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Thermalization of highly energetic partons in a QCD plasma

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We study the thermalization of highly energetic partons in a high-temperature QCD plasma. We investigate the non-equilibrium dynamics using an effective kinetic description of QCD, following the evolution of a highly energetic parton from the hard momentum scales all the way to the medium scales, while keeping track of the recoil onto the medium [1-2]. We find that successive radiative emissions are important to develop a turbulent energy cascade which drives the fragmentation of energy to the medium scales and dominates the collinear region. Elastic interactions with the medium are more significant near medium scales, and primarily responsible for out-of-cone energy loss and the equilibration of the energy. We discuss the implications of our findings for phenomenological descriptions of jet quenching physics and studies of jet thermalization in heavy ion collisions.

[1]- S. Schlichting, I. Soudi, Fragmentation and equilibration of jets in a QCD plasma (8 2020).

[2] Y.Methar-Tani, S.Schlichting, I.Soudi, in preparation

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