Research Report
ICRR Inter-University Research Program 2021

Research Subject:

Operation and maintenance of laser light injector to measure light scattering probability with the Super-Kamiokande detector

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Summary of Research Result :

The laser calibration system has 5 laser wavelengths to measure the attenuation of the purified water inside the Super-Kamiokande detector.

After Gd loading, we are monitoring water quality using 4 wavelengths of laser (337, 375, 405 and 445 nm). The water quality has been stable since 2021 Jan.

To calculate the light scattering probability of SK6 period, Monte-Carlo data for laser calibration system was used and compared with real-time data. A Monte-Carlo sample uses a combination of three water transparency parameters, absorption, symmetric and asymmetric. We found a set of parameters which give the best fit between Monte-Carlo and data using chi-square method. These values are important property of purified water in the Super-Kamiokande detector simulation tuning.

- Preliminary water transparencies of SK6 period

Wavelength [nm]	Transparency [m]
337	59.74
375	95.19
405	123.15

445	118.32
473	77.06

While the water parameters up to 473nm can be measured by the Korean laser system, we use Pope/Fry measurements of water parameters over 473nm.

No.