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Proton-induced knockout reactions with polarized and unpolarized beams

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Abstract

Proton-induced knockout reactions provide a direct means of studying the single particle or cluster structures of target nuclei. In addition, these knockout reactions are expected to play a unique role in investigations of the effects of the nuclear medium on nucleon-nucleon interactions as well as the properties of nucleons and mesons. However, due to the nature of hadron probes, these reactions can suffer significant disturbances from the nuclear surroundings and the quantitative theoretical treatment of such processes can also be challenging. In this article, we review the experimental and theoretical progress in this field, particularly focusing on the use of these reactions as a spectroscopic tool and as a way to examine the medium modification of nucleon-nucleon interactions. With regard to the former aspect, the review presents a semi-quantitative evaluation of these reactions based on existing experimental data. In terms of the latter point, we introduce a significant body of evidence that suggests, although does not conclusively prove, the existence of medium effects. In addition, this paper also provides information and comments on other related subjects.

Keywords: Spectroscopic factors, Nuclear medium effects, Nucleon knockout reaction
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