Measurement of directed flow of inclusive jets in heavy-ion collisions at RHIC

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Abstract

Jets are collimated sprays of hadrons fragmented by highly virtual partons produced in the early stage of heavy-ion collisions via hard scatterings. Different observables of the jet-medium interaction probe the properties of the Quark-Gluon Plasma and its dynamics. The bulk medium produced in non-central heavy-ion collisions is expected to be tilted with respect to the beam axis, while the hard scatterings are symmetric along the rapidity. This asymmetry between hard and soft processes coupled with in-medium interactions can induce a large rapidity-odd directed flow (v_1) for jets. In fact, it has been observed that the D^0 mesons show a significantly larger v_1 signal as a function of rapidity compared to charged hadrons at the top-RHIC energy, reflecting the interplay between soft and hard processes.

In this poster, we report the first measurement of inclusive jets v_1 in isobar (Ru+Ru and Zr+Zr) and Au+Au collisions at $\sqrt{s_{\rm NN}} = 200$ GeV. Inclusive jets are reconstructed using the anti-k_T algorithm with a hard-core selection to suppress the combinatorial background. The jet v_1 is presented as a function of rapidity and transverse momentum in these collision systems. Finally, we discuss the implications of these results on the jet-medium interaction in a tilted bulk medium.