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tracc: GPU track reconstruction library for HEP experiments

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GPUs are expected to be a key solution to the data challenges posed by track reconstruction in future high energy physics experiments. `tracc`, an R&D project within the ACTS track reconstruction toolkit, aims to demonstrate tracking algorithms in GPU programming models including CUDA and SYCL without loss of physical accuracy such as tracking efficiency and fitted parameter resolution. We discuss the current status and demonstrate the performance of the full track reconstruction chain with GPUs for the first time. The physical and computational performance are studied using events simulated in the Open Data Detector, which is an open-source tracking geometry. The benchmark result shows that a GPU is faster than a CPU for pp collision events with pileups higher than 140, corresponding to the data size of the HL-LHC. We also explore its potential as an experimental-independent toolkit for other high energy physics experiments such as ATLAS and CEPC.

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