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Spin Dependent Sensitivity Projection for QUEST-DMC

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QUEST-DMC is a dark matter direct detection experiment aiming for world-leading sensitivity to interactions with sub-GeV mass dark matter. The experiment is comprised of a superfluid helium-3 bolometer equipped with a NEMS acting as our detector and a SQUID readout system. A Geant4 model of the detector and surrounding cryostat has been developed to simulate the background energy deposits in the detector volume. These simulations are normalised using ambient gamma spectra measured in situ with a NaI(Tl) detector, along with additional material assay data provided by the Boulby Underground Laboratory. This poster outlines the Geant4 modelling and Monte Carlo simulation of background within this bolometer system and the surrounding cryostat, and discusses the use of this background simulation along with sub mK prototype bolometer data to identify the current sensitivity limit for QUEST-DMC.

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