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【384】Studies of a magnesium fluoride (MgF2) photomultiplier tube for direct observation of liquid argon scintillation light

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GERDA searches for neutrinoless double-beta decay of Ge76. The liquid argon (LAr) filled cryostat containing the enriched germanium detectors is instrumented with photomultiplier tubes (PMTs) to detect LAr scintillation light, thereby vetoing background events. Currently employed PMTs are not directly sensitive to this wavelength: instead it is shifted to their sensitive region using wavelength shifters. A new Hamamatsu PMT type with a MgF2 window is transparent to this wavelength without shifters, potentially allowing material reduction, vital for low-background experiments. We present measurements of one such PMT, including gain, dark current, and afterpulse rate (at room temperature and cooled with nitrogen), with respect to long-term tests in nitrogen and LAr.

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