Multiplicity dependence of strange and multi-strange particle in jets in pp collisions at $\sqrt{s} = 7$ TeV

authors

Abstract

Comprehensive results on the production of unidentified charged particles, $\pi^{\pm}$, $K^{\pm}$, p, K^{0}_{S}, K^{*0}, ϕ, Λ, $\Xi^{\pm}$, $\Omega^{\pm}$ hadrons in jets in proton-proton (pp) collisions at $\sqrt{s} = 7$ TeV are presented with PYTHIA 8.

1 Introduction

In heavy-ion collisions at ultra-relativistic energies, it is well established that a strongly coupled Quark-Gluon-Plasma (QGP) is formed [**?** **?** **?** **?** **?**]. Recent measurements in high multiplicity pp, p–A and d–A collisions at different energies have revealed strong flow-like effects even in these small systems [**?** **?** **?** **?** **?** **?** **?** **?** **?** **?**]. In a recent letter [**?**], the ALICE Collaboration reported the multiplicity dependent enhancement of strange (K^0_S, Λ and $\overline{\Lambda}$) and multi-strange (Ξ^-, $\overline{\Xi}^+$, Ω^- and $\overline{\Omega}^+$) particle in pp collisions at $\sqrt{s} = 7$ TeV. As well as, those results were complemented by the measurement of $\pi^{\pm}$, $K^{\pm}$, p, $\overline{p}$, K^{*0} and ϕ with ALICE [**?**].

In a recent study, the ALICE Collaboration has studied baryon-to-meson ratios with a new twist: by studying the ratios in two parts of the events separately – inside jets and in the event portion perpendicular to a jet cone [**?**]. In contrast to the inclusive distribution, the Λ/K^0_S ratio within jets in pp and p–Pb collisions does not exhibit baryon enhancement. It is plausible that the baryon enhancement may therefore be attributable to the soft (low Q^2) component of the collision as discussed in [**?**]. This results disfavors the hard-soft recombination models, while it is consistent with a picture in which the value of baryon/meson ratio has two independent mechanisms: i) the expansion of the soft particles of the underlying event within a common velocity field (radial flow), and ii) the production of particles via hard parton-parton scatterings and the subsequent jet fragmentation. This comprehensive set of data does allow for a detailed test of production models.

The theoretical picture of collective effects in heavy ion collisions is vastly different from the picture known from pp collisions. Due to the very different geometry of the two system types, interactions in the final state of the collision become dominant in heavy ion collisions, while nearly absent in pp collisions.

References