Contribution ID: **65** Type: **Poster**

Hyperon production and interaction studies in proton-proton scattering with HADES

Tuesday, 17 October 2023 16:50 (3 minutes)

Hyperon-hyperon and hyperon-nucleon interaction potentials are important to study in order to understand the strangeness content of neutron star cores. Strangeness is energetically favorable to be created in such dense matter since it lowers the Fermi pressure but the resulting maximum allowed mass is lower than observed masses. This could be explained by including strongly repulsive hyperon - nucleon interactions for the potentials. Hence, measurements of these interactions are needed. The structure of hyperon resonances is also important to study. This can be done by measurements of electromagnetic decays since they provide access to for example electromagnetic transition form factors.

HADES (High-Acceptance Di-Electron Spectrometer) at GSI collected high-statistics proton-proton data in 2022 at 4.5 GeV beam kinetic energy. The Λ –Λ reaction is currently being studied in this data along with production of Σ states where the Dalitz decay of hyperons could be observed for the first time. In addition, the reaction pp $\rightarrow$ p K^+ K^+ Ξ^- [π^- Λ [p π^-]] is ideal for studying double strange hyperon –nucleon interactions close to threshold. However, it is challenging to analyze due to the many final state particles and complex decay chain. This talk will address the hyperon physics cases and discuss the ongoing analyses.

Parallel Session

Hadron Spectroscopy

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Session Classification: Poster Session