EXAMPLE GB07

Example session of online 2020 CM

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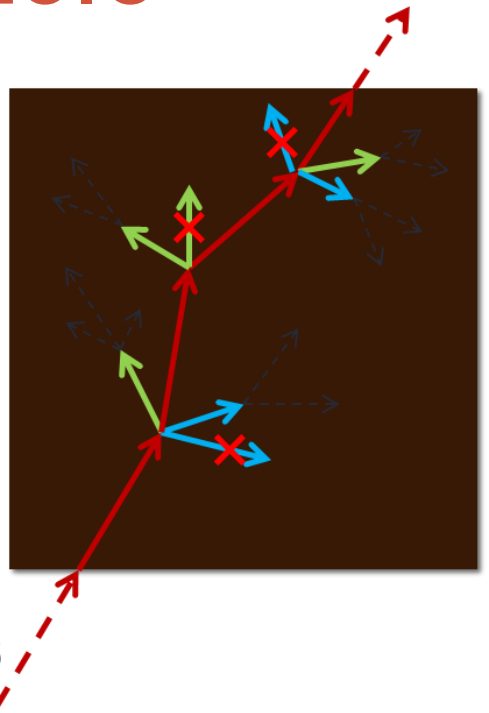
Leading particle biasing in 10.6



- Leading particle biasing = technique that “trims” a shower development to get faster particles going through a volume (eg, shield) and estimate the exiting flux
  - At each interaction inside the volume:
    - Keep the “leading particle”
    - Randomly keep one particle of each species
      - Augmenting their weight accordingly
      - Ie : if 3 pions, surviving pion has its weight ×3
- Technique existing in hadronic package since long
  - With application to hadronic interactions only
- Re-implemented with the “generic biasing” scheme in 10.6
  - Makes it applicable to any post-step interaction
  - Extend scheme to handle (the numerous) 2-particle final states
    - Above scheme does not act on such final states
  - Case treated (and applicable to all cases) by an additional killing probability applied to the (non-leading) surviving particles
    - And augmenting their weight accordingly
- Class G4BOptnLeadingParticle (biasing operation)
  - In source/processes/biasing/generic

GB07

- Demonstrates usage of the technique in the generic biasing scheme
- Geometry in a simple block.
- Defines a biasing operator, GB07OptrLeadingParticle, that decides to what particles, what processes and how to use the G4BOptnLeadingParticle biasing operation.
- Biasing setup:
  - pi+ and pi-, inelastic process,
  - proton and anti-proton, inelastic process,
  - neutron, inelastic and capture processes,
  - anti-neutron, inelastic process,
  - gamma, conversion and photonNuclear processes,
  - electron, electronNuclear process,
  - positron, annihilation and positronNuclear processes,
  - pi0, decay process.
  - For conversion, annihililation and pi0 decay, a 2/3 killing prob. is applied to the non-leading track
- When applied to 10 GeV incident p or γ, a gain ~2 in speed is obtained.