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Research Result Report
ICRR Inter-University Research Program 2024

Research Subject: Data Taking, Calibrations, Measurements and Analysis with Super-Kamiokande I-VII

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Participating Researchers:

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Summary of Research Result :

The aim of the project was a collaborative work –between UAM members and ICRR colleagues– to get out the most of the Super-Kamiokande (Super-K) experiment, SuperK-Gd and the preparation for the next generation Hyper-Kamiokande (Hyper-K) during the JFY2024. We have contributed to various aspects:

Calibration and related works: The team members have been continuously involved in evaluating the performance evolution of the Super-K detector using autoXenon and Nickel data. Details of the calibration work are explained in 2024i-B-002. Regarding to NiCf events generation with KG4, we have generated NiCf events for SKV, SKVI and SKVII and have been made comparisons of vertex reconstruction, N50 and bsenergy.

UDEAL: we maintained and monitored daily measurements of water transparency at various wavelengths in the EGADS demonstrator using the UDEAL system throughout half of the JFY2024.

Physics analysis: significant efforts have been dedicated to key analyses in Super-K, particularly the search for the Diffuse Supernova Neutrino Background (DSNB). We have been working on NCQE analysis, a critical background source for DSNB. A new neutron tagging algorithm has been implemented for SKVI and is being applied to SKVII. As part of this effort, comparisons of NEUT versions 5.4.0.1, 5.6.4, and 5.9.0 have been conducted for SKVI and SKVII.

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Additionally, Super-K faced serious incidents with its geomagnetic compensation system, and we actively contributed to and participated in the repair work during August 2024

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