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Optimization of neutron tagging for DSNB search in SK-Gd

For the detection of diffuse supernova neutrino background (DSNB), the SK-Gd experiment had been started with 0.01% gadolinium (Gd) concentration (SK-VI) since August 2020, and then the concentration was increased to 0.03% (SK-VII) in July 2022. We achieved the anti-electron neutrino sensitivity by detecting the total 8MeV gamma from Gd neutron capture.
We also developed a neural network (NN) that selects the neutron capture events and rejects the BG events effectively. In this study, we evaluated the neutron capture efficiency in both SK-VI and SK-VII using the NN, and obtained higher capture efficiency than the conventional method with low BG contamination. Using this NN, we have performed the first DSNB search analysis with SK-VII data and will show the results.

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