

Research Result Report

ICRR Inter-University Research Program 2025

Research Subject: Water Transparency Measurement in Super Kamiokande

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Summary of Research Result :

- Maintenance and operation of the laser calibration system

Our group is responsible for the operation and maintenance of the laser calibration system used to monitor the water quality of Super-Kamiokande (Super-K). The automated laser system continuously measures the temporal variation of water transparency, and its performance and measurement results have been regularly presented at Super-K steering, calibration, and collaboration meetings.

- Monitoring results of water quality of SuperK in Apr. 2025~Mar. 2026

The water quality is monitoring by analyzing the scattered light of vertical light injectors installed in top and bottom of SuperK tank. During the SK-VIII phase, the water transparency of the detector has been maintained very stably, and the results are consistent with measurements obtained using muons as well as with those measured by other calibration systems. We confirmed that the improvement of water transparency after water convection through our laser system and this trend using a parameter developed by our group that is specifically sensitive to absorption as well.

- Position dependent measurement of water quality

Currently, attenuation length is being measured by vertical light injector. Our group aims to confirm the z-dependent result of water quality by utilizing 5 horizontal injectors installed evenly spaced interval along the barrel of SuperK tank. Using our current analysis method, we have confirmed through pseudo data studies that the z-dependence of the SK water quality can be sufficiently evaluated. We are now analyzing data from the horizontal injector system, and the results will be reported to the group in the near future.

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