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In Situ Optical Calibration of MiniCLEAN

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The MiniCLEAN dark matter experiment will exploit a single-phase liquid-argon detector instrumented with 92 photomultiplier tubes placed in the cryogen temperature with $4\text{-}\pi$ coverage of a 500 kg (150 kg) target (fiducial) mass. The detector design strategy emphasizes scalability to target masses of order 10 tons or more. The detector is designed also for a liquid-neon target that allows for an independent verification of signal and background and a test of the expected dependence of the WIMP-nucleus interaction rate. For MiniCLEAN, PMT stability and calibration are essential. The optical calibration will be able monitor the PMT stability and maintain the calibration. In MiniCLEAN, we use a Light-Emitting Diode(LED)-based light injection system to provide single photons for calibration, the calibration can be performed in near real-time, providing a continuous monitor at the condition of the detector.

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