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Inelastic Neutron Scattering at nELBE

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At the superconducting electron linear accelerator ELBE at Forschungszentrum Dresden-Rossendorf the neutron time-of-flight facility nELBE has become operational.

Fast neutrons in the energy range from ca. 0.1 to 10 MeV are produced by the pulsed electron beam from ELBE impinging on a liquid lead circuit as a radiator.

The short beam pulses of ˜10 ps provide the basis for an excellent time resolution for neutron time-of-flight experiments, giving an energy resolution of about < 1˜\%
at 1 MeV with a short flight path of ˜ 5 m.

The neutron intensity on target is ca. 4*10ˆ4 n/s/cmˆ2 using an electron bunch charge of 77 pC and 203 kHz pulse repetition rate.

The energy range of the neutrons produced is well suited for neutron cross section measurements relevant for the development of Generation IV reactor systems and
for the transmutation of nuclear waste.

First measurements of inelastic scattering cross section on natural Fe have been performed using a double time-of-flight method.

The cross section for the first excited level of Fe-56 and Fe-54 could be determined.

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