Extraction of heavy-flavor transport coefficients in QCD matter

R. Rapp [a,1], P.B. Gossiaux [b,*,1], A. Andronic [c,d,1], R. Averbeck [c,1],
S. Masciocchi [c,1], A. Beraudo [e], E. Bratkovskaya [c,f],
P. Braun-Munzinger [c,g], S. Cao [h], A. Dainese [i], S.K. Das [j,k],
M. Djordjevic [l], V. Greco [k,m], M. He [n], H. van Hees [f], G. Inghirami [c,f,o,p],
O. Kaczmarek [q,r], Y.-J. Lee [s], J. Liao [t], S.Y.F. Liu [a], G. Moore [u],
M. Nahrgang [b], J. Pawlowski [v], P. Petreczky [w], S. Plumari [k], F. Prino [e],
S. Shi [t], T. Song [x], J. Stachel [g], I. Vitev [y], X.-N. Wang [r,z]

[a] *Cyclotron Institute and Department of Physics and Astronomy, Texas A&M University, College Station, USA*
[b] *SUBATECH, IMT Atlantique, Université de Nantes, CNRS-IN2P3, Nantes, France*
[c] *Research Division and EMMI, GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany*
[d] *Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, Münster, Germany*
[e] *INFN, Sezione di Torino, Torino, Italy*
[f] *Institut für Theoretische Physik, J.W. Goethe-Universität, Frankfurt am Main, Germany*
[g] *Physikalisches Institut, Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany*
[h] *Department of Physics and Astronomy, Wayne State University, Detroit, USA*
[i] *INFN, Sezione di Padova, Padova, Italy*
[j] *School of Nuclear Science and Technology, Lanzhou University, Lanzhou, China*
[k] *Department of Physics and Astronomy, University of Catania, Italy*
[l] *Institute of Physics, University of Belgrade, Belgrade, Serbia*
[m] *Laboratori Nazionali del Sud, INFN-LNS, Catania, Italy*
[n] *Department of Applied Physics, Nanjing University of Science and Technology, Nanjing, China*
[o] *Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany*
[p] *J. von Neumann Institute for Computing, Jülich, Germany*
[q] *Fakultät für Physik, Universität Bielefeld, Bielefeld, Germany*
[r] *Key Laboratory of Quark and Lepton Physics and IPP, Central China Normal University, Wuhan, China*
[s] *Department of Physics, Massachusetts Institute of Technology, Cambridge, USA*
[t] *Department of Physics, Indiana University, Bloomington, USA*
[u] *Technische Universität Darmstadt, Darmstadt, Germany*
[v] *Institut für Theoretische Physik, Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany*
[w] *Physics Department, Brookhaven National Laboratory, Upton, USA*
[x] *Institut für Theoretische Physik, Universität Gießen, Gießen, Germany*
[y] *Theoretical Division, Los Alamos National Laboratory, Los Alamos, USA*
[z] *Nuclear Science Division, Lawrence Berkeley National Laboratory, Berkeley, USA*

Abstract

We report on broadly based systematic investigations of the modeling components for open heavy-flavor diffusion and energy loss in strongly interacting matter in their application to heavy-flavor observables in high-energy heavy–ion collisions, conducted within an EMMI Rapid Reaction Task Force framework. Initial spectra including cold-nuclear-matter effects, a wide variety of space-time evolution models, heavy-flavor transport coefficients, and hadronization mechanisms are scrutinized in an effort to quantify pertinent uncertainties in the calculations of nuclear modification factors and elliptic flow of open heavy-flavor particles in nuclear collisions. We develop procedures for error assessments and criteria for common model components to improve quantitative estimates for the (low-momentum) heavy-flavor diffusion coefficient as a long-wavelength characteristic of QCD matter as a function of temperature, and for energy loss coefficients of high-momentum heavy-flavor particles.
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Task force formation and acknowledgment

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* Corresponding author.
E-mail address: gossiaux@subatech.in2p3.fr (P.B. Gossiaux).

[1] Convener of the Heavy-Flavor EMMI RRTF.