

APR21-2021-001891

Abstract for an Invited Paper  
for the APR21 Meeting of  
the American Physical Society

## **Modelling the Propagation of Heavy Quarks and Interactions of Quarkonia with the Hot QCD**

**Medium**

WEIYAO KE, University of California, Berkeley; Lawrence-Berkeley National Laboratory

Heavy quarks are perturbatively produced in high-energy nuclear collisions and directly probe the dynamics of flavor diffusion in the quark-gluon plasma (QGP) medium created in such collisions. Quarkonia, bound states of heavy quark and anti-quark pair under the strong interaction, are sensitive to another intriguing medium property: the color screening in QGP, which induces quarkonia dissociation and suppresses the yield of the bound-state production. The dynamics of quarkonia is closely related to heavy quark transport, as heavy-quark pairs can recombine into quarkonia during the evolution, which is an enhanced contribution in high-energy collisions of large nuclei. Therefore, it is demanding to develop a consistent theoretical framework involving both heavy quark and quarkonia to unravel the information in heavy-sector measurements. We review recent developments in this endeavor: dissociation and regeneration of quarkonia are coupled with the evolution of heavy quarks, including elastic collisions and gluon emissions. We discuss the simultaneous understanding of medium modifications to the inclusive measurement of open heavy flavor and quarkonia production. With these developments, one aims to pin down the flavor diffusion parameter and color screening properties of the QGP using future precision measurements of the heavy-sector in nuclear collisions at RHIC and LHC. Finally, in addition to inclusive observables, we also discuss the prospect of study heavy flavor and quarkonia production in the context of jets, especially, how these massive particles help us understand hot QCD medium modifications to jet dynamics.