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Liquid argon test of the ARAPUCA device at the National Laboratory of Synchrotron Light in Campinas (São Paulo)

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The ARAPUCA is a new concept for liquid argon scintillation detection, particularly suited for large liquid argon time projection chambers. It is constituted by a combination of a passive light collector and photo-sensitive silicon devices, which will allow to improve the detection efficiency of actual devices by an order of magnitude. The basic idea is to trap photons inside a box whose internal surface has an extremely high reflectivity and which is observed by silicon devices (SiPM), so that the detection efficiency is high even with a small active coverage of the internal surfaces. The photon trapping is obtained with a smart combination of a short-pass dichroic filter and two different wavelength shifters, one of each side of the filter, which represents the acceptance window of the ARAPUCA. We will report of the first liquid argon test of the device in Brazil - at the National Laboratory of Synchrotron Light in Campinas (Sao Paulo) - which, to our knowledge, is the first liquid argon experiment in Latin America ever done up to now. The device was exposed to an alpha source of known energy so that it was possible to estimate its detection efficiency. The results were excellent and in perfect agreement with Monte Carlo predictions.

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