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Study of wavelength-shifting plates for the outer detector Hyper-Kamiokande

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Hyper-Kamiokande is a new generation of 260 kiloton water Cherenkov detector, construction of which began in 2020. One of the main goals is to search for CP symmetry violation in neutrino oscillations. Hyper-Kamiokande is divided into internal and outer detectors, which are equipped with photomultiplier tubes (PMT). The outer detector (OD) is used as a veto system for incoming charged particles, mainly muons. In OD, Cherenkov radiation is detected by photomultipliers with a diameter of 8 cm and wavelength-shifting (WLS) plates, which cover the “dead” space between the photomultipliers and thereby increase the light collection area of OD and increase the efficiency of detecting background events. In total, it is planned to use about 3600 photomultipliers in combination with WLS plates in the Hyper-Kamiokande outer detector. Light from Cherenkov radiation will hit the plates, be absorbed and then re-emitted in accordance with the relationship between the emission and absorption spectra of the material used. The report will present the results of a study of parameters of WLS plates and a method for quick tests and control their quality.

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