

Highlights-278: A Software Toolkit to Study Systematic Uncertainties of the Physics Models of the Geant4 Simulation Package

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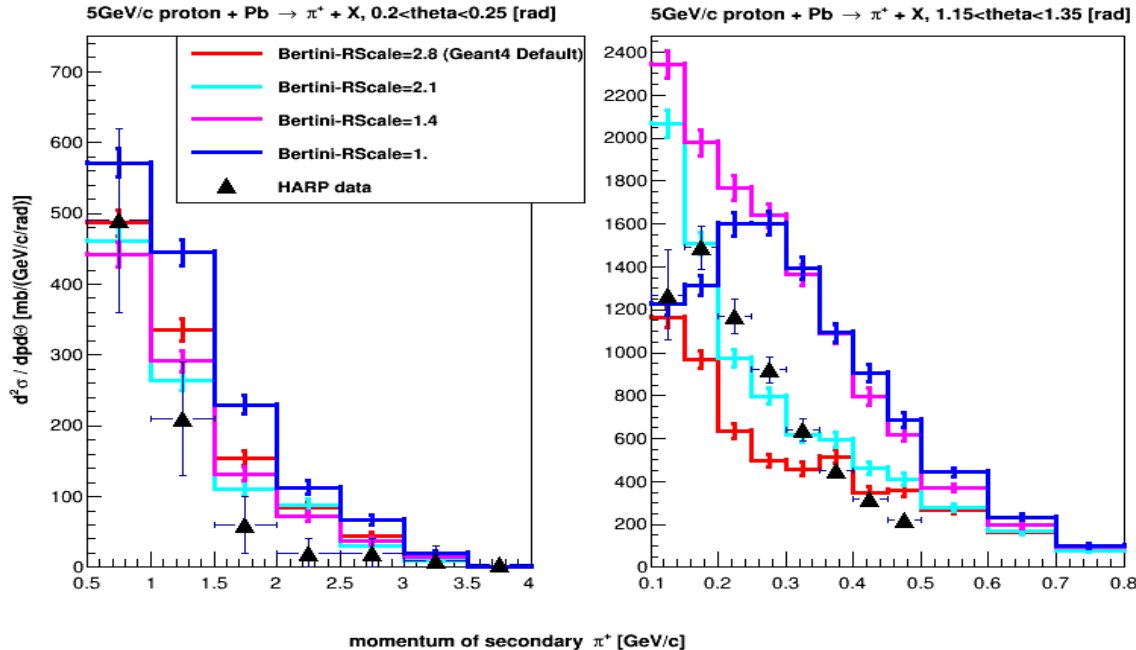
Presentation delivered by S.Y.Jun (Fermilab)

Highlights-278 (I)

- Geant4 offers a set of models to simulate interactions of particles with matter
 - these models are tuned to cover a very wide range of tasks
 - but having a one-size-fits-all is not so simple
- User community wants to be able to study how sensitive Geant4 predictions would be to varying Geant4 model parameters
 - this needs to be done in a convenient, comprehensive, run-time configurable, documented way
- The task calls for a set of software tools
 - allow to easily run one or multiple variants of Geant4 simulation application
 - combine simulated results and to perform collective statistical analysis of them
- Such tools are being developed by Geant4 teams at Fermilab and SLAC
- As the 1st step, the toolkit has been used to explore sensitivity of the Geant4 Bertini Cascade model to the variations of several key parameters
 - development of hadronic showers in matter
 - simulation of hadron-nucleus interactions
 - comparison with experimental data, where available
- Further development of the toolkit and inclusion of other key Geant4 models are planned for in the near future

Highlights-278 (II)

Selected results are included to illustrate the case:



Production of π^+ by a 5GeV/c proton beam interacting with a Lead nucleus as simulated by Geant4 Bertini cascade model.

Bertini default predictions are compared with results from several variants and with experimental data from HARP:

- M.G. Catanesi et al., Phys.Rev.C77 055207, 2008
- M. Apollonio et al., Phys.Rev.C80 035208, 2009

Variations of Bertini parameter RadiusScale maybe larger that one standard deviation.