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Production of Strange Hadrons and Resonances in pp, pPb and PbPb Collisions at the LHC Energies

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Nuclear matter at sufficiently high temperature and energy density undergoes a transition to a phase in which quarks and gluons do not remain confined: the quark-gluon plasma (QGP) phase [1]. Such an exotic state of strongly interacting quantum chromodynamics matter can be produced in the laboratory in high-energy heavy-ion collisions, where an enhanced production of strange hadrons is observed. Strangeness enhancement is originally proposed as a key signature to identify the formation of QGP in high-energy heavy-ion collisions [2]. The yield of strange hadrons is one of the various observables, which is sensitive to the system evolved after nuclear collisions. In particular, the resonance particles are also important for probing QGP phase because of their shorter lifetime (a few fm/c), comparable to the medium lifetime, and due to the rescattering and regeneration processes at the freeze-outs, the yields of the resonances may vary with respect to the non-resonance particles. Recent studies of small collision systems at the Large Hadron Collider (LHC) show unambiguous similarities in hadron production between high multiplicity pp, pPb collisions and PbPb collisions [3]. The studies on production of strange hadron and resonances play important roles in characterizing the LHC data in different collision systems.

In this contribution, we investigate the strange hadron and resonance yields using pQCD-inspired multiple-Parton scattering approach-based two different models, EPOS3 including the hydrodynamical evolution of produced particles and AMPT with a String Melting scenario. The results of yield ratios of identified hadrons will be presented for pp, pPb and PbPb collisions at various LHC energies and results will be confronted to the available experimental data to understand the properties of strongly interacting matter produced in heavy-ion collisions in terms of the model parameters.

1. Shuryak E. V., Quantum chromodynamics and the theory of superdense matter, Phys. Rep. **61**, 71–158 (1980).
2. Koch P., Muller B. & Rafelski J., Strangeness in relativistic heavy ion collisions, Phys. Rep. **142**, 167–262 (1986).
3. Adam J. et. al., ALICE Collaboration, Enhanced production of multi-strange hadrons in high-multiplicity proton-proton collisions, Nature Physics volume **13**, 535-539 (2017).

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