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# Novel features and GPU performance analysis for EM particle transport in the Celeritas code

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Celeritas is a new computational transport code designed for high-performance simulation of high-energy physics detectors. This work describes some of its current capabilities and the design choices that enable the rapid development of efficient on-device physics. The abstractions that underpin the code design facilitate low-level performance tweaks that require no changes to the higher-level physics code. We evaluate a set of independent changes that together yield an almost 40\% speedup over the original GPU code for a net performance increase of 220$\times$ for a single GPU over a single CPU running 8.4M tracks on a small demonstration physics app.

**Primary authors:** JOHNSON, Seth (Oak Ridge National Laboratory); Dr TOGNINI, Stefano (Oak Ridge National Laboratory); CANAL, Philippe (Fermi National Accelerator Lab. (US)); Dr EVANS, Thomas (ORNL); LIMA, Guilherme (FermiLab (US)); LUND, Amanda (Argonne National Lab); JUN, Soon Yung (Fermi National Accelerator Lab. (US)); PASCUZZI, Vincent (Lawrence Berkeley National Lab. (US))

**Presenter:** JOHNSON, Seth (Oak Ridge National Laboratory)

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