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

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The first measurements of the transverse momentum (p_T) spectra, integrated yields and mean p_T of Σ^0 and $\overline{\Sigma}^0$ hyperons in pp collisions at $\sqrt{s} = 7$ TeV at the LHC are presented. The $\Sigma^0(\overline{\Sigma}^0)$ is reconstructed via its electromagnetic decay channel $\Lambda(\overline{\Lambda})\gamma$. The $\Lambda(\overline{\Lambda})$ baryon is reconstructed via its decay into $p + \pi^- (\overline{p} + \pi^+)$, 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 results on the first detection of Σ^+ hyperon at LHC with ALICE are shown. Also, the feasibility of a search for a bound state of proton, neutron and $\Sigma^0(\Sigma^0$ -hypernuclei ${}^3_{\Sigma^0}$ H) is presented, based on the luminosities foreseen for the LHC Runs 3 and 4.

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