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Initial state azimuthal anisotropies in small collision systems

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Recent experimental results have revealed a surprisingly rich structure of multiparticle azimuthal correlations in high energy proton-nucleus collisions. Final state collective effects can be responsible for many of the observed effects, but it has recently been shown that a part of these correlations are present already in the wavefunctions of the colliding particles. A domain structure at length scales of the inverse saturation scale, present in the classical color field of a high energy nucleus, naturally leads to such multiparticle correlations. This talk discusses recent work on azimuthal anisotropy coefficients originating from the initial stage color fields. In particular, we describe a recent calculation [1] of the momentum space 2-particle cumulant azimuthal anisotropy coefficients v_n{2}, n=2,3,4 from fundamental representation Wilson line distributions describing the high energy nucleus. These would correspond to the flow coefficients in very forward proton-nucleus scattering. This calculation finds significant differences between Wilson lines from the MV model and from JIMWLK evolution. The talk also discusses the relation [2] of this calculation to earlier work on the ridge correlation obtained in the "glasma graph" approximation [3], and to the "field domain model" [4] where the correlations would originate from a novel nongaussian fluctuation structure in the nuclear color field.

[1] T. Lappi, Phys. Lett. B744 (2015) 315-319

[2] T. Lappi, S. Schlichting, B. Schenke and R. Venugopalan, in preparation

[3] K. Dusling and R. Venugopalan, Phys. Rev. Lett. 108 (2012) 262001, Phys. Rev. D87 (2013) 054014, Phys. Rev. D87 (2013) 051502, Phys. Rev. D87 (2013) 094034

[4] A. Dumitru and A. V. Giannini, Nucl. Phys. A933 (2014) 212, A. Dumitru, L. McLerran and V. Skokov, Phys. Lett. B743 (2015) 134, A. Dumitru and V. Skokov, Phys.Rev. D91 (2015) 7, 074006

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