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Elliptic flow of inclusive charged hadrons in Au+Au collisions at $E_{\mathrm{lab}} = 35$ A GeV using the PHSD model

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Abstract

Elliptic flow (v_2) of inclusive charged hadrons at mid-rapidity ($|\eta| < 1.0$) in Au +Au collisions at $E_{\mathrm{lab}} = 35$ A GeV using the parton hadron string dynamics (PHSD) model are presented as a function of centrality, transverse momentum (p_{T}) and pseudo-rapidity (η). The v_2 results are obtained using the η-sub event plane method with respect to the event plane angle (ψ_2) and participant plane angle (ψ_2^{PP}). p_{T}-integrated charged hadron v_2 shows a strong centrality dependence in Au+Au collisions at $E_{\mathrm{lab}} = 35$ A GeV. The eccentricity-scaled elliptic flow (v_2/ε_2) also shows centrality dependence. The higher values of v_2/ε_2 in central collisions suggest the development of stronger collectivity. The calculations are compared with the results from Au+Au collisions at $\sqrt{s_{\mathrm{NN}}} = 7.7$ GeV published by the STAR experiment at RHIC. We also compare the results of HSD and PHSD modes to investigate the contribution of hadronic and partonic phases of the medium on the calculated v_2. The current results serve as a prediction of the collective behavior of the matter produced in baryon-rich and moderate temperature conditions for the upcoming multi-purpose detector at the nuclotron-based Ion collider facility (NICA) and compressed baryonic matter experiment at the facility for anti-proton and ion research. These predictions are also useful for interpreting data measured at relativistic heavy ion collider (RHIC) beam energy scan program.

Keywords: heavy-ion collisions, elliptic flow, PHSD model

(Some figures may appear in colour only in the online journal)