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Polarizing neutron optics

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Polarizing neutron optics found numerous applications in polarized neutron techniques. Stacks of bent polarizing supermirrors on thin substrates are used as multichannel polarizers and analyzers (“benders”). Solid state benders were also designed and can be made quite compact. Highly polarized white beam is produced by successive reflections from two polarizing supermirrors/monochromators. They can be used to polarize the beam without changing its direction. To meet this end, S-shaped benders and transmission polarizers (V-cavity, multichannel V-cavity, transmission bender, compact V-bender) are also designed. Since the apertures of the collimation slits and the detector are quite different, the design of polarizers and analyzers often differ. A wide-angle analyzer can be built with numerous benders turned with respect to each other or by using tapered channels (fan analyzers). The fan analyzers with the geometry of straight or curved channels can be used, depending on the instrument requirements. Inverting the geometry, one can develop a focusing polarizer. Neutron spin optics was recently proposed to widen the functionality of neutron optics. NSO devices may play an important role in developing alternative schemes of measurements, especially with small samples, which are often of special interest.

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