

Research Result Report

ICRR Inter-University Research Program 2023

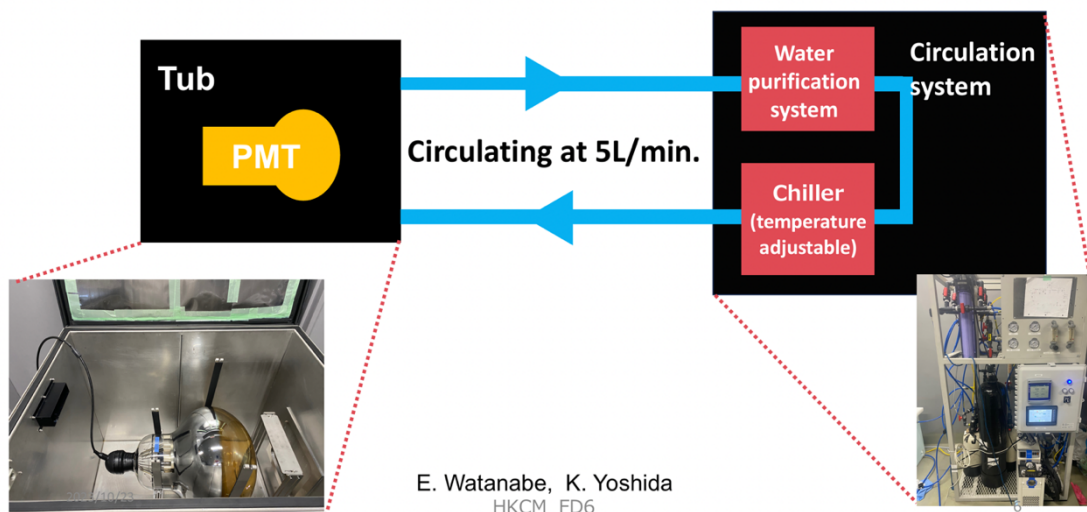
Research Subject: Water Purification System R&D for Precision Neutrino Detectors

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Participating Researchers: Yasuhiro Nakajima (University of Tokyo)

Summary of Research Result :

The >300 L/hr Gd-compatible water purification system was delivered in FY2022. It been continuously operating stably for about 8 months now, delivering temperature-controlled ultra-pure water to the Hyper-K PMT test experiment in a dark tub, shown in the figure below. So far, preliminary measurements of the temperature dependence of the dark rate and gain have been measured between 13.7 – 24.7 °C. This experiment will continue in the next fiscal year for improving the accuracy of the measurements and also to study the PMT light yield/quantum efficiency.



The successful long-term operation of this system has given confidence in the similar design for the WCTE system, which has proceeded to manufacturing for delivery to CERN this year.

Automatic emergency shutdown in case of a leak was successfully tested. Remote monitoring and shutdown is still being implemented (delayed due to hardware connection issues), to allow more reliable unattended operation.

Black sheet material candidates for the WCTE (and IWCD) were soak tested by a visiting scientist from IBS using this system and the spectrophotometer. Soak testing and cleaning with water circulation of more detector liner materials will continue in the next fiscal year.

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