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The Production of K_0 's in p+p Reactions

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Since the recent discovery of a massive neutron star of about 1.97 solar masses [1] the discussion about a possible existence of a condensed kaon matter inside the neutron star has been revived [2,3]. Kaons not only influence the nuclear EOS [1,2], but also play an important role for the cooling process of a neutron star [4]. Thus a better understanding of the kaon nucleon/nucleus interaction is urgently requested. For example, characteristics of the interaction such as the KN potential and the KN scattering in medium still need further investigation.

These properties can be obtained by comparisons of proton-nucleus or heavy ion data to transport models [5,6,7]. Hence the models should be able to reproduce elementary reactions at the first place. In this contribution we present high statistics K_0 s data from p+p collisions at $E_{kin} = 3.5$ GeV measured by the HADES detector at GSI (Darmstadt, Germany). The measurement of this energy regime is of particular importance because of two reasons. First of all there is a lack of data at these energies. Second of all it is not clear, whether the processes are dominated by resonance productions or already need to be described via string models (e.g. PYTHIA or FRITIOF) in the transport calculations. In both cases the constraints put up by this measurement for the transport models will be essential for the interpretation of the physics measured by CBM at the future FAIR facility.

The good statistics in the p+p data set allow for a double differential analysis in pt - y and angular distributions in momentum bins. Exclusive production channels as $p + p \rightarrow Y + \Delta^{++} + K_0$, $p + p \rightarrow Y + p + \pi^+ + K_0$ and others have been studied and the extraction of the relative cross sections has been carried out. In particular, the role played by the Δ^{++} resonance has been addressed. These results can be used to constrain the transport models. Results of the ongoing investigation and the influence of angular anisotropy will be presented in the contribution.

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Authors: BERGER-CHEN, Jia-Chii (Technische Universitaet Muenchen (DE)); Prof. FABBIIETTI, Laura (Technische Universität München)

Presenter: BERGER-CHEN, Jia-Chii (Technische Universitaet Muenchen (DE))

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