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Measurement of gamma-rays from neutron-oxygen reaction for neutrino-nucleus interaction

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Precise knowledge of the neutrino neutral current quasielastic interaction cross section is important for several physics searches at Super-Kamiokande. For example, it is necessary to understand the background accurately in searches for supernova relic neutrinos and dark matter. At the T2K experiment the cross section has been measured but systematic errors are large. This is because neutrino interactions often produce nucleons whose subsequent gamma-ray production on oxygen is currently not well understood. Super-K and T2K must rely on models based on little data. In order to improve these models, measurements of gamma-ray production with a quasi-mono energetic neutron beam and water target have started at Osaka University's Research Center for Nuclear Physics. Gamma-ray measurements were made with a germanium detector and a LaBr₃(Ce) scintillator. In addition, the neutron flux was measured in order to estimate the gamma-ray production cross section. So far three experiments have been carried out with 80 MeV and 392 MeV (kinetic energy) neutrons, and 6.13 MeV gamma-rays were observed that are not currently modeled well in Super-K simulations. In this talk, these measurements and gamma-ray production cross section results will be presented.

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