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## **The observation of gamma rays after neutral current interactions at Super-Kamiokande by using the T2K neutrino beam**

We report the first measurement of the neutral current quasi-elastic (NCQE) cross section on oxygen by observing nuclear de-excitation gamma rays with the T2K neutrino beam. These interactions from atmospheric neutrinos are one of the main backgrounds in supernova relic neutrino searches. These gamma rays are observed in the Super-Kamiokande (SuperK) water Cherenkov detector. We select candidate events by using the T2K beam timing, dramatically reducing the background of natural radioactivity. We observed 43 events in the 4-30 MeV reconstructed energy region, compared with the MC prediction 55.7 with an estimated NCQE signal efficiency of about 70%. We observed an NCQE cross section of  $1.35 \times 10^{-38} \text{cm}^2$  with a 68% confidence interval of  $(1.06, 1.94) \times 10^{-38} \text{cm}^2$ .

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