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Influence of tubular initial conditions on two-particle correlations

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Relativistic nuclear collisions data on two-particle correlations exhibit structures as function of relative azimuthal angle and rapidity. A unified description of these near-side and awayside structures is proposed for low to moderate transverse momentum. It is based on the combined effect of tubular initial conditions and hydrodynamical expansion.

A 3+1 hydrodynamic approach with fluctuating tubular initial conditions, in addition to reproducing both the near and away-side structures [1], leads to a good qualitative agreement with various data: dependence on trigger/associated particle tranverse momentum and on centrality [2], difference in the away-side structure for in-plane/out-of plane triggers [3]. Some results on the relation between triangularity and triangular flow have also been obtained for this approach [4].

Since 3+1 hydrodynamics is a complicated scenario, we have also studied the effect of single tubes in 2+1 hydrodynamics. Contrary to expectations, the hydrodynamic solution shows that the high energy density tubes (leftover from the initial particle interactions) give rise to particle emission in two directions and this is what leads to the various structures [2], including the effect of in-plane/out-of plane triggers [3]. This description is sensitive to some
of the initial tube parameters and may provide a probe of the strong interaction.

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