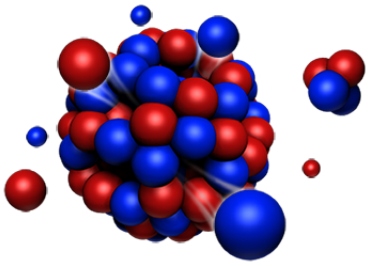

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Detailed Supermirror physics in MCNP6

Thursday, 17 October 2019 11:50 (25 minutes)

Neutron guide shielding is a complex problem that adds transmission through the guides via neutron mirrors to the traditional particle transport. The combination of these phenomena is rarely available in transport codes. PHITS started featuring neutron mirror starting with version 2.12, and F.X. Gallmeier implemented them in MCNPX in 2009. In this work, we have ported this physics into MCNP6 and greatly expanded its capabilities. The code now features event biasing for mirrors, with the possibility to split the particle into reflected and transmitted part. DXT spheres are also now compatible with these reflecting surfaces.

Furthermore, the latest development makes the neutron track follow a more realistic path in the mirror coating, including the walk into the Ni/Ti layers up to a depth dependant on its momentum transfer. This not only allows to more accurately represent the differences in reflectivity depending on wavelength, but it also provides a realistic gamma generation - A feature critical for shielding in beamlines, and not available, to the author's knowledge, in other transport codes-.

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