Abstract Submitted
for the DNP12 Meeting of
The American Physical Society

Monte Carlo Simulation of Partons in Ultra-Relativistic Heavy Ion Collisions[1] TRAVIS SALZILLO, Tarleton State University, RAINER FRIES, GUANGYAO CHEN, Texas A&M University — Quantum Chromodynamics (QCD) is the theory behind interactions of quarks and gluons through the strong nuclear force, and it is often studied experimentally through ultra-relativistic collisions of heavy ions. Hydrodynamics is a transport theory which describes the flow of these partons during a collision when they are in a state known as Quark Gluon Plasma (QGP). However, one of the primary unsolved problems in QCD is the evaluation of initial conditions to be used in hydrodynamics. The purpose of this project was to use the theory of Color Glass Condensate (CGC) to create a model which would simulate the initial phase of these collisions while maintaining accuracy to empirical data. The initial positions of quarks and other partons were established through the random sampling of their distribution functions in nuclei. The average color charge density of the incoming nuclei was then determined. Using CGC, the color charge density was used to calculate the energy-momentum tensor of the system. The results were visualized through plots of components of the energy-momentum tensor as a function of the rapidity and transverse coordinates of the system. The energy-momentum tensor may then be used in hydrodynamics.

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Date submitted: 31 Jul 2012 Electronic form version 1.4