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PMT/WLS plate optical modules for Cherenkov detectors

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Optical modules which consist of photomultipliers and wavelength shifting (WLS) plates are considered as photosensors for water Cherenkov detectors. A WLS plate absorbs Cherenkov light and reemits it at longer wavelengths. The reemitted light is then detected by a PMT. Such an optical module allows to increase the efficiency of the Cherenkov light detection by a factor of 2 . This report will describe the design of modules, optimization of the concentration of WLS dopants, and present the results of measurements of parameters of WLS plates and PMTs, including the light yield, efficiency, and dark rate. Selection of a reflector will be also discussed, as as well the study of plates aging using high temperature tests.

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