

Geant4 status in CMS

- Production version of Geant4 for 2016
 - Geant4 version 10.0p02 built in sequential mode
 - Production platform slc6_amd64_gcc491
 - Default physics list: **QGSP_FTFP_BERT_EML**
 - ~8 billion events already produced in 2015
- Current main development versions of Geant4 in CMSSW
 - Geant4 10.0p03 + patch of Geant4e for threading + patch to pi- capture by hydrogen
 - Multi-threaded Geant4 is fully integrated with CMS multi-threaded framework
 - Test production in MT mode in 2016
 - Platform slc6_amd64_gcc530
 - Geant4 10.1p02 was integrated in the one of development branches
 - Geant4 10.2p01 was also integrated few day ago
 - Our main goal for 2016 is to prepare it for 2017 CMS production

CMS experience with Geant4 10.1p02 and 10.2p01

- Much less efforts to integrate these releases compared to 10.0
 - The only problem – clhep 2.3.1.1 does not compile versus old Geant4 10.0p03, so not possible to perform early integration of newer CLHEP
- In both releases there is, at least, one place with data race in the MT mode:
 - G4KL3DecalChannel::DecayIt()
- When we integrate 10.2p01 a problem appears with the G4ENSDFSTATE.1.2.1.tar.gz
 - Thanks to G.Folger who promptly provided G4ENSDFSTATE.1.2.2.tar.gz
- CMS would propose to include in future a new platform for Geant4 nightly CentOS7-gcc60
 - when the compiler will be officially available

Geant4 physics performance

- When CMS performed a very basic validations of Geant4 10.1p02 results it was observed that hadronic shower deliver about 5% less energy in ECAL
 - The sum of the response is stable, this means that the hadronic shower become longer
 - CMS needs more information on validation of Geant4 hadronic physics both for Geant4 10.1p02 and 10.2p01
 - This target MC/data comparisons
 - Special interest to longitudinal shower profile validations
- From CMS side we put efforts and manpower to restore functionality of 2006 test-beam comparisons in order to validate new Geant4 releases
- We also plan to perform new comparisons versus data of run-2

Outlook for near future

- CMS has a goal to use 10.2 for 2017
 - This will happen if various comparisons MC/data will be understood
 - CMS will feedback 10.2p01 validation results and foresee 10.2p02 before summer
- A series of test beam experiments for CMS upgrade is started
 - In May 2016 a first prototype of a new W/Si calorimeter will be exposed at electron beam
 - 28 layers, 0.1 mm Si plates, 128 cells in a layer

