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T-Matrix Theory of Quark-Gluon Plasma

Investigating the properties of the strongly coupled quark-gluon plasma (sQGP) remains a topic of great current interest. In particular, an understanding of how the sQGP's remarkable transport properties, as inferred from experiment, emerge from the underlying QCD interactions is a formidable challenge. In this talk, we will introduce a quantum many-body approach that is aimed at addressing this challenge. Starting from the heavy-flavor sector where the large masses of charm and bottom quarks enable controlled approximations, we self-consistently evaluate the in-medium one- and two-body spectral functions. We discuss how the approach can be constrained by first-principle lattice-QCD calculations and applied to compute transport parameters of heavy quarks and the sQGP, with applications to heavy-ion collisions.

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