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SoNDe High-Flux Neutron Detector

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New high-flux and high-brilliance neutron sources demand a higher count-rate capability inneutron detectors. In order to achieve that goal, the Solid-State Neutron Detector (SoNDe)project developed a scintillation-based neutron detector. It is capable of fully exploiting theavailable flux current and coming neutron facilities, such as the European Spallation Source(ESS).[1] In addition to enabling high count-rates, one of the design goals was to develop amodular and scalable solution that can also be used in other instruments or differentcontexts, such as for laboratory setups.[2] Since higher brilliance and flux sources call for detectors that can handle high-flux,especially when considering pulsed sources with high peak-flux, SoNDe provides
-Possibility to handle a flux of more than 50 MHz on a 1x1 m^2 detector area
-Pixel resolution down to 3x3 mm^2
-Neutron detection efficiency higher than 80%, good gamma-discrimination
-µs time resolution
Count rates of 250 kHz per module (5 x 5 cm^2) were measured under primary beamconditions at neutron scattering experiments. Combined with the high area coverage of thesquare modules and the high efficiency of the scintillator this allows to use high flux neutronsources to capacity.
[1] JAKSCH, Sebastian, et al. Proceedings of the International Conference on NeutronOptics (NOP2017). 2018. S. 011019
[2] JAKSCH, Sebastian, et al. Cumulative Reports of the SoNDe Project July 2017. arXiv preprint arXiv:1707.08679, 2017

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