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ALPHA-RESONANCES IN MEDIUM AND HEAVY NUCLEI I. Review of phenomenological models

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Abstract

The low-lying rotational bands in light nuclei were explained a long time ago by α-clusters orbiting around the remaining core. These quasimolecular states are related to an enhancement of the elastic α-particle cross section at large angles, the so-called Anomalous Large Angle Scattering (ALAS) phenomenon. On the other hand, α-particles were evidenced by the discovery of the α-decay for nuclei with $Z > 50$. We used a phenomenological model of an α-particle moving in a pocket-like potential, able to explain the ALAS phenomenon, in order to understand the main features of the decay data between ground and excited states. Then we extended the Brink model, explaining giant resonances, and presented a possibility to detect α-like collective resonances.

keywords: alpha decay, resonant state, decay width

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