The broad away side of azimuthal correlations: 3 vs 2 final state particles in high energy nuclear collisions

Abstract content

In high energy heavy ion collisions at the RHIC there are many interesting phenomena already observed and interpreted using well known models that incorporate energy loss dynamics. Nevertheless there are important aspects of the medium induced dynamics, that are still not well understood. In particular, there is a broadening of the away-side peak appearing in azimuthal correlation studies in Au+Au collisions which is absent in p+p collisions at the same energies. This double hump structure has been the subject of different theoretical analysis which are based on the assumption that unlike p+p collisions, A+A collisions are strongly influenced by collective phenomena. This broadening of the away-side peak is already present but suppressed in p+p collisions: 2 to 3 parton processes produce such structures but are suppressed with respect to 2 to 2 processes. We argue that in A+A collisions the different geometry for the trajectories of 3 as opposed to 2 particles in the final state, together with the medium induced energy loss effects on the different cross sections, create a scenario that enhances processes with 3 particles in the final state (where one particle is absorbed by the medium and the other one punches through), which gives on average this double hump structure.

Summary

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