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Photomultiplier tube characterization for MiniCLEAN STEPHEN JADITZ, LANL/MIT, MINICLEAN COLLABORATION — MiniCLEAN is a single-phase dark matter experiment which uses liquid argon (87 K) or neon (27 K) as an active medium. Photomultiplier tubes (PMTs) submerged in the cryogen detect light emitted by tetraphenyl butadiene, which fluoresces at short optical wavelengths when excited by the primary ultraviolet scintillation of the argon or neon. The collaboration has chosen to use 8" Hamamatsu R5912-02MOD PMTs, the low-temperature successor of the R1408-R5912 lineage. The bialkali photocathode of the R5912-02MOD has a platinum underlay which increases electron mobility, enabling operation at temperatures lower than 150 K where traditional bialkali cathodes fail. The number of dynodes in the tube has also been increased to 14, which lowers the bias required to attain reasonable gain and saves heat load in the voltage divider chain of the base. This talk describes characterization of the tube and base for use in MiniCLEAN. I present gain and dark rate measurements as a function of temperature, considerations that inform the base design, and implications of using this tube in a low-background experiment.

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