Elastic Scattering and ^{6}He-Induced Reactions

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Resumo

Low-energy collisions induced by secondary radioactive beams of exotic nuclei constitute an active field of research, as these systems may exhibit unique features such as neutron halos and modifications of the nuclear shell structure. In Brazil, these investigations are carried out at the RIBRAS facility [1, 2, 3, 4], which has been in operation since 2004 at the Open Laboratory of Nuclear Physics and Applications (LAFNA), Institute of Physics, University of São Paulo (IFUSP). RIBRAS produces light radioactive ion beams, such as ^{6}He, ^{8}Li, ^{7}Be, and ^{8}B, with typical intensities ranging from 10^4 to 10^6 particles per second. In this work, we present measurements performed with a radioactive ^{6}He beam incident on targets of different masses: light targets (^{9}Be and ^{27}Al) [5, 6], a medium-mass target (^{51}V), and a heavy target (^{nat}Zr). For all these systems, in addition to elastic scattering, a significant production of alpha particles was observed, indicating that alpha-production channels play an important role in the reaction mechanisms. This behavior is consistent with the Borromean nature of the ^{6}He nucleus (^{4}He + 2n; $E_{\rm bu} = 0.973$ MeV), which enhances the coupling to breakup and transfer channels. The results obtained for these systems will be presented and discussed.

References

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