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Imaging nested-mirror assemblies for efficient beam transport with tailored spectra

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A mirror system for neutron transport with high brilliance transfer from a source or a divergent beam to an instrument is presented. The assembly of nested short elliptical (or very short flat) mirrors located halfway between two common focal points M and M' images cold neutrons by single reflections from an area around M onto an area of similar size at M'. An absorber on the straight line MM' blocks the direct view onto the source, with little impact on the transported solid angle. The simple geometry with well-defined, non-grazing angles of reflection off the individual mirrors opens up versatile possibilities to tailor beam size, divergence, wavelength spectrum and polarization to experimental needs. A common small-wavelength cut-off of the transported spectrum can be set by proper choice of the m values of supermirrors. Monochromatic beams can be generated using bandpass supermirrors. Adjustable apertures far away from the instrument define the size and the divergence of the beam at the sample, thus keeping background radiations low. The absence of mirrors in the harsh radiation environment close to an intense source simplifies the maintenance of beam tubes and increases mirror lifetimes.

[1] O. Zimmer, Imaging nested-mirror assemblies –A new generation of neutron delivery systems?, J. Neutron Res. 20, 91-98 (2018)

Poster back-up

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