

Production of Σ^0 hyperon and search of Σ^0 -hypernuclei at LHC with ALICE

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Abstract

The first measurements of the transverse momentum (p_T) spectra, integrated yields and mean p_T of Σ^0 and $\bar{\Sigma}^0$ hyperons in pp collisions at $\sqrt{s} = 7$ TeV at the LHC are presented. The Σ^0 ($\bar{\Sigma}^0$) is reconstructed via its electromagnetic decay channel $\Lambda(\bar{\Lambda})\gamma$. The Λ ($\bar{\Lambda}$) baryon is reconstructed via its decay into $p + \pi^-$ ($\bar{p} + \pi^+$), while the photon is detected by exploiting the unique capability of the ALICE detector to measure low-energy photons via conversion into e^+e^- pairs in the detector material. The yield of Σ^0 is compared to that of the Λ baryon, which has the same quark content but different isospin. These data contribute to the understanding of hadron production mechanisms and provide a reference for constraining QCD-inspired models and tuning Monte Carlo event generators such as PYTHIA.

In addition, the feasibility of a search for a bound state of proton, neutron and Σ^0 (Σ^0 -hypernuclei ${}^3_{\Sigma^0}\text{H}$) is presented, based on the luminosities foreseen for the LHC Runs 3 and 4.