

## First measurement of $\Sigma^0$ -production in proton induced reactions on a nuclear target at $E_{kin} = 3.5$ GeV\*

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The measurement of  $\Sigma$  hyperons is rather difficult because of their abundant decay into neutral particles. For this reason, data are available only for few energy points in pp, pA and AA collisions, in particular, the energy gap between 2 and 4 GeV remains unexplored. Also, since  $\Sigma$  hypernuclei have not been measured so far, nothing is known quantitatively from experiments

about the  $\Sigma$ -N interaction. For these reasons precise measurements of  $\Sigma$  hyperons are needed in the field of hadron physics.

We have studied the production of neutral  $\Sigma^0$  baryons in the nuclear reaction p + Nb at an incident proton energy  $E_{kin} = 3.5$  GeV. The measurement has been performed with the HADES experiment setup at GSI, Darmstadt.

From  $4.2 \times 10^9$  recorded events,  $\Sigma^0 \rightarrow \Lambda^0 \gamma$  decays were identified via the decay  $\Lambda^0 \rightarrow p \pi^-$  coincident with  $e^+ e^-$  pairs from external gamma conversion.

Experimental details, analysis procedures and background determination are presented. The momentum and the rapidity distribution

of the particle and an observed total of about 220 candidate events is used to pin down the  $\Lambda/\Sigma$  ratio.

The obtained numbers and spectra are compared to predictions from transport model calculations and are discussed in the

context of thermal particle production in nuclear fireballs.

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### List of tracks

Small systems (pA)

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