Full Simulation: status and perspectives

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Bruno: status

➢ Bruno has been used in the last production

  ➢ Very first "real life" use

➢ I think it is fair to say that it was a success

  ➢ Both the basic operation modes (full-fast and full-full) extensively tested, with no big problems

    ➢ In full-fast, a bug on the Bruno side caused some duplication of information, but the results have already been corrected offline

    ➢ In full-full, a handful of jobs crashed due to navigation problems, which of course should be investigated, but honestly it's not really a major issue

    ➢ Detectors have already provided feedback and requested new tunings to be applied to the next production

Bruno: profiling

- ➢ Started to have a look at the performance of Bruno from the software point of view

- ➢ Several very useful tools already existing

- ➢ Will show here something obtained with *callgrind*

  - ➢ A *valgrind* "flavour", which tells you how the processing time is used, i.e. how much of it is being spent in each function

  - ➢ Extremely powerful

  - ➢ Extremely slow

- ➢ Results refer to single particle (electrons) simulation job

- ➢ Time counters are reset after the BeginOfRun, in order to discard the initialization time and focus on event processing

Bruno: profiling
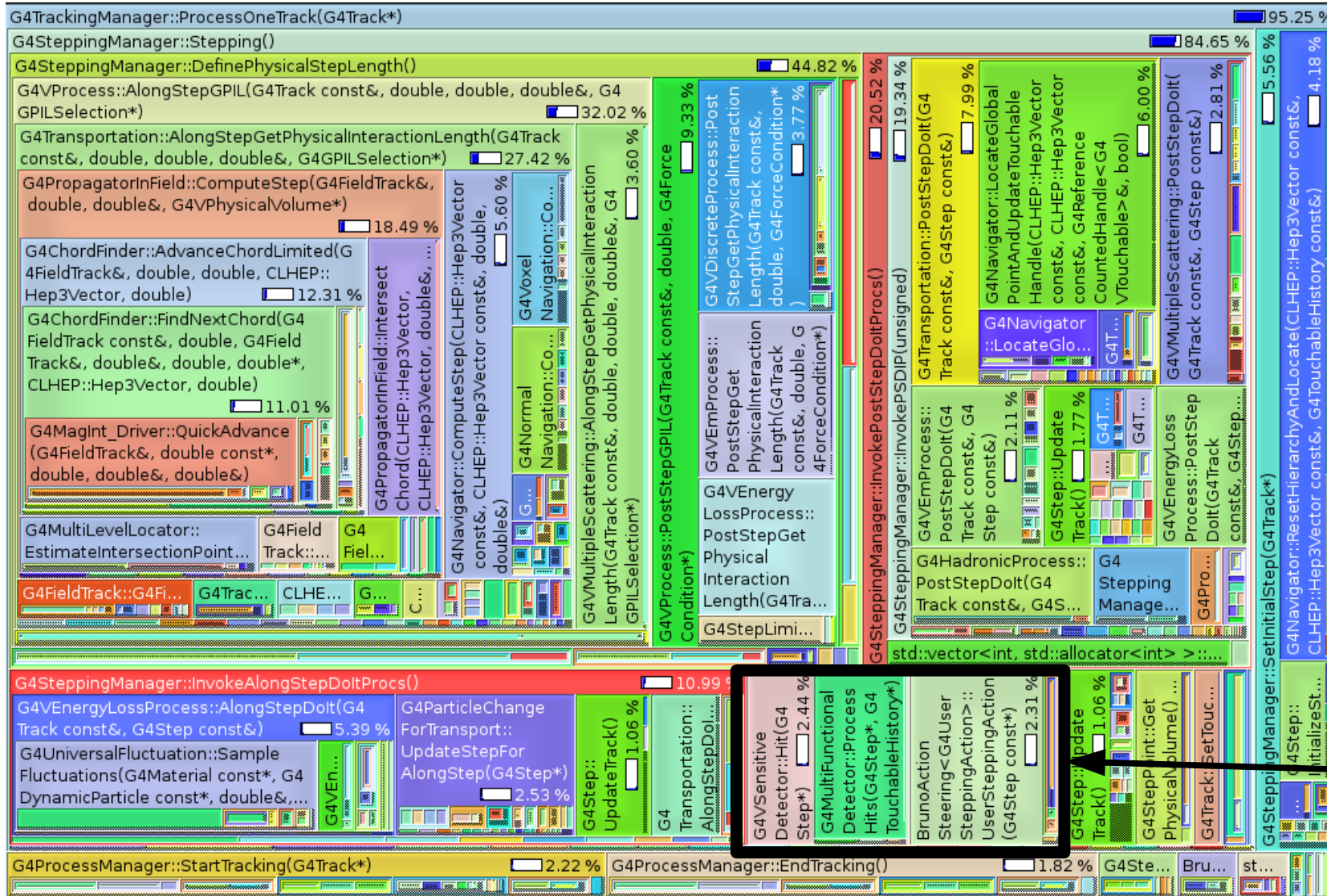
Hit production, MCTruth processing

Bruno: profiling

➢ Most of the processing time goes into G4 internals (physics, geometry, magnetic field)

➢ Bruno's overhead is limited to ~5%

  ➢ Basically only hit production and MCTruth recording

  ➢ Remarkable, but to be checked with different events

➢ This can mean three things

  ➢ We are not adding much to the basic G4 functionality (true)

  ➢ What we are adding, we are adding carefully (*probably* true)

  ➢ The physics part (production cuts) is not optimized yet, i.e. its fraction is somewhat overestimated, i.e. Bruno's impact is underestimated (true)

Future perspectives

➢ Tuning of *existing* functionality

  ➢ MCTruth information: what is needed? What is useless?

  ➢ Step length limitations: where? Why? How much? May require dedicated productions.

  ➢ Production cuts

  ➢ Can staged simulation help in some of these issues?

➢ Implementing what is *missing*

  ➢ Are we happy with our EDM (the format of the output file)?

  ➢ What about detector description?

  ➢ Any hope of simulating something different from RadBhabha and single particles?

    ➢ How to overlay events then?

  ➢ AOB?

What about re-packaging?

➢ A longstanding issue...

➢ Basic package structure and build system already setup (thanks Roberto!)

    ➢ Presently Bruno code splitted into two code packages and one "runtime" package containing macros and geometry

    ➢ Compilation runs smoothly, and the resulting binary produces the same results as the non-splitted version

➢ Only limitation to complete re-packaging and final migration is manpower

    ➢ Persons who should take take of it are pretty overloaded with other tasks

Bruno: tunings