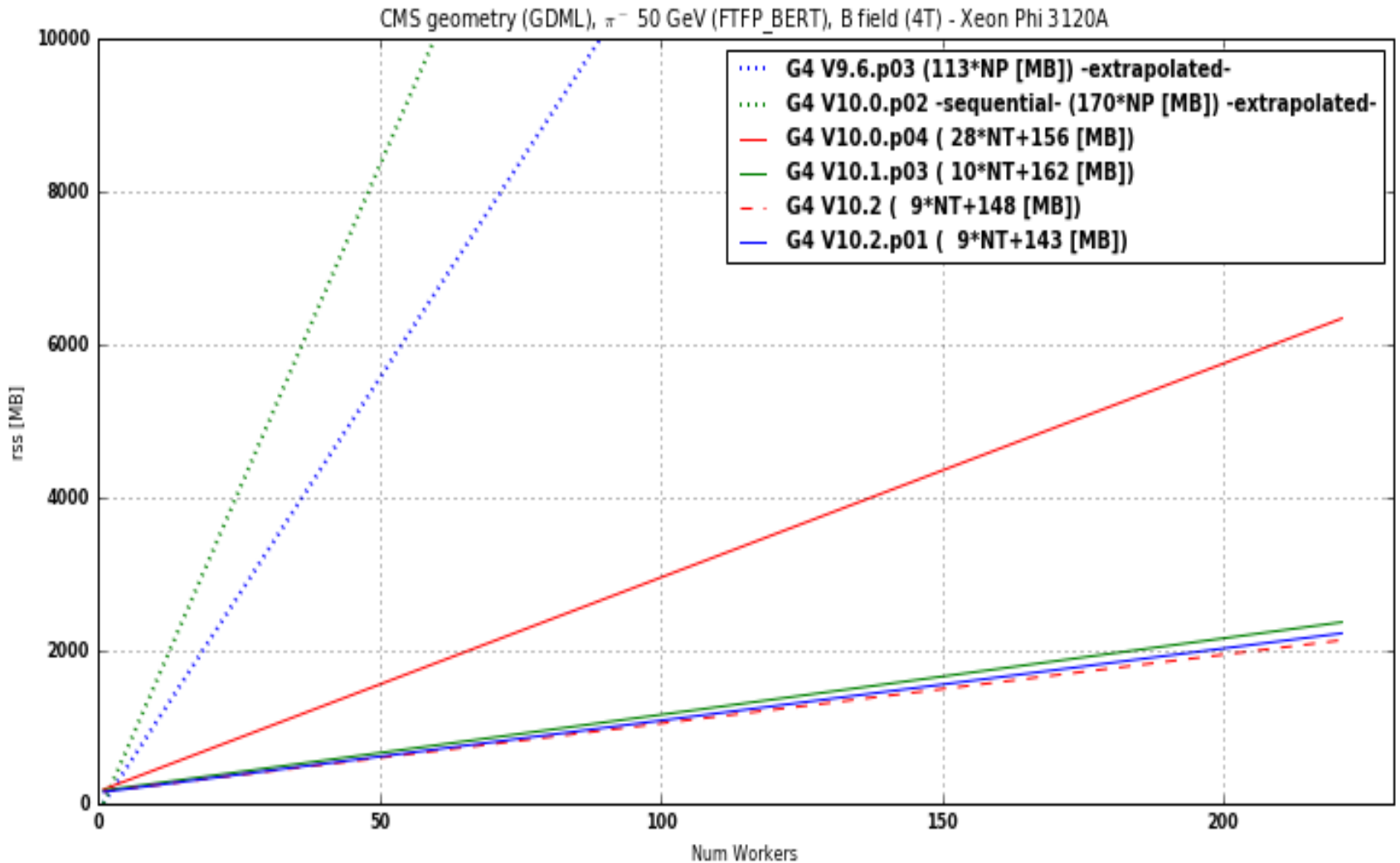


# Geant 4

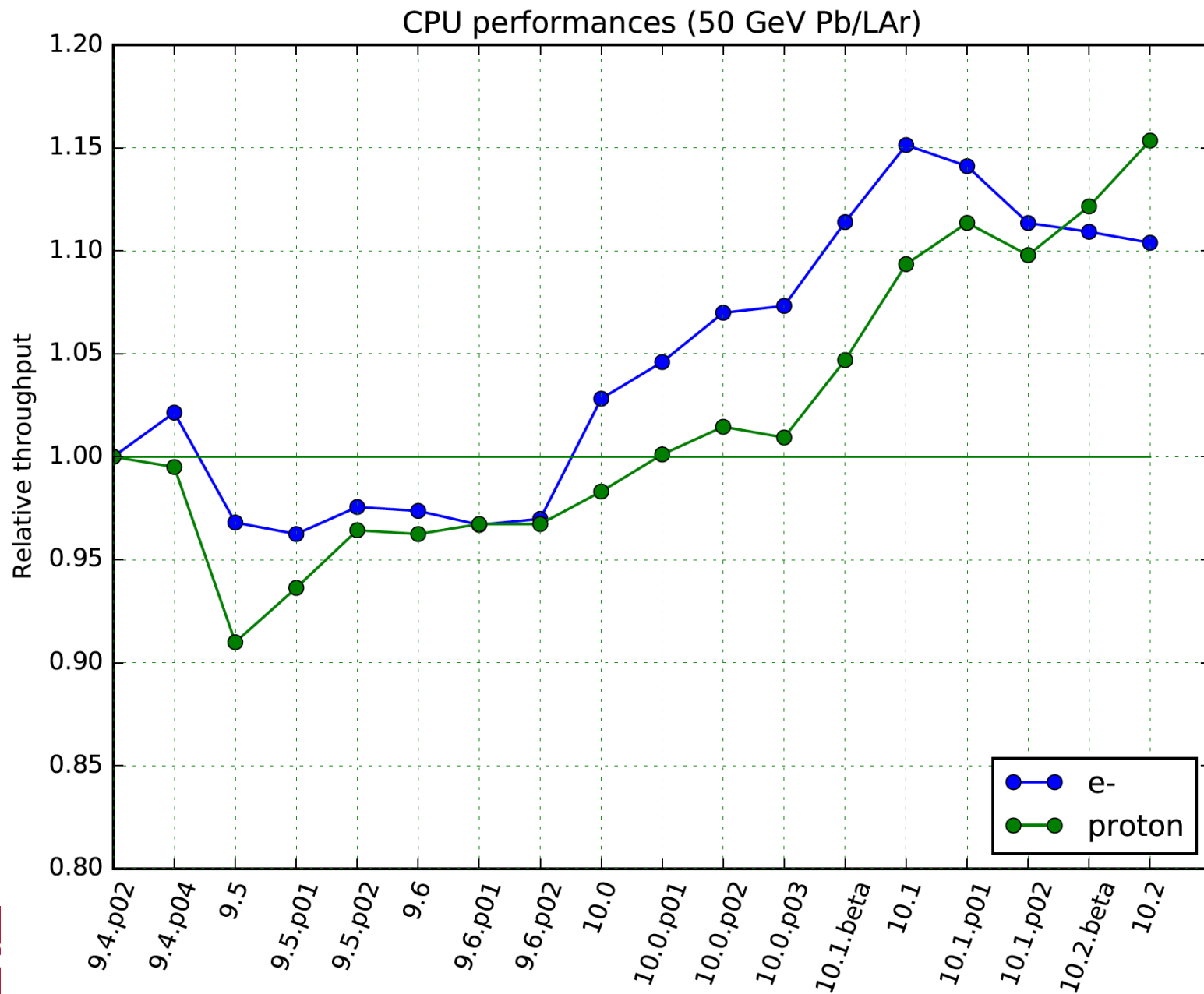
## 2016 Development Plan - non-physics part -

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On behalf of the Geant4 Collaboration  
Geant4 Technical Forum  
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- Full set of proposed 2016 work plan would be found at [http://geant4.web.cern.ch/geant4/support/planned\\_features.shtml](http://geant4.web.cern.ch/geant4/support/planned_features.shtml)
- In this talk I will summarize some key development items in non-physics part of the work plan.
- For all categories :
  - Implement use of C++11 constructs in key areas
- Your suggestions, comments, requirements are essential.



# Computing performance in sequential mode



- Geometry / transportation
  - Review use of regular navigation in conjunction with multiple-scattering
  - Profiling and optimization of multiple navigation
  - Separate safety computation from navigator
  - Introduction of fast and high-order steppers in field propagation
  - Introduction of scaled shapes construct
  - Complete implementation of the Unified Solids library with progressive adoption of shapes from VecGeom
- Persistency / analysis
  - Extend reader/writer to support scaled shapes
  - Support for parallel geometry in ASCII module
  - Evaluate parallel paging for ntuples for Root and eventually Csv formats
  - Support for handling more than one output files by one analysis manager

- Materials
  - Evaluate usage of G4float for material data instead of G4double
  - Improved G4Exception usage in material classes
  - Extension through abstract interface to provide information about processes using extended properties - (\*)
- Geometry Biasing & Importance
  - Switching between generic and geometrical biasing
  - Command line and "smart" biasing scheme
  - Consolidate geometrical biasing for the case of deleted and re-instantiated geometries
- Generic Biasing
  - Enrich event biasing options: Bremsstrahlung splitting; leading particle biasing
  - Prototype: biasing of charged particles; occurrence biasing; DXTRAN-like biasing; material/isotope biasing; Woodcock tracking; implicit capture
- Reverse Monte Carlo
  - Improvements of EM processes for case of thick shielding
  - Complete migration to multi-threading

- Run, event and detector response
  - Multi-threading:
    - Finalize new design of threads (allow threads to join/leave workers pool)
    - Migration from Posix threads to std::thread
  - Enhanced General Particle Source (GPS) in MT mode
  - Porting of material scanner to MT
  - Extension of scoring w/ analysis and MT improvements
  - Migration to use of MinMax random engine and array interface
  - Introduction of HepMC-3 interface
- Physics list
  - Merging of existing factory G4GenericPhysicsList and G4alt::G4PhysListFactory
  - Deletion of builders in multi-threaded mode
- User interface
  - Implement CTest testing for G4Py
  - Provide an alternative way for distributing random number seeds with MPI
  - Provide a method of load balance between MPI ranks

- New drivers :
  - OGLFile, ParaView,
  - G4DAE,PDF3D, vizualization for iOS and Android – (\*)
- Full support for visualization of Boolean shapes
- Support of user-drawn primitives in multi-threaded mode - (\*)
- Enhancement to existing viewers :
  - Additional functionalities to supports save and restore viewpoint in OpenGL drivers
  - Adapt to newer OpenGL versions, exploit new functionalities and replace deprecated calls such as glBegin/glEnd
  - Support save and restore viewpoint and save replay fly-through in OpenInventor – (\*)
  - Updated HepRAPP viewer to make it work with newer Java versions - (\*)
  - Updates to gMocrenFile and gMocren to support visualization attributes and other information - (\*)
  - Change from flat format to hierarchical format in VRML - (\*)
- New Transparent Visualization tool to support high resolution transparent visualization with ability to rotate and zoom - (\*)
- Visualization of GPS source - (\*)



- Basic & Extended Examples
  - New extended example (Hadr07) focused on testing physics
  - Extended biasing examples: fix overlap among B02, B03 and GB03 examples
  - New extended example showing how to create or use a physics list
  - New extended example demonstrating monitoring of steps/tracks
  - Investigation of MongoDB interface for analysis
- Advanced examples
  - Implementation of the LTE/RBE modeling derived by experimental measurements in hadrontherapy example
  - Introduction of polarized physics in GammaRayTel example, to build an experiment for polarised gamma detection
  - Testing suite against the TG43 reference by using the brachytherapy example
  - Upgrade of human\_phantom example with extension to nuclear medicine – (\*)

- Support of version 9.6 has been ceased at the time of 10.2 release.
  - No further official patch will be released for v9.6 (or earlier versions).
- Users are requested to communicate with us urgently if there is an explicit need for extending support of v9.6.
  - Please note, migration effort to version 10 series is minimal if the user sticks to the sequential mode, and still gets remarkable performance gain.