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Neutron Polarimetry On the 10^-4 Level

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Correlation coefficients of the polarized neutron beta decay offer a way to test the standard model by precision measurements. One of the currently leading systematic errors is the neutron polarization. State-of-the-art polarizing super mirrors in the X-SM geometry deliver about 99.7(1)% polarization.
We present recent developments in cold neutron polarization, based on the opaque test bench of 3He spin filters: We have shown experimentally that the accuracy of polarization analysis with opaque 3He spin filters is better than 10^-4. By optimizing the operating conditions of supermirrors and selecting the materials, we have achieved a polarization of 99.97(1) % with the X-SM geometry for a divergent 5.3 Å beam (monochromatized by a velocity selector). These results solve the issue of neutron beam polarization for the next generation of neutron beta decay correlation experiments which aim for accuracies of 10^-4.

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