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GPU-Accelerated Parton Cascade in Ultra-relativistic Heavy-Ion Collisions

A Multi-Phase Transport Model (AMPT) for relativistic heavy-ion collisions depends on Zhang's Parton Cascade (ZPC) package to simulate initial stage parton cascade. On the basis of ZPC, we have developed a software to exploit the powerful parallel processing capability of GPU when simulating the cascade. Named PCG (Parton Cascade on GPU), the software allows collision detection among interacting partons formed in a heavy-ion collision to be processed much more rapidly than ever before. With simulating Pb-Pb collisions at $\sqrt{s_{NN}}=2.76$ TeV as a use case, the correctness of PCG is verified through comparison of the output of PCG with those of ZPC, then the computational efficiency of PCG is found to be several times faster relative to ZPC, which is a serial code and only runs on CPU. PCG has been integrated into AMPT for simulating heavy-ion collisions and it can help save large amount of computing resources for large scale event generation in ultra-relativistic heavy-ion collisions at top LHC energy.

Topics

Other related physics

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