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Quenching factor measurement for NEWS-G

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The NEWS-G experiment, located at the Sudbury Neutrino Observatory (SNO) in Canada, is searching for Weakly Interacting Massive Particles (WIMPs) in the sub-GeV mass range. This direct dark matter detection experiment uses Spherical Proportional Counters (SPCs) as detectors, which measure nuclear recoils in noble gases. Since nuclear recoils are quenched compared to electronic recoils, precise measurements of the quenching factor (QF) are essential for accurately calibrating the detector for nuclear recoil events. Therefore, it plays a key role in determining sensitivity of the detector towards dark matter detection. To facilitate these in-beam QF measurements, we recently developed a neutron detector for detecting the scattered neutron from SPC.

This work outlines the ongoing efforts of the NEWS-G group to measure the quenching factor (QF) for various gas mixtures, pressures, and neutron energies. The development and preliminary results from our new neutron detector will also be discussed. Additionally, a brief overview of our recent measurements conducted with the tandem accelerator at the University of Montreal will be presented.

Collaboration(s)

NEWS-G collaboration

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