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Probing light-flavour particle production in small collision system through event topology with ALICE

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Recent measurements in high-multiplicity pp and p−Pb collisions at the LHC have shown that small systems exhibit similar phenomena traditionally associated with heavy-ion collisions, such as strangeness enhancement, finite radial-flow and azimuthal anisotropy. These effects challenge the notion that such systems can be modelled as incoherent superpositions of parton-parton scatterings, as commonly assumed in Monte Carlo generators like Pythia. This study explores light-flavour hadron and resonance production as a function of event topology, particularly transverse spherocity, which classifies events as either isotropic (soft-dominated) or jet-like (hard-dominated). In addition, charged particle yields are investigated in different azimuthal regions relative to the leading particle, allowing subtraction of underlying event contributions and isolation of jet-like signals. The analysis includes multi-differential measurements of light flavour particles as a function of multiplicity and event topology in pp collisions at $\sqrt{s} = 13$ TeV. These results provide valuable insight into the role of final-state effects and medium-like behaviour in small systems. Comparisons with state-of-the-art QCD-inspired event generators help identify deficiencies in current modelling approaches. This study aims to establish topological selections as powerful tools for disentangling competing particle production mechanisms in small collision systems.

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