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Perfomance evaluation of tailored shielding for energy-selective neutron detection in reactor environments

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With nuclear reactor technology rapidly advancing and the plan to raise the nuclear energy production by a factor of 4, the need for advanced detectors, geometries and shields has become apparent. The precise and reliable measurement of the neutron flux is not only relevant for the safe operation of nuclear reactors, but also for future reactor experiments essential for progressing the technology. In the presented work, simulations were performed using MCNP-6.3 to investigate the effects of various common reactor materials in different shield geometries on the performance of benchmark detectors. This was performed using a validated simulation of a 1 Ci Am/Be neutron source located at the University of Liverpool for a detailed experiment to simulation evaluation. The use of a conical shield/reflector material around the detector showed lower efficiency for the detection of thermal neutrons, and higher efficiency for the detection of fast neutrons when compared to the results for no additional material. The tailored measurement of neutrons of specific energies is highly relevant for reactor experiments on innovative technologies.

Footnotes

Funding Agency

I have read and accept the Conference Policies

Yes

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