

## The GeantV project: preparing the future of simulation

Detector simulation is consuming at least half of the HEP computing cycles, and even so, experiments have to take hard decisions on what to simulate, as their needs greatly surpass the availability of computing resources. New experiments still in the design phase such as FCC, CLIC and ILC as well as upgraded versions of the existing LHC detectors will push further the simulation requirements. Since computing resources will not increase at best, it is therefore necessary to sustain the progress of High Energy Physics and to explore innovative ways of speeding up simulation. The GeantV project aims at developing a high performance detector simulation system integrating fast and full simulation that can be ported on different computing architectures, including accelerators. After more than two years of R&D the project has produced a prototype capable of transporting particles in complex geometries exploiting micro-parallelism, SIMD and multithreading. Portability is obtained via C++ template techniques that allow the development of machine-independent computational kernels. A set of tables derived from Geant4 for cross sections and final states provides a realistic shower development and, having been ported into a Geant4 physics list, is also a basis for a performance comparison.

The talk will describe the development of the project and the main R&D results motivating the technical choices of the project. It will review the current results and the major challenges facing the project. We will conclude with an outline of the future roadmaps and major milestones for the project.