

Investigation on alpha clustering via knockout reaction

The alpha clustering has been one of the main interest in nuclear physics. In order to probe the alpha clustering through reaction observables, the proton-induced alpha knockout reaction, (p,p alpha), is considered in this study. The purpose of this work is to reveal how the alpha cluster amplitude is probed through the (p,p alpha) reactions.

Within the distorted wave impulse approximation (DWIA) framework, We have newly introduced the “masking function” which defines the probed region of the alpha cluster amplitude through the (p,p alpha) reactions. It has been clearly shown by means of the masking function that the alpha knockout reaction probes the alpha cluster in the nuclear surface, which will be the direct measure of well-developed alpha cluster states. A simplified form of the masking function is also introduced and the incident energy dependence of the masking effect is investigated.

As a conclusion, alpha knockout reaction can be the probe for the alpha cluster amplitude in the nuclear surface owing to the masking effect originated from the absorption of distorting potentials, and is a suitable method to investigate how alpha cluster states are spatially developed.

Summary

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