



Status and plans for CMS simulation

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Summary of CMS full simulation

- CMS used Geant4 10.0p02 for Run-2 simulation
 - >16 billion events are produced
 - Sequential Geant4 in production
 - QGSP_FTFP_BERT_EML Physics List
- Geant4 10.2p02 is used now for 2017 production
 - Production started at winter break
 - Minor fixes from Geant4 10.2p03 are added
 - FTFP configuration from Geant4 10.1 is used
 - FTFP_BERT_EMM PhysicsList
 - Multithreaded Geant4

Geant4 10.4 migration for 2018

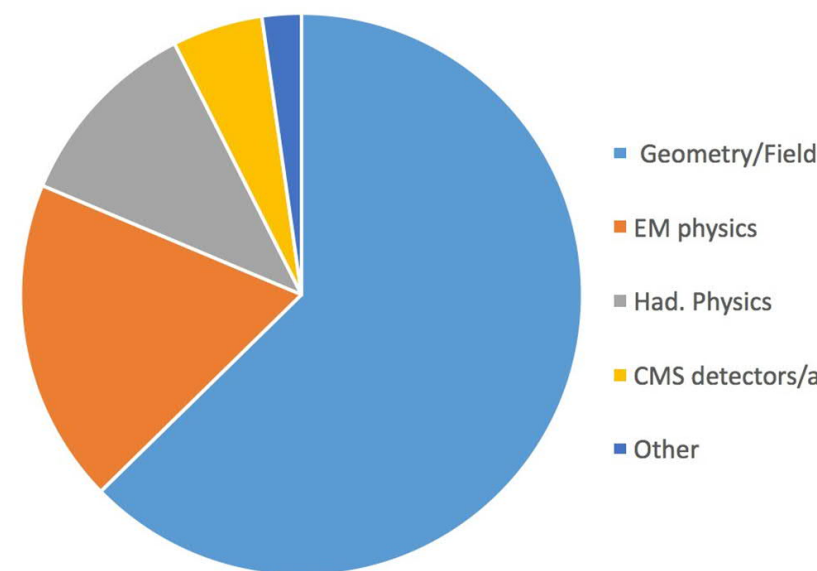
The main reason of migration – to improve simulation performance

This is a minor release – no interface change compared to Geant4 10.2

- More clean-up and optimizations
- Technical fixes
- Compatible with new compilers
- Integration of each new reference version does not require any significant change in CMSSW libraries

Expected benefits

- Improved physics
- Improved and more performant geometry and transportation in magnetic field
- **Better interfaces to VecGeom**
 - see talk of S.Banerjee





CMS adaptation of Geant4 10.4

- The process started when Geant4 10.4beta become available
 - CMS needed early start in order to be ready for the beginning of 2018
 - Few minor modifications were added to CMSSW in order to be compliant both with 10.2 and 10.4
- Geant4 reference tags are integrated inside CMSSW in a special git branch
 - Geant4 inside CMSSW was switched after reference tags
 - Validation was done for 10.4beta -> 10.3ref08 -> 10.3ref09->10.3ref11->10.4
 - For each reference tag TB2006 tests and tests versus run-2 data were performed (see results in S.Banerjee talk)
- Technically Geant4 10.4 is working inside CMSSW
 - Physics validation is in progress
 - Migration to CLHEP 2.4.0.0 is in progress
 - Migration to the build with VecGeom is in progress



CMS plans

- Short term plan:

- End of January a new release to be used for the first half of 2018 will be created
 - Expected Geant4 10.4+VecGeom
- Main simulation production will be in the second part of 2018
 - CMS may integrate a patch to 10.4 if it will appear before the spring

- Current architectures used by CMS:

- Slc6-amd64-gcc630 – default
- Slc6-amd64-gcc700
- Slc7-amd64-gcc630
- Slc7-amd64-gcc700

- Long term preview

- HGCal – new fine grain endcup calorimeter
- Improvements in EM and hadronic models will be required
- Speed-up of full simulation is necessary