

η photoproduction off ^3He : Search for η -mesic nuclei

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Photoproduction of η -mesons off ^3He has been studied via the $\eta \rightarrow 2\gamma$ and $\eta \rightarrow 3\pi_0$ decay modes at the tagged photon beam of the Mainz MAMI accelerator using the combined 4π Crystal Ball/TAPS calorimeter. In a previous experiment, Pfeiffer et al. [1] had reported evidence (although at low statistical significance) for the formation of a quasibound η - ^3He state. The present experiment aimed at an improved statistical quality for both the excitation function of coherent photoproduction on η -mesons off ^3He and the peak-like structure in the excitation function of π_0 -p back-to-back pairs. The η -mesons have been identified by an invariant mass analysis of 2-photons (respectively 6-photons) events. In both cases also the constraints from the intermediate π_0 -invariant masses have been used. The coherent reaction $\gamma + ^3\text{He} \rightarrow \eta^3\text{He}$ has been selected by the suppression of events with observed recoil nucleons and by a missing energy analysis. Preliminary results for the excitation function show an extremely rapid rise at the production threshold similar to what has been observed in hadronic induced reactions at COSY [2] .

[1] M. Pfeiffer et al., Phys. Rev. Lett. 92 (2004).

[2] T. Mersmann et al., Phys. Rev. Lett. 98, 242301 (2007).

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