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In-medium dressed quark evolution in a light-front Hamiltonian approach

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Using a non-perturbative light-front Hamiltonian approach, we investigate the scattering and gluon emission of dressed quark states inside a $SU(3)$ colored background field. We consider the scenario in deep inelastic scattering and in heavy ion collisions, where the quark originates from far outside the background field and is described by the light-front wavefunction of the QCD eigenstate in the $|q\rangle+|qg\rangle$ Fock space. We perform numerical simulations of the real-time quantum state evolution of an initially dressed quark state. We then extract the jet momentum distribution, the cross section, and the gluon emission rate. This investigation provides a novel systematic description of in-medium jet evolution using a non-perturbative formalism.

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