

Abstract Submitted
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Simulation and Automation of Microwave Frequency Control in Dynamic Nuclear Polarization for Solid Polarized Targets¹ GONADUWAGE PERERA, IAN JOHNSON, DUSTIN KELLER, University of Virginia — Dynamic Nuclear Polarization (DNP) is used in most of the solid polarized target scattering experiments. Those target materials must be irradiated using microwaves at a frequency determined by the difference in the nuclear Larmor and electron paramagnetic resonance (EPR) frequencies. But the resonance frequency changes with time as a result of radiation damage. Hence the microwave frequency should be adjusted accordingly. Manually adjusting the frequency can be difficult, and improper adjustments negatively impact the polarization. In order to overcome these difficulties, two controllers were developed which automate the process of seeking and maintaining the optimal frequency: one being a standalone controller for a traditional DC motor and the other a LabVIEW VI for a stepper motor configuration. Further a Monte-Carlo simulation was developed which can accurately model the polarization over time as a function of microwave frequency. In this talk, analysis of the simulated data and recent improvements to the automated system will be presented.

¹DOE

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