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New insights on heavy flavor dynamics and hadronization from small to large collision systems from Λ_c^+ production with CMS

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The observation of collectivity signals in small hadronic collisions raises the question of whether the tiny droplet of quark-gluon plasma can form in small systems. Dynamics and hadronization of heavy flavor quarks in small-system collisions provide a powerful tool to address the origin of observed collective phenomena because of their early production time and sensitivity to the finite system size effect. In heavy-ion collisions, charm hadron production can occur via coalescence. One expects the effect to be more significant for baryons with three constituent quarks than mesons. Those motivate the studies of Λ_c^+ production in various collision systems.

In this talk, we report a comprehensive study of charm and bottom hadron elliptic flow in pp and pPb collisions with the LHC Run-2 data recorded by CMS, where a mass hierarchy is evident. We also present new measurements of the Λ_c^+ yields and ratios to prompt D^0 yields as functions of p_{T} and event multiplicity. They are directly compared with light flavor strange baryon-to-meson ratios to provide constraints on the charm hadronization in small systems. Moreover, ratios of Λ_c^+ over D^0 yields in pp and PbPb collisions, as well as the Λ_c^+ nuclear modification factors, will also be reported. We compare results from various collision systems to theoretical models. They provide crucial new insights into charm hadronization mechanisms and the possible QGP medium effects in high-multiplicity events.

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