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R&D Towards Next Generation Dark Matter Experiment at Boulby

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Rare event experiments, such as those targeting dark matter interactions and neutrinoless double beta decay ($0\nu\beta\beta$), should be shielded from ɣ-rays originating in rock. This poster presents the simulation of gamma-ray transport through water shielding and assessment of the water thickness needed to suppress the background from rock down to a negligible level. The simulation studies the effectiveness of water shielding around a detector, focusing on the Weakly Interacting Massive Particle (WIMP) energy range (0 −20 keV) and the region of interest (ROI) around the $0\nu\beta\beta$ Q-value (2.458 MeV). This poster also presents the measurements of radioactivity of rock in the Boulby mine that is a potential site for a future dark matter experiment. The measurements are used to normalise simulation results in assessing the required shielding at Boulby.

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