XXIV QUARK MATTER DARMSTADT 2014

Contribution ID: **603** Type: **Poster**

Heavy-quark diffusion at LHC, RHIC, and FAIR within a UrQMD-hydrodynamical hybrid model

Tuesday 20 May 2014 16:30 (2 hours)

Heavy charm and bottom quarks provide an important probe of the transport properties of the quark-gluon plasma, created in heavy-ion collisions at the Large Hadron Collider (LHC). They are produced in the early hard collisions and then interact with the hot and dense medium, consisting of light quarks and gluons, undergoing a phase transition to a hot and dense hadron gas. Using a hybrid model of Ultrarelativistic Molecular Dynamics (UrQMD) and 3D hydrodynamics to simulate the evolution of the hot and dense medium, we describe heavy-quark interactions with the medium in terms of a Fokker-Planck/Langevin framework with drag and diffusion coefficients based on a Dirac-Brueckner evaluation of the in-medium scattering-matrix elements using lattice QCD heavy-quark potentials for elastic light-heavy-quark scattering or a phenomenological resonance-scattering model based on chiral and heavy-quark effective theory to evaluate the nuclear modification factor, R_AA, and elliptic flow v_2 of D- and B-mesons and “non-photonic electrons” from their semileptonic decays.

The results are compared with recent data from the ALICE collaboration on R_AA and elliptic flow of single electrons, muons, and D-mesons, data on non-photonic electrons from the PHENIX Collaboration. We also study the impact of the corresponding medium modifications of D and $\overline{\mathrm{D}}$ mesons on the contribution of their correlated decay to the dilepton signal. This is particularly interesting, because in the intermediate $\ell^+\ell^-$-invariant-mass region, $M_\phi < M_{\ell^+\ell^-} < M_{J/\psi}$ this is the dominant dilepton source competing with “thermal radiation” from the QGP.

Finally we use the same HQ-diffusion model for predictions about similar signals of D and $\overline{\mathrm{D}}$ mesons to be expected at the future CBM experiment at FAIR.

On behalf of collaboration:

None

Author: VAN HEES, Hendrik (Goethe University Frankfurt and FIAS)

Co-authors: STEINHEIMER, Jan (Goethe University Frankfurt and FIAS); BLEICHER, Marcus (Goethe University Frankfurt and FIAS); LANG, Thomas (Goethe University Frankfurt and FIAS)

Presenter: VAN HEES, Hendrik (Goethe University Frankfurt and FIAS)

Session Classification: Poster session

Track Classification: Open Heavy Flavour and Quarkonia