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From focusing monochromators to nested mirror optics

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Neutron scattering is a well-established technique for the investigation of the static and dynamic properties of materials over a wide range of spatial and temporal scales. Many studies of high interest, however, can only be performed on small samples and typically require elaborate extreme environments. To improve the signal-to-noise ratio, various focusing techniques have been developed during the last 50 years such as focusing monochromators or focusing neutron guides. Indeed, impressive gains in flux of more than two orders of magnitude have been achieved.

In this contribution I will give an overview about various concepts for beam focusing, the efficient transport of neutrons, and the selection of their phase space, i.e. beam size and divergence. In combination with highly-brilliant neutron sources, the flux and the cleanliness of the beams can be improved tremendously thus allowing conducting experiments that were thought to be not feasible many years ago.

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