

Beyond the Barrier: Exploring α -Nuclear Potentials with Exotic Heavy Nuclei

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The poor knowledge of the α -nuclear potential in unstable nuclei still dominates the uncertainties associated to the production of the heavy p-nuclei [1,2]. Calculations of the elastic scattering cross section at energies close to the Coulomb barrier based on global α -nucleus potentials differ up to a factor of 2 when moving towards unstable nuclei with higher proton-to-neutron ratios. The lack of experimental data in the region around the heavy p-nuclei does not contribute to solve this issue.

In this talk I will present the first measurement of the elastic scattering of α -particles on exotic heavy nuclei, concentrating on the Sn isotopic chain. The experiment, performed at the HIE-ISOLDE facility at CERN, profited from the use of innovative thin silicon films with high amounts of He [3] and the high intensity beams for the isotopes 108, 109 and 110-Sn produced at ISOLDE. In addition to the astrophysical context of the measurement, I will present the main properties of the films, introduce the experimental setup considered for the measurement, and will show the current status of the analysis performed to the data obtained. The results from this benchmark measurement will open the door to the study of α -nuclear potentials in exotic proton-rich nuclei, contributing to the reduction of the uncertainties in network calculation studies.

References:

- [1] A. Simon, et al. J. Phys. G 44, 064006 (2017)
- [2] W. Rapp, et al. Astrophys. J. 653, 474 (2006).
- [3] V. Godinho, et al. ACS Omega 1(6), 1229 (2016).

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