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3D Structure of Jet-Induced Diffusion Wake in an Expanding Quark-Gluon Plasma

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Diffusion wake accompanying the jet-induced Mach-cone provides a unique probe of the properties of quark-gluon plasma in high-energy heavy-ion collisions. We explore the 3D structure of the diffusion wake induced by γ-triggered jets in Pb+Pb collisions at the LHC energy within CoLBT-hydro model. We identify a valley structure caused by the diffusion wake on top of a ridge from the initial multiple parton interaction (MPI) in jet-hadron correlation as a function of rapidity and azimuthal angle. This leads to a double-peak structure in the rapidity distribution of soft hadrons in the opposite direction of the jets as an unambiguous signal of the diffusion wake. Using a two-Gaussian fit, we extract the diffusion wake and MPI contributions to the double peak. The diffusion wake valley is found to deepen with the jet energy loss as characterized by the γ-jet asymmetry. Its sensitivity to the equation of state and shear viscosity is also studied.

Theory / experiment

Theory

Group or collaboration name

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