

# Design and test of the lens based optical detector for SAND in the DUNE experiment

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This work focuses on the development and testing of prototypes for a novel optical detector designed for the GRAIN within the SAND detector. One of the two possibilities for the optical system is a two-lens focusing system composed of plano-convex lenses enclosing gas, paired with a  $32 \times 32$  Silicon PhotoMultiplier (SiPM) array. This configuration allows for the efficient transmission and focusing of vacuum ultraviolet (VUV) scintillation light from Liquid Argon onto the SiPM plane. The goal of the tests was to calibrate the acquisition board using an artificial light source and evaluate detector performance.

The readout of SiPM matrices requires a multi-channel mixed-signal ASIC, while the back-end electronics is implemented using Field Programmable Gate Arrays (FPGAs). In this context, I contributed to the design of a dedicated ASIC for the  $32 \times 32$  SiPM readout system. A Monte Carlo simulation analysis was performed to validate the proposed ASIC design, ensuring compatibility and performance optimization for the GRAIN detector setup.

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