

# **P4-A “Review of existing biasing options”**

ESA/ESTEC G4 meeting, october 2010

Plenary Session X :

*“Summary reports from the parallel sessions”*

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# 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.
    - Some practice “culture” : reliability of estimators, fake convergences...
    - Some knowledge of what is done elsewhere, in other packages
- This session was 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
- 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 ?

# Session outcomes

- Session shown quite enthusiasm in reviving the biasing activity in Geant4
- First decisions:
  - Write down theoretical aspects of biasing in physics reference manual
    - For reference and for our own understanding
    - Write the mathematics of biasing
    - Push for the related statistics
    - Validate with toy Monte Carlo
  - Promote G4ConvergenceTester –re-implementation of MCNP statistical convergence criteria- from dark-lost example to a noble directory under the source one
    - After revisiting and refreshing this class
  - Refresh memory and documentation about use-cases
- Medium/long term plans to be defined, effort to organize.