ID de Contribution: **206** Type: **Talk**

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

mardi 4 juin 2024 09:50 (20 minutes)

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 v2 for light-flavor identified particles such as $\pi^{\pm}$, $K^{\pm}$, 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-pT, 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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Classification de Session: Track1-LF

Classification de thématique: Light-flavours and Strangeness