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Theoretical advances in understanding jet and open heavy flavor production

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High transverse momentum (pT) and heavy particles have long been considered powerful probes of the hot and dense QCD matter produced in heavy-ion collisions. With the upcoming RHIC upgrade and start of the LHC heavy-ion program, it is crucial that the theoretical understanding of these probes be on a solid foundation. Recent advances in the theory of jet physics in heavy-ion collisions, such as the development of Monte Carlo simulation of jet quenching, the theory of medium response to jets, jets tagged with electromagnetic probes, and the theory of jet shapes and jet cross sections, have paved the way for a more complete understanding of the interplay between high pT probes and hot and dense QCD matter. Additionally, there have been several recent advances in the theory of open heavy flavor production, such as heavy flavor diffusion and the dissociation of open heavy flavor mesons. In this talk, I will present a report on the theoretical status of jet and open heavy flavor production, with a focus on recent theoretical advances and open questions.