Probing gluon saturation through two-particle correlations at STAR

Xiaoxuan Chu for the STAR Collaboration

Brookhaven National Laboratory

Abstract

The gluon distribution function grows rapidly with decreasing momentum fraction x. However, the total scattering cross section is bound by unitarity, which requires that the increase of gluon density be tamed. This is explained by gluon recombination under the color glass condensate (CGC) framework. A definitive discovery of nonlinear effects in QCD and the saturation regime would significantly improve our understanding of nucleon structure and nuclear interactions at high energy. Two-particle azimuthal correlation is one of the most direct and sensitive channels to access the underlying nonlinear gluon dynamics. In this talk, we will present recent results of forward di-hadron correlations measured at STAR, together with the signatures of gluon saturation predicted by CGC. In 2024, RHIC is planned to collect high statistics p+A data with STAR forward upgrade. New opportunities for measurements to study the nonlinear effects in QCD will also be discussed.