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Transverse spherocity dependence of elliptic flow and application of machine learning tools in heavy-ion collisions at the LHC using AMPT model

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Recently, event shape observables such as transverse spherocity (S_0), has been studied successfully in small collision systems at the LHC as a tool to separate jetty and isotropic events. In our work, we have performed an extensive study of charged particles' azimuthal anisotropy in heavy-ion collisions as a function of S_0 for the first time using a multi-phase transport (AMPT) model. We have used the two-particle correlation (2PC) method to estimate the elliptic flow (v_2) for different centrality classes in Pb-Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV for high-S_0, S_0-integrated and low-S_0 events. We found that transverse spherocity successfully differentiates heavy-ion collisions'event topology based on their geometrical shapes {\em i.e.} high and low values of spherocity (S_0). The high-S_0 events are found to have nearly zero elliptic flow while the low-S_0 events contribute significantly to elliptic flow of spherocity-integrated events. It was found that the number of constituent quark scaling of elliptic flow is strongly violated in events with low-S_0 compared to S_0-integrated events. In the absence of experimental explorations in this direction, we implement a machine learning based regression method to estimate S_0 distributions in Pb-Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV by training the model with experimentally available event properties. This method works well as a good agreement between the simulated true values and the predicted values from the ML-model is observed.

References:
1. N. Mallick, R. Sahoo, S. Tripathy and A. Ortiz, J. Phys. G48, 045104 (2021).
2. N. Mallick, S. Tripathy, A. N. Mishra, S. Deb and R. Sahoo, Phys. Rev. D103,094031 (2021).
3. N. Mallick, S. Tripathy and R. Sahoo, arXiv:2105.09770 [hep-ph].

Preferred track

High-temperature QCD

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