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Pion photoproduction on a deuteron at the VEPP-3 electron beam

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The pion photoproduction on nucleons and light nuclei is one of the main sources of information about their structure and electromagnetic properties. The ability to perform the experiments with polarized beam and/or target greatly increases the value of these reactions. The reason for this is that the study of various polarization observables reveals the mechanisms that cannot be seen and evaluated without using the polarized beam and/or target, since the contributions from small reaction amplitudes are strongly suppressed in unpolarized experiments.

The polarization observables include the components of tensor analyzing power of the pion photoproduction on a deuteron. In addition to their unique sensitivity to certain excitation mechanisms of nucleon resonances, these tensor observables can also manifest themselves in the study of dibaryon resonances. In contrast to theoretical studies, where the tensor polarization observables of the pion photoproduction on a deuteron have been studied for more than 40 years, there are quite a few experimental values for them. The reason is the difficulty to conduct the experiments in which a tensor-polarized deuterium target is used. A high degree of tensor polarization can be obtained only in the gaseous state, which corresponds to the target thickness 3-4 orders of magnitude smaller than in the solid state. Therefore, to perform an experimental study of tensor polarization observables, it is reasonable to use an internal tensor polarized target

At present, the internal target method is implemented only at the VEPP-3 storage ring in the Budker Institute of Nuclear Physics. The low thickness of the tensor-polarized gaseous deuterium target (1013 atoms/cm2) is compensated by the high electron beam current inside the VEPP-3 storage ring (~0.2 mA). In this paper, we present a review of the experimental works devoted to the study of the pion photoproduction on a tensor-polarized deuteron performed with the use of the VEPP-3 electron beam [1-4]. The connection between the electro- and photoreactions on the deuteron is described, and the methods for analyzing the experimental statistics and estimating the inseparable background with the use of the GEANT4 package and the GENBOS photoreaction generator [5] are presented.

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References

1. I.A. Rachek et al., Physical Review Letters 98 (2007) 182303.
2. V.V. Gauzshtein et al., Nuclear Physics A 1041 (2024) 122781
3. B.I. Vasilishin et al., Physical Review C 106 (2022) 024003
4. V.V. Gauzshtein et al., European Physical Journal A 56 (2020) 169
5. A.S. Iljinov et al., Nucl. Phys. A 616 (1997) 575

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