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Light-yield results of 1 liter liquid argon scintillation detector based on Silicon Photo Multipliers operating at cryogenic temperature

We present the results obtained with a liquid argon scintillation detector with light read-out completely based on SiPM. We used a 1 liter PTFE chamber observed by an array of 7 large area SiPMs (Hamamatsu S11828-3344M) covering about the 4% of the internal surface. The chamber is lined with a reflective foil (3M VIKUITI) evaporated with a wavelength shifter (TetraPhenyl Butadiene). This solution allows to convert the UV photons to the visible band, thus matching the SiPM sensitivity window while maximizing light collection. The measured light-yield is comparable with the highest light-yield values obtained in similar conditions using standard 3" cryogenic PMT's (Hamamatsu R11065) for a 3 times higher photo-cathodic coverage. The present result, combined with the other well known intrinsic SiPM advantages (compact design, contained costs, low bias voltage, ...) represents a step forward in the confirmation of the SiPM technology as a real alternative to standard PMT-based read-out systems for application in cryogenic noble liquid detectors.

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