

CMS GeantV Plans

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(FNAL)

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CMS Status

- Successful integration of GeantV with CMS “toy” framework:
<https://github.com/mrguilima/toy-mt-framework>
- Now included in GeantV repository: [examples/physics/GeantV/cmsToyGV](#)
(for alpha release)
- VecGeom v00.05.00 included in CMSSW_10_0_X (but in scalar mode w/ sse3 instructions, only for use with Geant4)
- Up to 10% speedup seen with just scalar VecGeom, due to code improvement

CMS Plans

1. Prepare private CMSSW branch to integrate GeantV alpha release (along with corresponding versions of VecCore and VecGeom)
2. Use design of GeantVProducer in cmsToyGV to create similar producer in full CMSSW
 - CMS runs Geant4 in multithreaded mode – special OscarMTProducer
3. As a baseline, compare MT runs of Geant4 and GeantV:
 - Disable all SD applications, remove production cuts ([cmssw/pull/22306](https://github.com/cms-sw/cmssw/pull/22306))
 - Limit physics lists to EM physics ([cmssw/pull/22357](https://github.com/cms-sw/cmssw/pull/22357))
 - just tracking particles through geometry/materials
 - Run different physics processes, number of threads, geometries?
 - Can try Intel VTune profiler to see if any bottlenecks
 - Also try different instruction sets for VecGeom? need appropriate machines

Further Plans

4. Try new asynchronous “ExternalWork” feature of full CMSSW framework:
 - a) Acquire: pass data from CMSSW to external
 - b) Work: external does work (e.g. GeantV propagates tracks)
 - c) Produce: external returns data to CMSSW (via callback)
 - “external” can be GeantV, GPU, cloud computing, etc.
 - Simple example: [FWCore/Integration/test/AcquireIntStreamProducer.cc](#)
5. Build up to full run of CMSSW simulation (SDs, etc.) w/ GeantV
 - GeantV returns container of tracks (from many events), not single track/step
 - May require some reorganization of SD applications
 - Try to encapsulate changes in CMSSW run manager or associated classes
 - [examples/physics/GeantV/FullCMS](#) is a good guide

Backup