Geant4
Track Propagation
(g4ext)

Leo Piilonen, Virginia Tech

Why g4ext?

- During event reconstruction, swim each charged track through the detector geometry; store the position, momentum, and covariance matrix at the entrance/exit of selected volumes
- Replaces basf module ext (which uses geant3)

How was ext used?

(1) gsim and ext in same basf job [for MC]:
simulate an event, reconstruct all tracks, then swim each track using ext

(2) gesim and ext in same basf job [for real data]:
reconstruct all tracks, then swim each track using ext. (gesim just creates the geant3 detector geometry and environment for ext)

```
path add_module main cdctable genunpak bpsmear gsim acc_mc calsvd
path add_module main addbg tof_datT0TS tsimtof calcdc l4 evtime l0svd
path add_module main reccdc recsvd trasan T0Ft0 trak trkmgr AnadEdx
path add_module main ext rectof rececl_cf rececl_match rececl_gamma
path add_module main rececl_pi0 rec_acc muid_set muid_dec klid
path add_module main efcclust v0finder rec2mdst evtvtx evtcls
```

How is g4ext used?

(1) g4superb and g4ext in same basf job [for MC]:
simulate an event, reconstruct all tracks, then swim each track using g4ext

(2) g4ext alone in basf job [for real data]:
reconstruct all tracks, then swim each track using g4ext. (no need for "gesim" equivalent)

```
path add_module main genunpak g4superb trasan recsvd trak trkmgr
path add_module main g4ext rectof rececl_cf rececl_match rececl_gamma
path add_module main rececl_pi0 g4muid_set muid_dec klid
path add_module main v0finder rec2mdst evtvtx evtcls
```

g4superb event()

```
runMgr->BeamOn( 1 event );

RunInitialization();
DoEventLoop( 1 event );
RunTermination();

GenerateEvent();                    <-- using B4PrimaryGeneratorAction()
eventMgr->ProcessOneEvent();

DoProcessing();
```

uses
B4TrackingAction()
B4SteppingAction()
B4StackingAction()

```
navigator->LocateGlobalPointAndSetup();
trackContainer->PrepareNewEvent();
B4EventAction->BeginOfEventAction();
for (each generated track) {
  trackMgr->ProcessOneTrack();
  (stack any secondaries);
}
B4EventAction->EndOfEventAction();
```

g4ext event()

```
for (each Rectrk) {
   (extract Rectrk and Reccdc parameters);
   errpropMgr->InitTrackPropagation();
   while (track has not escaped nor stopped) {
      errpropMgr->PropagateOneStep();
   }
   errpropMgr->EventTermination();
}
```

no use of
B4EventAction()
B4TrackingAction()
B4SteppingAction()
B4StackingAction()

How is g4ext used?

(1) g4superb and g4ext in same basf job [for MC]:

They do not coexist yet: g4ext initialization messes up g4superb event simulation

(2) g4ext alone in basf job [for real data]:

Works fine, produces panther tables for use by subsequent analysis modules (ext-compatible)

```
path add_module main genunpak g4superb trasan recsvd trak trkmgr
path add_module main g4ext rececl_cf rececl_match rececl_gamma
path add_module main rececl_pi0 g4muid_set muid_dec klid
path add_module main v0finder rec2mdst evtvtx evtcls
```

- Still working on (1) ... run separate basf jobs for now.
- g4muid_set may get absorbed into g4ext