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3D structure of diffusion wake in high-energy hevay-ion collisions

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Diffusion wake is a unique signal of the medium response which provides rich information of quark-gluon plasma in high-energy heavy-ion collisions. It can be characterized by a depletion of the azimuthal angle distribution of hadrons in the trigger direction in γ/Z jet events. However, this signal, if integrated over a large range of rapidity, can be overwhelmed by an enhancement of soft hadrons from multiple parton interaction (MPI) at the LHC energy, which is uniform in azimuthal angle. A recent 2D jet tomography can be applied to the event selection to enhance the path length of jet propagation and hence the signal of jet-induced diffusion wake. In this work, it is found that diffusion wake has a unique structure in the longitudinal direction and can be measured even without the assistance of 2D jet tomography at the LHC energy. We use an azimuthal cut to isolate hadrons affected by the diffusion wake and reduce contribution from the jet side. We find an unambiguous signal of diffusion wake. We further use a Gaussian fitting method to extract diffusion wake component and study its sensitivity to the properties of the dense QGP medium like flow and shear viscosity.

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