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Investigating collective flow patterns and the influence of electromagnetic fields in relativistic proton-nucleus collisions

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The recent experimental observations of azimuthally anisotropic flow in small systems at RHIC and LHC energies has stimulated a big interest in these collisions, traditionally regarded only as control measurements for heavy-ion collisions and now becoming a new study area for the formation and evolution of the quark-gluon plasma. In the early stage of proton-nucleus collisions extremely intense electromagnetic fields are produced with a magnitude of few m_π^2; unlike symmetric heavy-ion collisions, in these small asymmetric systems the electric field along the impact parameter axis is comparable to the magnetic field perpendicular to the reaction plane. By means of microscopic simulations within the Parton-Hadron-String Dynamics (PHSD) approach we investigate the emergence of collectivity and the influence of electromagnetic fields on final hadronic observables in proton-nucleus collisions at relativistic energy. One of the main effects of the combined asymmetry of electromagnetic fields and particle distributions is a splitting in the rapidity dependence of the directed flow of positively and negatively charged mesons [1].

[1] L. Oliva, P. Moreau, V. Voronyuk and E. Bratkovskaya, arXiv:1909.06770.

Collaboration (if applicable)

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