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The Role of Resonances in p+p Reactions associated with Strangeness Production

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The understanding of p+p reactions is fundamental for the interpretation of p+A and also heavy-ion collisions, in which in-medium modifications of hadrons are expected with increasing nuclear matter density. Such modifications can be investigated by comparisons of experimental data to transport models [1,2,3]. Hence, the models should be able to reproduce elementary reactions at the first place. In this contribution we present high statistics K0S data associated with resonance formations in p+p collisions at Ekin = 3.5 GeV measured by the HADES detector at GSI (Darmstadt, Germany). The measurement of this energy regime is of particular importance not only because no data is available at these intermediate energies, but also because 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 HADES and CBM at the future FAIR facility.

The high acceptance and resolution of the HADES spectrometer allows to study exclusive K0S reactions with the focus on the channels p + p -> Y + Delta^{++} + K0S and p + p -> Y + p + pi^{+} + K0S (with Y being either a Lambda or a Sigma^{0}). In particular, the role played by the Delta^{++} resonance has been addressed. The ability to distinguish the resonant from the non-resonant reactions, as well as the Lambda from the Sigma^{0} reactions will be demonstrated in the contribution. This enables us to extract exclusive cross sections as well as angular distributions of the mentioned reactions, which is especially interesting in the case of p + p -> Sigma^{0} + Delta^{++} + K0S , as this reaction has not been measured at other energies before. Finally, the published results [4] can be used as a basis for future studies of p+A and heavy-ion reactions.

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[4] G. Agakishiev et al., arXiv:1403.6662 [nucl-ex] (2014).

Primary author: Mrs BERGER-CHEN, Jia-Chii (Excellence Cluster Universe, TU München)

Presenter: Mrs BERGER-CHEN, Jia-Chii (Excellence Cluster Universe, TU München)

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