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Exploring the origin of collective phenomena in small collision systems at the LHC

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The observation of collective-like behaviors in pp and p–Pb collisions at LHC energies has sparked debate about the similarities between the dynamics of small systems and heavy-ion collisions. In this talk, our latest published results are presented, showing baryon-meson v2 grouping (within 1 sigma) and significant splitting (approximately 5 sigma) at intermediate pT in high-multiplicity p–Pb and pp collisions, similar to those observed in heavy-ion collisions. The Hydro-Coal-Frag model, which incorporates partonic flow and quark coalescence, best describes the data, while alternative models fail to reproduce the pattern, providing strong evidence of a collectively flowing partonic medium in high-multiplicity pp and p–Pb collisions. The key question of how far down in system size the dynamics of small systems and heavy-ion physics remain similar is also investigated. The observed baryon-meson grouping and splitting, down to lower multiplicities (Nch ˜ 25), suggest that partonic collectivity may persist even in smaller systems. Additionally, our newly published results on ultra-long-range two-particle correlations, |Deltaeta|> 5.0(6.5), extending down to or below minimum bias multiplicity in pp and p–Pb collisions, explore the limits of collective medium formation in small systems.

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