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# Measurement of the differential cross section of neutron scattering on deuterium in the neutron energy range from 400 keV to 2.5 MeV

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Accurate experimental data describing elastic scattering of neutrons on deuterium are of interest for both fundamental research, for understanding quantum-mechanical few-body systems, and nuclear applications, e.g. for the design and safe operation of heavy-water moderated critical systems. Below 3 MeV of incident energy, however, the available measurements of scattering angular distributions are scarce and partially inconsistent. The differential cross section of neutron scattering on deuterium was measured using monoenergetic neutrons in the energy range from 400 keV to 2.5 MeV. A proportional counter filled with mixtures of deuterated gases was used as both neutron target and detector for the recoil deuterons. As the deuteron recoil energy is directly related to the neutron scattering angle, the experimental pulse-height can be analysed to reconstruct the neutron angular distributions over a large angular range.
Interferences due to photon-induced events were minimized by means of passive shielding and an active rise-time discrimination scheme. To account for the finite resolution of the detector, incomplete energy deposition (wall effect), and multiple scattering events, a dedicated Monte Carlo model was implemented simulating neutron and deuteron transport in the detector. The coefficients of the Legendre expansion of the differential cross section are obtained from the comparison of simulations to measurements using an iterative procedure.

## Selected session

Few-Body Systems

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