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A novel use of light guides and wavelength shifting plates for the detection of scintillation photons in large liquid argon detectors

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1 A Novel Use of Light Guides and Wavelength Shifting
2 Plates for the Detection of Scintillation Photons in
3 Large Liquid Argon Detectors

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8 **Abstract**

9 Scintillation light generated as charged particles traverse large liquid argon de-
10 tectors adds valuable information to studies of weakly-interacting particles. This
11 paper uses both laboratory measurements and cosmic ray data from the Blanche
12 dewar facility at Fermilab to characterize the efficiency of the photon detector
13 technology developed at Indiana University for the single phase far detector of
14 DUNE. The efficiency of this technology was found to be 0.48% at the readout
15 end when the detector components were characterized with laboratory mea-
16 surements. A second determination of the efficiency using cosmic ray tracks is
17 in reasonable agreement with the laboratory determination. The agreement of
18 these two efficiency determinations supports the result that minimum ionizing
19 muons generate $\mathcal{N}_{phot} = 40,000$ photons/MeV as they cross the LAr volume.

20 *Keywords:*

21 liquid argon scintillation, neutrino detectors, photon detection

22

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