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Calculating the jet quenching parameter $\hat{q}$ in lattice gauge theory

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We present a framework where first principles calculations of jet modication may be carried out in a non-perturbative thermal environment. As an example of this approach, we compute the leading order contribution to the transverse momentum broadening of a high energy (near on-shell) quark in a thermal medium. This involves a factorization of a non-perturbative operator product from the perturbative process of scattering of the quark. An operator product expansion of the non-perturbative operator product is carried out and related via dispersion relations to the expectation of local operators. These local operators are then evaluated in quenched SU(2) lattice gauge theory.

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