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## Effective theory for jets in medium

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We revisit the jet broadening and radiative energy loss problems in heavy ion collisions from effective theory point of view. Soft collinear effective theory (SCET) describes the dynamics of QCD at high energies and is particularly suitable for calculations involving jets. By modifying its Lagrangian to include medium interactions we develop an effective theory for jets in medium. A number of issues are addressed in this new language. We demonstrate the gauge invariance of results for jet broadening and radiative energy loss. We show how the cross-section for radiative corrections to jet production factorizes for QCD hard processes. We include the effect of the nuclear recoil in the medium and quantify it for RHIC and LHC energies. Also we calculate the radiative energy loss beyond the conventional soft gluon approximation, extending the previous results to large  $x$  values. We discuss the phenomenological applications for RHIC and LHC.

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