Geometrical Biasing Progress Report

1. **New Biasing Scheme (user interface change for v9.0)**
2. **Class clean-up**
3. **Examples**
4. **Coupled Transportation/Parallel Navigation**

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Geometrical Biasing Report

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New Biasing Scheme (default since v9.0)

- Parallel geometry now must inherit from G4VUserParallelWorld
- Parallel and mass sampler classes now combined into one G4GeometrySampler class:

  e.g.: mgs(detector->GetWorldVolume(),"neutron");

  An additional set method defines whether or not the sampler is in a parallel geometry: mgs.SetParallel(false);
- When a parallel world is created, parallel navigation must be activated. An application with physics list that uses the AddTransportation method will automatically use G4CoupledTransportation which is picked up by the creation of the parallel world copy.
- All scoring can be implemented *only* through the Primitive Scorer classes.
- Users utilising the older scoring classes will need to migrate to using Primitive Scorers. The same functionality is provided apart from G4ScoreTable. Scorers are now attached to logical volumes (in place of geometry cells). This requires explicit copy numbers to be utilised for the same logical volume and the GeometryCell methods should be accessed through the physical volume and replica number method.
- A demonstration of the new biasing and scoring is available in examples/extended/biasing/B01 and B02.

Developments since mini-workshop (1)

- New module for process-based biasing
- Migrated classes from processes/scoring and transportation modules
- Removed classes from old biasing scheme
- These are now replaced by either G4CoupledTransportation (parallel navigation) or in processes/biasing module
- The scoring is implemented with the new scoring framework (in digits_hits and processes/scoring modules).
- The following classes were removed: G4ParallelNavigator, G4ParallelStepper, G4ParallelWorld, G4VParallelStepper, G4VPGeoDriver, G4VScorer, G4ImportanceSplitExaminer, G4VImportanceSplitExaminer, G4VWeightWindowExaminer, G4WeightWindowExaminer.

Developments since mini-workshop (2)

- Examples B01 and B02 migrated to new scheme
  - And found to reproduce the old system
- B03 removed (python/obsolete)
- TIARA still needs updating / re-writing / migrating / maintaining
- Benchmarking vs. data with Figure of Merits still need developing for biasing
- Biasing documentation updated, but not extended

Coupled Transportation

- Most of the effort with respect to biasing development has been spent on CoupledTransportation
- CoupledTransportation allows parallel navigation which is required for Geometrical Biasing
- We attempted to introduce this as the default transportation for Geant4 in release v9.0, but due to performance issues it was not possible
- Further profiling and debugging is continuing so that it can be introduced in v9.1
- For biasing in parallel geometries this is now the only possibility for transportation