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Jet-induced Enhancement of Deuteron Production at the LHC Energies

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The recent observation of jet-associated deuteron production in pp collisions at √s = 13 TeV by the ALICE Collaboration opens a new window to study the production mechanism of light nuclei as well as the phase-space structure of jets produced in high-energy nuclear collisions. Here, we investigate jet effects on deuteron production in both pp and p-Pb collisions at the LHC energies, using the nucleon coalescence model for light nuclei production with the nucleon phase-space information obtained from A Multi-Phase Transport (AMPT) Model. In the low transverse momentum (pT) region (pT /A < 1.5 GeV/c), covered by current measurements, the in-jet deuteron coalescence parameter B2 is found to be enhanced by factors of about 10 in pp collisions and 25 in p–Pb collisions, which are consistent with the recent ALICE measurements. In the higher pT region (pT /A > 2GeV/c), we find that both the yield ratio of deuteron to proton (d/p) and B2 are significantly larger in the Toward region than in the Transverse region, which is in line with the sharper two-nucleon angular distribution inside the jet cone, reflecting a genuine effect of jets.

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