

# First Measurement of Atmospheric Neutrino Neutral-Current Quasi-Elastic Interactions for Supernova Relic Neutrino Search at Super-Kamiokande

Neutrinos emitted from past core-collapse supernovae are called supernova relic neutrinos (SRN), or diffused supernova neutrino backgrounds (DSNB). The electronics and triggering in Super-Kamiokande-IV (SK-IV) enables tagging inverse beta decay interactions from SRN by neutrons captured on hydrogen. Neutral current quasi-elastic (NCQE) scattering of atmospheric neutrinos on  $^{16}\text{O}$  in SK forms an important remaining background with neutron in SRN detection. Recently, the use of vertex reconstruction of the 2.2 MeV photons from the neutron captures and a neural network improved the discrimination against backgrounds and significantly increased tagging efficiency, allowing for a measurement of NCQE events from atmospheric neutrinos. For the first time, the NCQE cross section of atmospheric neutrinos has been measured with neutron tagging technique, using the data set of 2,778 days live-time in SK-IV. This result will be presented and compared against theoretical predictions.

## Authorship annotation

for the Super-Kamiokande collaboration

## Session and Location

Wednesday Session, Poster Wall #2 (Robert-Schumann-Room)

## Poster included in proceedings:

yes

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**Track Classification:** Poster (participating in poster prize competition)