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A Deep Learning Based Estimator for Light Flavour Elliptic Flow in Heavy Ion Collisions at RHIC and LHC Energies

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Recent developments on a deep learning feed-forward network for estimating elliptic flow (v_2) coefficients in heavy-ion collisions have shown us the prediction power of this technique. The success of the model is mainly the estimation of v_2 from final state particle kinematic information and learning the centrality and the transverse momentum (p_T) dependence of v_2 . The deep learning model is trained with Pb-Pb collisions at 5.02 TeV minimum bias events simulated with a multiphase transport model (AMPT). We extend this work to estimate v_2 for light-flavor identified particles such as π^\pm , K^\pm , and $p + \bar{p}$ in heavy-ion collisions at RHIC and LHC energies. The number of constituent quark (NCQ) scaling is also shown. The evolution of pT-crossing point of $v_2(p_T)$, depicting a change in meson- baryon elliptic flow at intermediate- p_T , is studied for various collision systems and energies. The model is further evaluated by training it for different p_T regions. These results are compared with the available experimental data wherever possible for light hadrons.

See:

[1] Physical Review D 105, 114022 (2022)

[2] Phys. Rev. D 107, 094001 (2023)

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