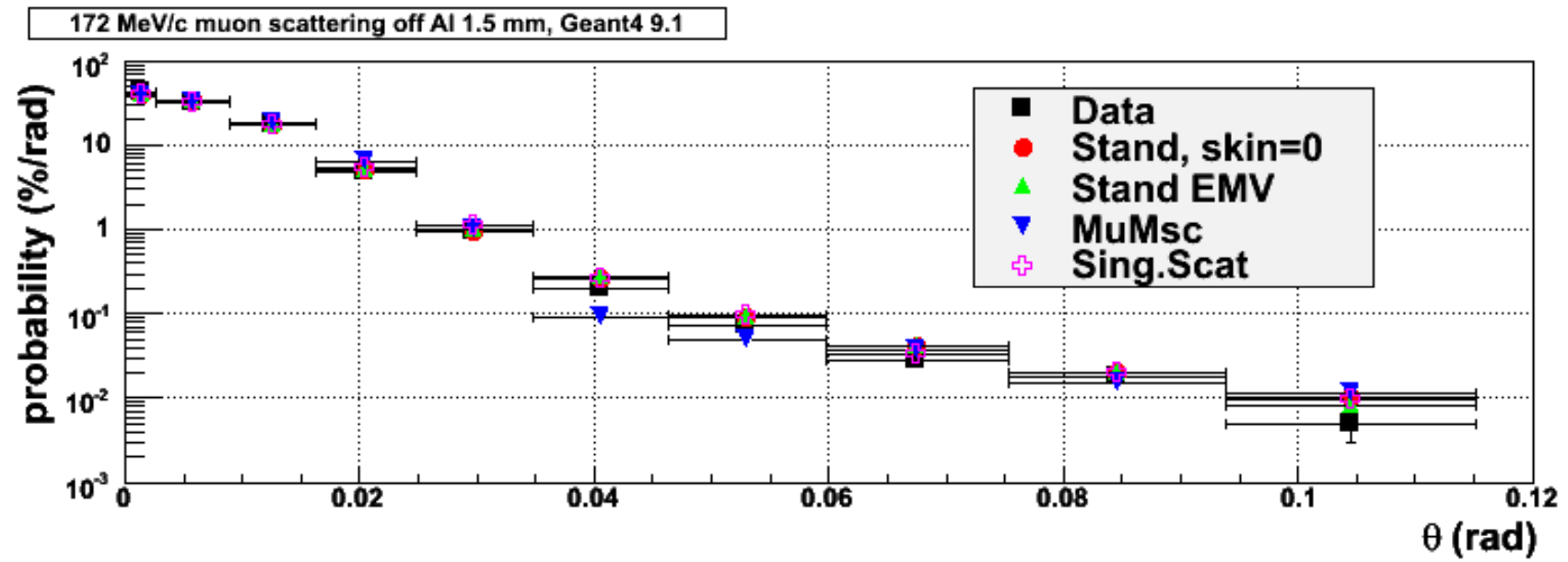
Scattering

- Processes:

- ❑ G4MultipleScattering
- ❑ G4MuMultipleScattering
- ❑ G4CoulombScattering
- ❑ G4ScreenedNuclearRecoil (TestEm7)
- ❑ G4UHadronElasticProcess
- ❑ G4QElastic

- Models:

- ❑ G4UrbanMscModel
- ❑ G4UrbanMscModel90
- ❑ G4MuMscModel
- ❑ G4eCoulombScatteringModel
- ❑ G4CoulombScatteringModel



Scattering

- To do
 - Systematic validation versus data
 - Optimal combinations of models in Physics Lists per particle type for different use-cases

Nuclear Interactions

- Out of the scope of this meeting