HADRONIC DISSIPATIVE EFFECTS ON TRANSVERSE DYNAMICS AT RHIC

T. Hirano[a], **U. Heinz**[b], **D. Kharzeev**[c], **R. Lacey**[d], and **Y. Nara**[e]

[a]Department of Physics, The University of Tokyo
7-3-1, Hongo, Bunkyo-ku, Tokyo 113-0033, Japan, *hirano@phys.s.u-tokyo.ac.jp*

[b] Department of Physics, The Ohio State University
191 West Woodruff Avenue, Columbus, OH 43210, USA, *heinz@mps.ohio.edu*

[c] Nuclear Theory Group, Physics Department, Brookhaven National Laboratory
Upton, NY 11973-5000, USA, *kharzeev@bnl.gov*

[d] Department of Chemistry, SUNY Stony Brook
Stony Brook, NY 11794-3400, USA, *roy.lacey@suny.edu*

[e] Akita International University
193-2 Okutsubakidai, Yuwa-Tsubakigawa, Akita 010-1211, Japan, *nara@aiu.ac.jp*

We simulate the dynamics of Au+Au collisions at the Relativistic Heavy Ion Collider (RHIC) with a hybrid model that treats the dense early quark-gluon plasma (QGP) stage macroscopically as an ideal fluid, but models the dilute late hadron resonance gas (HG) microscopically using a hadronic cascade. By comparing with a pure hydrodynamic approach we identify effects of hadronic viscosity on the transverse momentum spectra and differential elliptic flow $v_2(p_T)$. We investigate the dynamical origins of the observed mass-ordering of $v_2(p_T)$ for identified hadrons, focusing on dissipative effects during the late hadronic stage. We find that, at RHIC energies, much of the finally observed mass-splitting is generated during the hadronic stage, due to build-up of additional radial flow. The ϕ meson, having a small interaction cross section, does not fully participate in this additional flow. As a result, it violates the mass-ordering pattern for $v_2(p_T)$ that is observed for other hadron species. We also show that the early decoupling of the ϕ meson from the hadronic rescattering dynamics leads to interesting and unambiguous features in the p_T-dependence of the nuclear suppression factor R_{AA} and of the ϕ/p ratio.

References

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[2] T. Hirano, U. Heinz, D. Kharzeev, R. Lacey and Y. Nara, arXiv: `0710.5795[nucl-th]`.