Examining the Hardness Parameter using the Glauber Model and Multiplicity Distributions from the STAR Beam Energy Scan and Fixed-Target Programs

Aaron Poletti
(For the STAR Collaboration)
(DNP 2020 CEU Abstract)

University of California - Davis
ajpoletti@ucdavis.edu

Abstract

The Glauber Model in conjunction with a negative binomial distribution (NBD) has been used to simulate particle production in heavy-ion collisions. Particle multiplicities are generated by drawing random numbers from a NBD some number of times, N, where $N = xN_{Coll} + (1-x)N_{Part}/2$, and x is the hardness parameter. Hardness represents the ratio of hard versus soft processes in the collision. Particle production scales with the number of nucleon-nucleon collisions (N_{Coll}) in hard processes and number of participant nucleons (N_{Part}) in soft processes. The best fit to the multiplicity data from STAR can be obtained by scanning the three dimensional parameter space consisting of 2 NBD parameters plus the hardness parameter. The dependence of the hardness parameter on $\sqrt{s_{NN}}$ can be studied and used to understand nucleon stopping among other observables. Results from the STAR Fixed-Target and RHIC Beam Energy Scan programs will be presented.