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GPU based photon propagation for CORSIKA 8

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Right on time for several large scale experimental upgrades, the widely used and long-standing air shower simulation toolkit CORSIKA will be updated to a “state of the art” C++ simulation framework. To meet the simultaneously rising demand for high-quality air shower simulations and the ecologic necessity to reduce energy consumption several new possibilities for optimizations will be tested.

One of the biggest runtime consumer in the classic simulation is the propagation of fluorescence and Cherenkov photons through the atmosphere. With the rising popularity of highly parallel computing architectures, the runtime of this specific workload can be reduced significantly. In this Work, the most common architecture, in the form of GPUs, is utilized for this task. Two competing implementations in Cuda and OpenCL are compared and different techniques presented that enable a high GPU utilization.

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