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Does non-monotonic behavior of directed flow signal the onset of deconfinement ?

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Yes, it does! We investigate the effects of nuclear mean-field on the directed flow v_1 in high energy nucleus-nucleus collisions from $\sqrt{s_{NN}} = 2.7$ GeV to 27 GeV incident energies within a transport theoretical model based on the framework of the relativistic quantum molecular dynamics. Specifically, we use the JAM transport model with potentials. Our approach reproduces the rapidity dependence of directed flow data up to $\sqrt{s_{NN}} \approx 9$ GeV showing the significant importance of mean-field. However, the slopes of dv_1/dy at mid-rapidity are positive at $\sqrt{s_{NN}} = 11.7$ and 19.6 GeV, and becomes negative above 27 GeV. Thus the result from a JAM hadronic transport model with nuclear mean-field approach is incompatible with the data. Therefore within our approach, we conclude that the excitation function of the directed flow cannot be explained by the hadronic degree of freedom alone.

On behalf of collaboration:

NONE

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