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Hybrid approach for simulating heavy flavor transport in small colliding systems

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In this talk, we present preliminary results of our study of heavy flavor (HF) transport in the evolving medium produced in p+p collisions at LHC energies. The findings are obtained using event-by-event simulations in a hybrid approach that combines multiple methods to model different stages of the interaction.

The investigation addresses the open question of Quark Gluon Plasma (QGP) droplet formation in collisions of small systems [1,2]. A number of observations indeed supports this scenario in high-multiplicity p+p, e.g. measured charged hadron azimuthal anisotropies [3] and strangeness enhancement [4]. On the other hand, there are vivid discussions about natural limitations of hydrodynamical description [5,6].

Typically, HF are considered to be excellent probes of the medium as they are mostly produced in the primary hard scattering and penetrate the expanding fireball. Remarkably, the azimuthal anisotropies of HF hadrons produced in p+p are found to be comparable [7] to those of light flavors, which favors the assumption of in-medium interactions of HF quarks with thermal constituents of the QGP formed [8]. Moreover, p+p data show a non-linear increase of the relative HF yields with the relative charged-particle multiplicity [9,10]. This has been preliminarily explained by the reduction of charged particle multiplicity due to formation of high density medium rather than by the increase of HF yields [11,12].

Thus, it is of great importance to simultaneously consider HF transport in various system evolution models, such as, for example, hydrodynamic expansion [13] and dense color string dynamics [14], and an «event activity» (bulk particles) even in p+p collisions.

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Primary authors: PROKHOROVA, Daria (Tsinghua University); Prof. SHI, Shuzhe (Tsinghua University)

Co-author: ANDRONOV, Evgeny (Saint Petersburg State University)

Presenter: PROKHOROVA, Daria (Tsinghua University)

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