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Feasibility studies of production and electromagnetic decay studies of hyperons for HADES

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Collaboration

HADES

Abstract content

The spectrum of excited states of single- and double-strange hyperons is poorly known. The internal structure of such hyperons is controversially discussed within various models, e.g. quark, bag and molecular models [1]. The most famous example is $\Lambda(1405)$. In this context, radiative decays are predicted to be an ideal tool to discriminate between various predictions [2]. Moreover, Ξ^- production yields measured by the high Acceptance Di-Electron Spectrometer (HADES) in Ar+KCl@1.76 GeV and p+Nb@3.5GeV experiments [3] strongly overshoot model predictions and thus require more detailed studies of elementary collisions.

HADES is a versatile detector installation optimized for dilepton detection and with excellent tracking capabilities useable for strangeness measurements at SIS18 energies. HADES has been recently upgraded by an electromagnetic calorimeter, a new RICH photon detector and a forward detector. All these improvements, combined with the improved SIS18 operation of proton beams at maximum energy 4.5 GeV, opens up new experimental possibilities. In our poster, we show results of feasibility studies of the cascade production close to the threshold and also the radiative decays of the excited hyperon states. Two benchmark channels, $pp \to \Lambda(1520)K^+p \to \Lambda(1115)e^+e^-K^+p$ and $pp \to \Xi^-K^+K^+p$, have been put into extensive simulations together with the most significant background channels. We show the results including expected count rates and signal-to-background ratios.

[1] E. Kaxiras et al., Phys. Rev. D 32, Aug 1985

[2] R.A. Williams et al., Phys. Rev. C 48, 1318 (1993)

[3] G. Agakishiev et al., Phys. Rev. Lett. 103, 132301 (2009)

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