Nuclear and Coulomb Interactions of ${}^{6}_{\Lambda}$He Hypernuclei with Nuclei at Intermediate and High Energies

M. V. Evlanov, A. M. Sokolov, and V. K. Tartakovsky

Institute for Nuclear Research, National Academy of Sciences of Ukraine, pr. Nauki 47, Kiev, 252028 Ukraine

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Abstract—Generalized expressions describing the integrated cross sections for diffractive nuclear and Coulomb interactions between incident cluster nuclei and absorbing nuclei have been derived and used to compute the corresponding cross sections for the interaction of ${}^{6}_{\Lambda}$He hypernuclei with light, medium-mass, and heavy nuclei. The high sensitivity of the cross sections for various processes of ${}^{6}_{\Lambda}$He breakup (and especially for Coulomb dissociation) to the energy required to detach a loosely bound neutron has been revealed. A significant role of triple scattering in the total cross section has been demonstrated. The possibilities of determining more precisely the energy of neutron separation from ${}^{6}_{\Lambda}$He and of estimating the ranges of $(n^{5}_{\Lambda}\mathrm{He})$ and $(\Lambda\alpha)$ interactions in the ${}^{6}_{\Lambda}$He hypernucleus have been investigated.