α-SCATTERING EXPERIMENT ON ^{64}ZN AND THE LOW ENERGY α-NUCLEUS OPTICAL POTENTIAL

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The *p* nuclei, a group of 35 stable nuclei beyond the iron peak, located on the proton-rich side of the valley of the β-stability, are thought to be produced mainly by a series of photodisintegration reactions from neutron rich isotopes, previously produced by neutron capture processes. The so-called γ process is believed to occur e.g. in the O/Ne layers of Type II Supernovae at temperatures of a few GK [1,2] or during the thermonuclear explosion of a white dwarf (Type Ia Supernovae) [3].

For the calculation of *p* nuclei abundances, the rates of reactions involved in a γ process network have to be known. This can be achieved by using α-nucleus optical potentials [4] for the calculation of (α, γ) and (γ, α) reaction rates. As such, the study of the low energy α-nucleus optical potentials is of crucial importance. These optical potentials can be studied experimentally e.g. via precise elastic scattering measurements.

In this work we present the experimental details and the results of the α scattering measurement on ^{64}Zn performed at the Atomki cyclotron, at energies close to the Coulomb barrier. A comparison of the cross sections to different global α-nucleus potentials predictions is also presented. Inelastic scattering cross section leading to the first few excited states of ^{64}Zn were also determined and are compared with calculations. Total cross sections important for the statistical model are also derived and compared with the available experimental data, extending our earlier work [5].

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