

Parallel session 4-A

Review of existing biasing options

And beyond...

Motivation for this session

- We have several biasing options in Geant4
- Biasing is largely a “trans-category” technique
 - Appears in physics generators : gps...
 - In EM : reverse MC...
 - In hadronics : leading particle, radioactive decay...
- But at the moment we have these living disconnected from each other
 - While there are certainly features, issues, solutions that can be shared
 - Some theoretical “culture” on foundations, statistics tools, etc.
 - with this reflected in documentation
 - » for example the *physics reference manual*
 - Some practice “culture” : reliability of estimators, fake convergences...
 - Some knowledge of what is done elsewhere, in other packages
- This session is an invitation in trying to connect/re-connect these various biasing developments, and try to state:
 - On the existing
 - On the missing features
 - And start to think about a wish list of actions

Timetable [1/2]

- 14:10 *Introduction*, Marc (now)
- 14:20 *Review of biasing options in other packages*, John
- 14:30 *Biasing options in the hadronics : Leading Particle, (Total) Cross Section, Radioactive Decay*, Dennis
- 14:40 *Reverse MC*, Laurent
- 14:50 *Biasing option in GPS*, Fan
- 15:00 *Geometrical biasing + Weight window technique*, Alexander
- 15:10 *Scoring & biasing + Wrapper process*, Makoto
- 15:20 *Implemented confidence level estimators*, Tatsumi

Timetable [2/2]

- 15:30 Discussion (20')
 1. Improving/generalizing the existing (non exhaustive):
 1. Hadronic has a (total) cross section biasing scheme : would it be useful to other packages ? At what cost ?
 2. Documentation and examples:
 1. documentation sometimes difficult to read, how to improve ?
 2. Status of the examples related to biasing ?
 2. Completing existing features:
 1. Monitoring convergence of “tallies”: what software tools ?
 2. What statistics tools, what confidence level estimators on tallies ?
 3. Collecting wish list for new features (non exhaustive):
 1. Forced interactions
 2. Differential cross-section biasing
 3. other ?

My reading...

- Using this book for my own teaching
 - Recent (2009)
 - Gives foundations
 - Lists applications
- Foundations for
 - Splitting
 - Importance sampling
 - Robustness Properties & Confidence Interval Reliability
 - Which points in particular traps in of “fake convergences”
- Transport chapter
 - T. Booth, MCNP
 - Focus on neutrons
 - Partly “independent” of the rest of the book, but still very informative...
 - This “transport chapter” helps to understand BTW that G4 is in general far to compete with MCNP on biasing...

