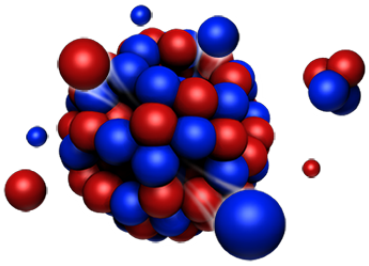

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Neutron beam extraction from small moderators: secondary source approach

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The advance in manufacturing of neutron supermirrors allows for an efficient brilliance transfer and a versatile design of the neutron transport system from moderator to the sample position. In the case of beam extraction from small moderators, as STS will provide, elliptical shaped supermirrors seem to be the optical element of choice. Here we describe an optical system consisting of two parts: a primary deflecting guide, which creates a rather concentrated secondary source far away from the moderator, and a secondary focusing system of choice, which can deliver alternative distinct phase space selection at sample position. To preserve a high brilliance transfer, the acceptance diagram of the secondary system must be included into the secondary source emission phase space volume. McStas code was used to calculate the neutron tracing and the sequence of elements used in the simulations is described. We present the results obtained for two future diffraction instruments at STS: MENUS and VERDI, with desired high resolution and high intensity options. For the secondary focusing system, beside the basic Montel type mirror arrangement, we explore also a Wolter type sequence of mirrors for aberration-less focusing.

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