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Development and Applications of Supermirror

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The introduction of the concept of supermirror in 1967 [1] and its technological realization [2] laid the foundation for increasing the efficiency of the transport of neutrons and of polarization analysis techniques due to the large increase of the maximal angle reflection by a factor of m when compared with the angle of total reflection of Ni. A complete guide system based on supermirror technology was implemented for the first time at the Swiss Spallation Source SINQ at PSI in 1994 using mostly mirrors with m = 2 [4]. The following years witnessed enormous increases in the performance of beamlines for neutron scattering thanks to the combination of new guide concepts, e.g. ballistic guides [5] and non-linearly tapered parabolic and elliptic guides [6], with supermirror whose performance has been improved continuously [7]. Supermirror with high reflectivity on metallic substrates [8] promote new applications namely extending neutron guides close to the moderators and focusing of neutron beams. As a result of the continuous developments of the deposition techniques for supermirror and the improved super-polishing of substrates on an industrial scale, non-magnetic and polarizing supermirrors are available with large angles of reflection, excellent reflectivity, and high polarization if magnetic materials are used. Here we report on the state-of-the-art and on the limitations of the performance of supermirror and possible applications.

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Poster back-up

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