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#01-215 Experiments with fast neutrons at nELBE

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The neutron time-of-flight facility nELBE at Helmholtz-Zentrum Dresden-Rossendorf features the first photo-neutron source at a superconducting electron accelerator. The electrons are focused onto a liquid lead target to produce bremsstrahlung which in turn produces neutrons via photo-nuclear reactions. The emitted neutron spectrum ranges from about 10 keV up to 15 MeV with a source strength of above 10^{11} neutrons per second. The very precise time structure of the accelerator with a bunch width of a few ps enables time-of-flight measurements at very short flight path and experiments to investigate the time response of novel detector concepts.

The high repetition rate of 100 to 400 kHz in combination with the low instantaneous flux and the absence of any moderating materials provide favorable background conditions.

The very flexible beam properties at nELBE enable a broad range of nuclear physics experiments. Examples for the versatility of nELBE will be presented: From transmission measurements and inelastic neutron scattering and fission experiments to determine nuclear reaction cross sections with relevance for fundamental nuclear physics, reactor safety calculations, nuclear transmutation or particle therapy to experiments to investigate the response of novel particle detectors e.g. for dark matter search experiments, nuclear instrumentation or the range verification in cancer treatment.

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