Cross section measurements of neutron elastic scattering on ^{54}Fe

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Studies of neutron-nucleus interactions are of considerable interest, not only for their importance to fundamental research in Nuclear Physics but also for practical applications. Iron is a major structural material, used widely in nuclear technology applications, especially nuclear reactors where it can be found in several places, from building the core structures to reflectors, moderators, etc. For this reason, accurate neutron data are indispensable for the design and reliable operation of such facilities.

Discrepancies between the current evaluated nuclear data libraries of iron, along with lack of experimental data in the fast neutron energy range, especially ones with monoisotopic-enriched targets, constitute an obstacle in the development of advanced reactor systems, such as Generation-IV reactors.

New measurements of neutron scattering on ^{54}Fe were carried out at the neutron time-of-flight facility GELINA, using a highly enriched ^{54}Fe sample. For the detection of the scattered neutrons, the new scintillator array ELISA (ELastic and Inelastic Scattering Array) was used. The spectrometer consists of 32 liquid organic scintillators, able to separate neutron and photon induced events via pulse-shape analysis, placed at eight different scattering angles in order to simultaneously calculate the differential cross section and the integral one via numerical quadrature [1-2].

In this presentation, the analysis procedure along with the preliminary results for the cross section of neutron elastic scattering on ^{54}Fe are presented.

References

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