Long-Range Rapidity Correlations in Heavy-Light Ion Collisions[1]
YURI KOVCHEGOV, DOUGLAS WERTEPNY, The Ohio State University — We study two-particle long-range rapidity correlations arising in the early stages of heavy ion collisions in the saturation/Color Glass Condensate framework, assuming for simplicity that one colliding nucleus is much larger than the other. We calculate the two-gluon production cross section while including all-order saturation effects in the heavy nucleus with the lowest-order rescattering in the lighter nucleus. We find four types of correlations in the two-gluon production cross section: (i) geometric correlations, (ii) HBT correlations, (iii) back-to-back correlations, and (iv) near-side azimuthal correlations which are long-range in rapidity. The geometric correlations (i) are due to the fact that nucleons are correlated by simply being confined within the same nucleus and may lead to long-range rapidity correlations for the produced particles without strong azimuthal angle dependence. Somewhat surprisingly, long-range rapidity correlations (iii) and (iv) have exactly the same amplitudes along with azimuthal and rapidity shapes: one centered around $\Delta\phi = \pi$ with the other one centered around $\Delta\phi = 0$ (here $\Delta\phi$ is the azimuthal angle between the two produced gluons). This prediction is in agreement with the recent ALICE p+Pb data.

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