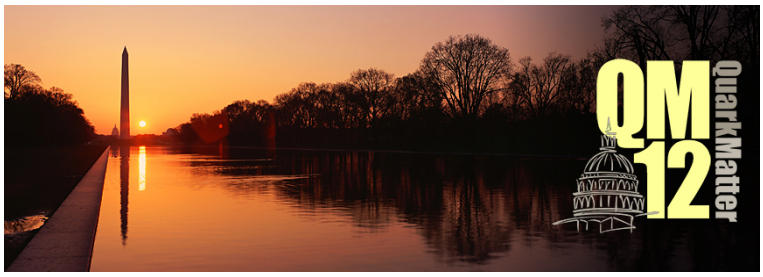

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Color decoherence of jets in Heavy Ion Collisions

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The recent jet measurements at RHIC and the LHC have challenged the heavy-ion community to a better understanding of jet fragmentation in the presence of the Quark-Gluon-Plasma (QGP).

Jet fragmentation in vacuum is well described by perturbative QCD and is characterized by color coherence effects that lead to the angular ordering of successive branchings along the jet. To investigate the alteration of color coherence in jets in the QGP we study the radiation pattern of a color-correlated quark-anti-quark antenna which is in fact the building block of jet evolution in vacuum.

We show that in a dense medium the onset of coherence is governed by the hardest scale induced by the presence of the medium. In a medium of length L and transport coefficient $\hat{q}$ this can either be the typical transverse momentum broadening of the gluon in the medium, $\sqrt{\hat{q}L}$, or the inverse of the size of the antenna as probed by the medium, namely $r_\perp^{-1} = (\theta_{qq} L)^{-1}$, where θ_{qq} is the opening angle of the antenna. Therefore, for $k_\perp < max(\sqrt{\hat{q}L}, r_\perp^{-1})$ we obtain complete decoherence of the antenna; for larger momenta color coherence is restored.

We expect the transition from color decoherence to coherence to play an important role in in-medium jet fragmentation.

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