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Simulation-driven Design for Increasing Neutrons with The Low Dispersion Using Neutron Supermirrors

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A beam from cold neutron sources or X-ray sources spread out radially from the source. These beams have a high divergence angle and the flux decreases inversely with distance. In order to analyze the structure of material, the beam must be sent to a sample at a distance. At this time, a long measurement time is required due to the low flux of the beam. Moreover, except for a few neutron imaging instruments, most neutron spectrometers require low dispersion neutrons, so the dispersion angle must be suppressed. However, focusing the beam with an elliptical or parabolic mirror increases the divergence angle, and decreasing the divergence angle with a collimator reduces the flux. Hence, it is necessary to design a neutron guide that convert the high dispersion angle of neutrons to a low angle. In this report, we will present a design for increasing neutrons with the low dispersion using a sophisticated arrangement of neutron supermirrors coated with different M-values. By inserting three types of mirrors with different installation angles into the horizontal plane of the neutron guide tube, neutrons with a dispersion angle of 0 to 1 degree can be converted to 0 to 0.5 degrees.

Paper submission Plan

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Best Presentation

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Contribution track

ICABU WG3. Beamline and Instrumentation

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