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# Floating-point profiling of ACTS using Verrou

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Numerical stability is not only critical to the correctness of scientific computations, but also has a direct impact on their software efficiency as it affects the convergence of iterative methods and the available choices of floating-point precision.

Verrou is a Valgrind-based tool which challenges the stability of floating-point code by injecting random rounding errors in computations (a restricted form of Monte Carlo Arithmetic). Through bisection techniques, this tool is able to locate which parts of a codebase are correlated with significant losses of numerical accuracy.

The ACTS project aims to establish a experiment-agnostic track reconstruction toolkit. It originates from the ATLAS Run2 tracking software and has already received strong adoption by FCC-hh, and is being evaluated for possible use by the CLICdp and Belle 2 experiments.

We have used Verrou to evaluate the numerical stability of ACTS' Runge-Kutta track propagation. As this step is known to be a reconstruction bottleneck for many experiments, we expect significant performance gains to be achievable by introducing reduced-precision arithmetic in it. In this talk, we will present the results of this study and discuss the more general applicability of Monte Carlo arithmetic to High Energy Physics software.

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