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Advances in parallelization of particle showers simulations in CORSIKA 8

CORSIKA 8 is a Monte Carlo simulation framework to model ultra-high energy secondary particle cascades in astroparticle physics. This presentation is devoted to the advances in the parallelization of CORSIKA 8, which is being developed in modern C++ and is designed to run on multi-thread modern processors and accelerators, are discussed.

Aspects such as out-of-the-order particle shower calculations, generation of high quality random numbers in multi-thread machines and fast task scheduling and submission on massively parallel platforms are discussed, followed by presentation of CORSIKA 8 approaches, including preliminary performance measurements.

Finally, the design choices and status of integration into CORSIKA 8 are presented, together with some basic examples.

Significance

This presentation summarizes the efforts for the parallelization of the main software package (CORSIKA) used by the artroparticle physics community for the simulation of extensive high energy particle showers.

References

Experiment context, if any

CORSIKA 8, IceCube, Pierre Auger Collaboration

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