

Dynamical Behavior of the SpinQuest Target Polarization due to Beam Heating and Radiation Damage

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Abstract

The SpinQuest experiment at Fermilab will utilize a high intensity 120 GeV proton beam incident on a transversely polarized target. The likely behavior of the SpinQuest polarized target due to beam heating and radiation damage has been recently analyzed. The target temperature will increase due to the beam heating which can cause local depolarization of the target material. The temperature of the target also depends on heat removal by the helium evaporation refrigerator. A simulation based on the finite-difference method was applied to obtain the final temperature of the target under the SpinQuest configuration. The radiation level in the target material was studied using GEANT to obtain the intensity of secondary particle production along the target length. Finally, using the target temperature and beam irradiation information, a LabView-based simulation was developed to calculate the depolarization in the target material as a function of position along the target length. In this talk, I will present the degree of dynamic target depolarization and the information and approach intended for reducing the systematics for these effects.