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Studies of Nuclear Reaction Cross-sections for Reactor and Astrophysical Applications

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The development of reactor technology demands high-quality nuclear data for the materials used in the reactors. There are several materials used in a reactor such as fuel, cladding, structure, coolant, moderator, reflector, shielding, etc. We have been involved in the measurements of reaction cross-sections for several years and have measured several nuclear reaction cross-section data for neutron-induced reactions such as (n,γ), (n,p), $(n,2n)$, (n, α), and proton induced nuclear reactions (p, n), (p, γ), etc., which are important for the different reactor materials. It is also observed in the EXFOR data library that there is a scarcity of data or a large discrepancy in the measured data. Including the reactions for the reactor technology, in recent times activity has been initiated for the reactions for astrophysical applications in order to understand the productions of the various isotopes in the stellar environment. The measurements were performed at the TIFR Pelletron facility, Mumbai, India. The method of analysis was standard activation analysis in which materials are irradiated with the interested particle beam and then the activity produced is measured with a high-purity HPGe detector. The measured data were supported with the nuclear modular codes predicted data such as TALYS and EMPIRE codes. The data/results are also useful to understand the predictability of the several models available in such codes. I will present the results of (n, γ) and (p, γ) nuclear reactions in this workshop.

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