

22nd International Conference on Computing in High Energy and Nuclear Physics, Hosted by SLAC and LBNL, Fall 2016

# Geant 4

## New Developments in Geant4 Version 10 Series

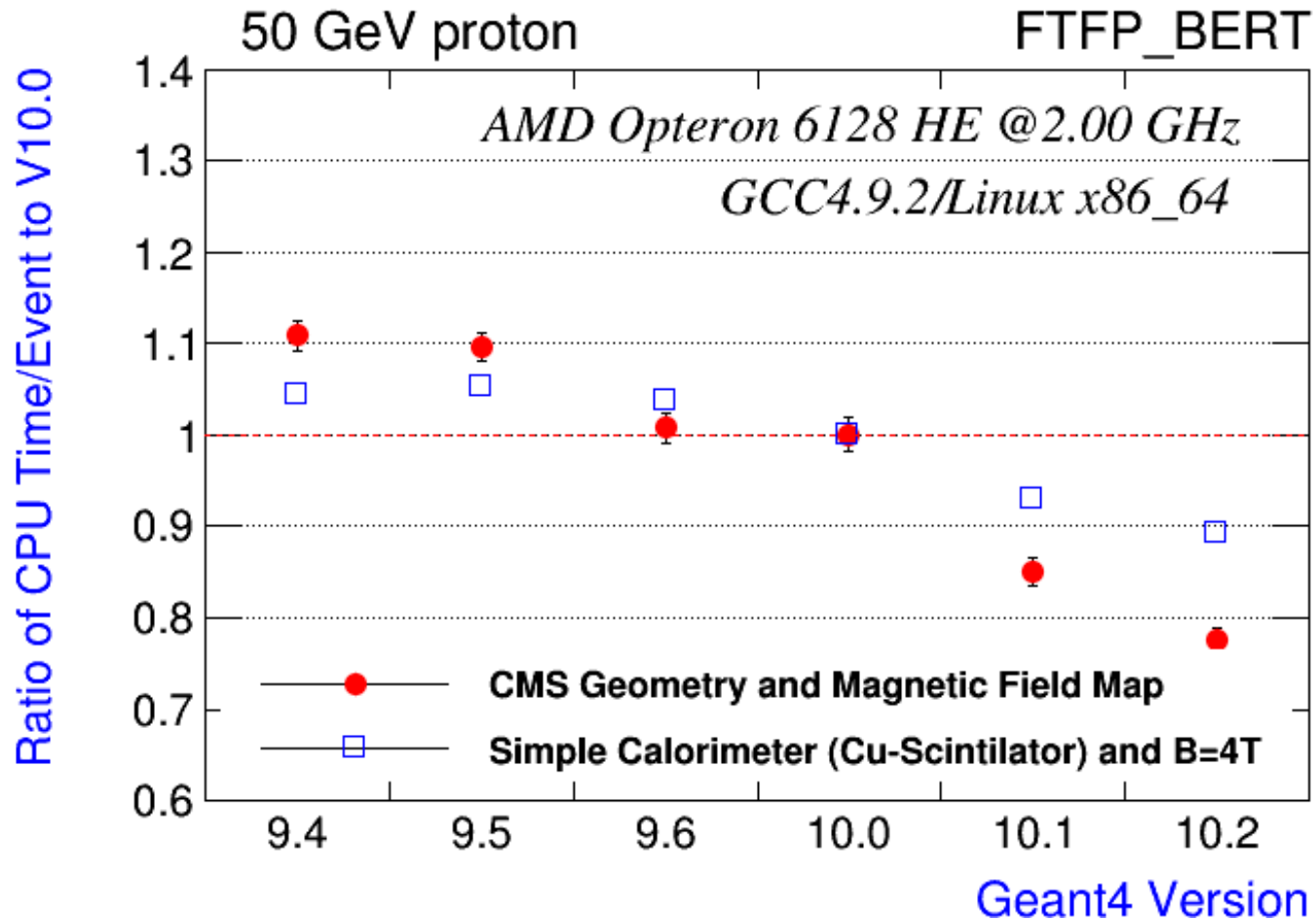
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On behalf of the Geant4 Collaboration



First of all, we are making it faster!



ATLAS : "The 10% CPU improvement we gain from the move from G4 9.6 to 10.1 is invaluable to the collaboration."

# More memory-efficient, more HPC friendly

Version	Intercept	Memory/thread
9.6 (seq.)	113 MB	(113 MB)
10.0.p02-seq	170 MB	(170 MB)
10.0.p02-MT	151 MB	28 MB
10.3.beta-MT	148 MB	9 MB

Memory space required for Intel Xeon Phi 3120A  
Full-CMS geometry (GDML), 4 Tesla field, 50 GeV pi- (FTFP\_BERT)

# of CPU	# of threads	Speed-up factor	efficiency
10	80	79	98.8%
20	160	158	98.8%
40	320	317	99.0%
80	640	626	97.8%
160	1280	1251	97.7%
320	2560	2297	89.7%
640	5120	3555	69.4%

Tachyon-2 supercomputer @ KISTI (South Korea)  
FTFP\_BERT physics validation benchmark

- Geant4 has successfully run with a combination of MT and MPI on Mira Bluegene/Q Supercomputer (@ANL) with up to ¼ million threads
  - Full-CMS geometry & field
- I/O is the limiting factor to scale above 128k concurrent threads:
  - Granular input data files, output data/histograms, etc.
  - 2016/2017 work item



Section	Specs.
Model	SUN Blade 6275
Blade Nodes	3176 Compute Nodes, 300 TFlops (Rpeak)
CPU	Intel Xeon x5570 Nehalem 2.93GHz, 8 cores per node, Total 25408 cores
Memory	24 GB (per node)
Storage	1125 TB (Disk) 2112 TB (Tape)
Interconnect Network	Infiniband 4x QDR