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Collectivity in p+p, p+A and A+A collisions from parton scatterings

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We show that the incoherent elastic scattering of partons, as present in a multi-phase transport model (AMPT), with a modest parton-parton cross-section of $\sigma = 1.5 - 3$ mb, naturally explains the long-range two-particle azimuthal correlation as observed in proton-proton, proton-nucleus and nucleus-nucleus collisions at the Large Hadron Collider. We calculate the elliptic, v_2 , and triangular, v_3 , Fourier coefficients of the two-particle azimuthal correlation function in proton-nucleus (p+Pb) and peripheral nucleus-nucleus (Pb+Pb) collisions. Our results for v_3 are in a good agreement with the CMS data. The v_2 coefficient is very well described in p+Pb collisions and is underestimated for higher transverse momenta in Pb+Pb collisions. The characteristic mass ordering of v_2 in p+A is reproduced whereas for v_3 such ordering is not observed. Our results indicates an emergence of collectivity in p+p, p+Pb and peripheral Pb+Pb collisions from parton scatterings.

References:

- [1] Guo-Liang Ma and Adam Bzdak, arXiv:1404.4129.
- [2] Adam Bzdak and Guo-Liang Ma, in preparation.

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