

In scattering experiments that use targets relying on dynamic nuclear polarization (DNP), target materials must be irradiated using microwaves at a frequency determined by the difference in the nuclear Larmor and electron paramagnetic resonance (EPR) frequencies. Since the resonance frequency changes with time as a result of radiation damage, the microwave frequency should be adjusted accordingly. Manually adjusting the frequency can be difficult, and improper adjustments negatively impact the polarization. Therefore, 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. The relationship between microwave frequency and corresponding polarization growth and decay rates in DNP experiments were extensively studied while developing this method. As a result, 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.