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Increasing the efficiency of photon collection in LArTPCs: the ARAPUCA light trap

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The Liquid Argon Time Projection Chambers (LArTPCs) are the best choice for the next generation of large neutrino detectors due to their optimal performance in particle tracking and calorimetry. The detection of Ar scintillation light plays a crucial role in the event reconstruction as well as time reference for nonbeam physics such as supernovae neutrinos detection and baryon number violation studies. In this contribution, we present the current R&D work on the so called ARAPUCA, a light trap device to enhance Ar scintillation light collection and thus the overall performance of LArTPCs. The ARAPUCA working principle is based on a suitable combination of dichroic filters and wavelength shifters to achieve a high efficiency in light collection. We discuss the operational principles, the last results of laboratory tests and the application of the ARAPUCA as the alternative photon detection system in the protoDUNE detector.

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