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Light Detection System for the DUNE Near Detector

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The Deep Underground Neutrino Experiment (DUNE) is an international long-baseline accelerator neutrino experiment hosted in the US. DUNE is currently under construction and will consist of two neutrino detectors: the Near Detector at Fermilab and the Far Detector in the Sanford Underground Research Facility, 1300 km downstream of the beam source. The Near Detector (ND) will sample the beam near the source and, like the Far Detector, will feature liquid argon (LAr) Time Projection Chamber (TPC) technology to resolve neutrino interactions in detail. These interactions produce scintillation light in the TPC volume which is registered by the Light Detection System (LDS). The LDS provides fast light information with a good spatial resolution that is essential to overcoming the high event pile-up expected in this TPC. It is based on dielectric light traps and a silicon photomultiplier readout. Two light detection approaches are employed in the ND-LAr TPC – ArCLight and Light Collection Module (LCM). Four prototypes of ND-LAr TPC were tested with cosmic rays at the University of Bern. The performance of the LDS is presented using the test results from the Bern data.

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