

The microwave system of the SpinQuest polarized target setup

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The SpinQuest experiment at Fermilab uses a polarized solid ammonia target under a 5T magnetic field, immersed in the liquid helium bath of an evaporation refrigerator, which lowers the lattice temperature of the material to nearly 1K. This brings the materials to thermal equilibrium (TE) polarization state. The TE polarization of the material is enhanced by radiating a d-band microwave, generated from Extended Interaction Oscillators (EIO), on the target material at a specific frequency, a process known as dynamic nuclear polarization (DNP). The output frequency of the EIO is determined by the size of its resonant cavity, which is controlled by a high-resolution stepper motor. The level of polarization drifts after accumulating an intense proton beam from the 120 GeV main injector over time, which triggers the frequency control system to adjust the EIO frequency to maintain the maximum level of polarization of the material as measured by the NMR system. The status of the microwave system during the ongoing beam commissioning period will be presented.

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