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CUDA-powered Large Scale Investigation of Cosmic Rays Spatial Propagation with Monte Carlo SDEs

Thursday 29 May 2025 12:15 (15 minutes)

In the context of the SDEGnO project, we present recent advancements in the GPU optimization of a Monte Carlo code for spatial propagation.
By implementing modern C++ standard and CUDA libraries, and restructuring the code to evaluate multiple heliosphere parametrizations in parallel,
we achieved an extremely significant speed-up, greatly enhancing the performance of the simulation and its capabilities for parameter exploration.
This talk will cover the optimization methodology, performance benchmarks, and validation results.
Furthermore, we outline the upcoming integration of GPU-optimized reweighting techniques for parameter tuning that will further improve exploration efficiency.

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