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Preparing a Polarimetry Measurement for the Nab Experiment

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The Nab experiment at the Fundamental Neutron Physics Beamline (FnPB) at the Spallation Neutron Source (SNS) aims to make precision measurements of the electron-neutrino correlation and Fierz interference term, associated with the beta decay of free neutrons. Residual polarization of the incident beam presents a potential source of systematic error in this measurement. In order to understand and mitigate these effects we must measure the beam polarization and the efficiency of our newly designed Neutron Spin Flipper. If we use ^3He polarizers to accomplish these measurements, it will require careful control of the magnetic environment along the beam line, in order to assure adiabatic spin transport of the neutrons, and prolong the polarization lifetime the ^3He cells. However the space for incorporating the necessary components is limited, and requires careful magnet construction to obtain the requisite magnetic fields.

Summary

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