

# Analysis of production and decay channels of hyperons in the HADES experiment

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This work presents the first comprehensive study of inclusive  $\Sigma(1385)^\pm$  hyperon production in proton–proton collisions at a kinetic beam energy of 4.5 GeV, performed with the High-Acceptance Di-Electron Spectrometer (HADES) at GSI. The  $\Sigma(1385)^\pm$  resonances were reconstructed via their dominant hadronic decay channels  $\Sigma(1385)^\pm \rightarrow \Lambda\pi^\pm$ , with subsequent  $\Lambda \rightarrow p\pi^-$  decay. Extraction of a clean signal was achieved using advanced background suppression techniques, including machine-learning-based event selection.

Efficiency and acceptance corrections were obtained from detailed simulations of various exclusive production channels using the PLUTO event generator, constrained by known cross-section and model calculations. Differential distributions in transverse momentum and rapidity were extracted over a broad kinematic range, benefiting from the extended HADES acceptance provided by a new Forward Detector. The  $\Sigma(1385)^+$  rapidity distribution exhibits forward–backward peaking, consistent with a t-channel production mechanism dominated by pion exchange, in agreement with previous exclusive measurements. In contrast,  $\Sigma(1385)^-$  production is more centered around mid-rapidity. The results will be presented and compared to the available model calculations.

## Collaboration

HADES

**Primary author:** SUMARA, Konrad (Jagiellonian University)

**Presenter:** SUMARA, Konrad (Jagiellonian University)

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