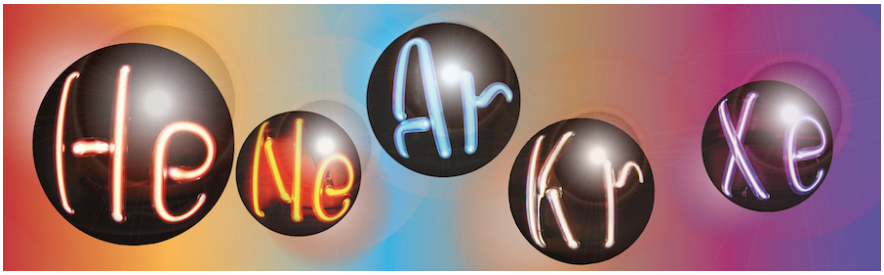

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Optical and quenching models for low energy nuclear recoil detection in liquid neon

Neon is a light element, making it well-suited for the detection of low-energy nuclear recoils from dark matter and neutrinos. In particular, reactor antineutrinos are difficult to detect via coherent elastic neutrino-nucleus scattering (CEνNS) due to the characteristically low-energy recoils they produce. The COHERENT Collaboration is planning to redeploy the CENNS-10 detector hardware as a new subsystem called MicroCLEAR, using liquid neon instead of liquid argon as a target. Prior to pursuing a CEνNS cross section measurement, MicroCLEAR will be recommissioned at the Triangle Universities Nuclear Laboratory to re-evaluate the energy dependence of the quenching factor. Previously, a single measurement was produced by members of the DEAP/CLEAN Collaboration in 2012 using the MicroCLEAN detector. Moreover, recent theoretical work by Sarkis et al. has improved the behaviour of quenching at low energies to account for physical effects in this limit. In this contribution, we apply this new recipe to neon and find reasonable agreement with existing calculations by Mei et al. Additionally, we have calculated optical model properties of liquid neon to enable a more robust modelling of the detector response.

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