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Neutron Optics from NOB Nano Optics Berlin

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Together with the Helmholtz-Zentrum Berlin NOB has developed several kinds of neutron optical devices for polarization, collimation and focusing of neutron beams. In most of them the neutrons are transported in thin silicon wafers with coated walls.

Results are shown for solid state benders and a radial bender for the polarization of neutrons.

A solid state polarizing bender without absorbing layers used together with a collimator allows polarizing or analyzing neutrons without deflecting them.

Two-dimensional polarization analysers for an angular range of 5 degrees in both directions are presented.

All these devices have polarizations of 95%.

In the last years several polarizing S-benders were built with very high polarizations, e. g. one with a cross section of 30 mm x 100 mm was tested at a wavelength of 4.4 Å with a polarization above 98% and a maximum transmission above 65% [1]. Further S-benders for shorter wavelengths were built and tested as well.

A focusing solid state lens was made from Si wafers coated with m=2 Ni-Ti supermirrors. Here a focus with a FWHM of 2.4 mm was reached and an intensity increase of 5.6 compared to the intensity without the lens.

[1] Th. Krist, F. Rucker, G. Brandl, R. Georgii: High performance, large cross section S-bender for neutron polarization, Nuclear Inst. and Methods in Physics Research, A 698 (2013) 94-97.

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