Direct radiative capture calculations on ^{56}Fe

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Abstract: Iron is one of the main structural materials used in nuclear infrastructures and technological applications. In the case of nuclear reactors, steel alloys are used in several parts, mainly for the pressure vessel, for building the core structures and in some reactors as reflectors. For this reason, accurate neutron cross section data are indispensable for the design and reliable operation of such facilities.

^{56}Fe is the most abundant naturally occurring isotope, it amounts to 92% of natural iron. The neutron cross section data of iron were studied under the CIELO project [1]. Based on this study, two main issues were discovered in the evaluated cross sections of the ^{56}Fe(n,γ) reaction. Those issues were addressed by implementing changes in the ENDF/B-VIII.0 evaluation [2]. Specifically, an artificial background was added in the energy region of 10 eV to 100 keV, in order to properly reproduce integral measurements in this energy range, and also the cross section above 850 keV was increased based on experimental data provided by the RPI [3].

This work aims to provide a physical interpretation behind these changes by exploring the direct radiative capture mechanism for ^{56}Fe. For the calculations, a dedicated code was utilized [4,5]. In this presentation, the first results of the direct capture cross section of ^{56}Fe will be presented.

References:

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