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(G*) Water Monitoring System for Water Cherenkov Detectors

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The Super-Kamiokande (SuperK) and Hyper-Kamiokande (HyperK) water Cherenkov detectors for particle and astroparticles consist of photomultiplier tubes (PMTs) that detect Cherenkov light surrounding a large ultra-pure water tank (40m and 70m diameter, respectively).

Water quality is critical because it ensures good water transparency and, as a result, a long Cherenkov light attenuation length compared to detector size. In this case, even charged particles with low energies that produce few photons can be detected efficiently.

When compared to standard water sampling tests, optical measurement has the advantage of monitoring water quality constantly. Thus, by measuring light transmission after passing through a 10m sample of water, one can gain insight into potential contamination sources through time-correlating water quality changes with environmental change.

TRIUMF is developing a high-sensitivity optical water monitoring system that can continuously monitor water quality for the HyperK detector. This system will also be used for a water Cherenkov test experiment (WCTE) at CERN in early 2024, for which we will develop an operation and calibration procedure, as well as analysis tools.

During this talk, I will present the schematics of the water monitoring detector, the work done to build the prototype detector and the optical study of this system.

Keyword-1

water monitor

Keyword-2

Cherenkov light

Keyword-3

light transmission

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