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Study of the Coulomb breakup of halo nuclei

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The aim of the work is a theoretical study of Coulomb breakup of halo nuclei in the framework of a non-stationary quantum-mechanical approach.The Coulomb breakup of halo nuclei is one of the main tools in studying the properties of halo nuclei and provides useful information about the halo structure [1]. A theoretical study of exotic nuclei by quantum- mechanical approach is relevant in connection with the planned experiments aimed to investigate the properties of light nuclei on radioactive beams.

Among the halo nuclei, the ^{11}Be nucleus is of particular importance, since the relative

simplicity of its structure allows more accurate theoretical studies [2]. In fact, the bound states of 11Be nucleus can be described quite well as 10Be nucleus and a weakly bound neutron. With a good approximation, the decay can be regarded as a transition from a two-particle bound state to a continuum due to a varying Coulomb field [2].

The influence of magnetic field on the breakup of the ^{11}Be nucleus is studied by numerical

methods, in particular numerically solving the non-stationary Schrödinger equation on a radial mesh [1]. The energy levels of the 11Be nucleus for the Woods-Saxon potential and the level shifts due to the external magnetic field are calculated. Numerical results are compared with a previous calculations [2] and analytical ones. The perturbation theory [3] is used as an analytical method.

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