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Strange and Exotic Baryons at MAMI

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Finding evidence for the existence of exotic states is one of the most exciting aspects of modern hadron physics. In the meson sector, it is possible to have a ‘smoking gun’ signature of a genuine exotic nature provided by certain charge-mass combinations and J^{PC} -configurations that cannot be explained by a quark-antiquark pair. Observations of several candidates were claimed by experiments such as Belle, BES, BaBar and LHCb. On the other hand, the existence of exotic baryons is much more controversial, especially since the unprecedented episode of the rise and fall of the $uudd\bar{s}$ pentaquark. Recently though, the matter of pentaquarks has been resurrected by the observation of a $c\bar{c}uud$ pentaquark as claimed by the LHCb collaboration. Although there are arguments favoring the inclusion of heavy quarks in stable pentaquarks, the question remains if such and other exotic states could also be formed by u , d and s quarks only.

The tagged-photon beam experiment A2 at the MAMI electron accelerator facility in Mainz allows the study of several photoproduction reactions in which exotic baryons could be involved in. A selection of current activities and recent results will be discussed: In η photoproduction off the neutron, the presence of an unusually narrow resonance is one possible explanation for a sharp structure seen in the total cross section. Recently, new insights could be gained by the measurement of spin-dependent cross sections. Experimental data allowing to search for an exotic state in the KN system of $\gamma d \rightarrow \Lambda KN$ are also available and undergoing analysis. Furthermore, analyses looking for a signature of the dibaryon supposedly discovered by the WASA-at-COSY collaboration have been started. Finally, a newly approved experiment dedicated to the study of the $\Lambda(1405)$ will be presented.

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