Abstract Submitted
for the DNP17 Meeting of
The American Physical Society

GPU-accelerated calculations of hadron spectra from heavy-ion collisions[1] MATTHEW GOLDEN, Ohio Northern University, ULRICH HEINZ, Ohio State University, JETSCAPE COLLABORATION — To calculate observables for heavy ion collisions, many events with fluctuating initial conditions are simulated and statistically analyzed. A larger set of simulated collision events yields better statistical results, so decreasing the computation time per event is important. A modern GPU possesses thousands of cores and can efficiently perform identical tasks in parallel. We take advantage of this for performing the Cooper-Frye integrals for the hadron spectra obtained from the numerical output from dissipative hydrodynamic simulations. For a given event, this computation consists of two parts: (1) generating thermal spectra of all hadron resonances as Cooper-Frye integrals over the freeze-out surface, and (2) computing the spectra of stable hadrons by letting unstable resonances decay. We here show results using input from (2+1)-dimensional boost-invariant hydrodynamic simulations where both of these steps were accelerated by parallelizing them on a GPU. The GPU implementation yields a speed-up by about two and one orders of magnitude, respectively, for the first and second of these steps. For semi-central Pb+Pb collision at the LHC, the time needed for the first step is reduced from 31 minutes on a single CPU to 16 seconds on the GPU, and for the second step from 4 minutes to 20 seconds.

[1]This research was funded by the National Science Foundation through the JETSCAPE collaboration.

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Date submitted: 28 Jul 2017 Electronic form version 1.4