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A first step towards quantum simulating jet evolution in a dense medium

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The fast development of quantum technologies over the last decades has offered a glimpse to a future where the quantum properties of multi-particle systems might be more fully understood. So far, quantum computing has seen ample application in areas such as quantum chemistry or condensed matter, but its usage in high energy physics is still in its infancy. In the particular case of QCD jets, these technologies might offer a way to, for the first time, fully understand the intricate interference pattern arising from the multi-parton cascade. In jet quenching, such aspects are intimately related to the natural scales at which the jet probes the medium. In this talk, we introduce a strategy to quantum simulate single particle evolution in a stochastic background field. We discuss how jet evolution can be translated to a digital quantum circuit and which measurement protocols can be implemented to extract physically relevant quantities. Future extensions of this strategy to include gluon radiation are discussed.

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