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Results for the Cross Section of the Reaction ^{12}C(n,n'γ)^{12}C* (4.44 MeV) at E_n = 6.20 and 6.34 MeV using Gamma Ray Detection[1] M.F. KIDD, J.H. ESTERLINE, B. FALLIN, A. HUTCHESON, A.P. TONCHEV, W. TORNOW, Duke University and TUNL, J.H. KELLEY, North Carolina State University and TUNL — The $\bar{\nu}$ energy spectrum measured by KamLAND is contaminated with background events which are a result of the neutrons from the ^{13}C(α,n)^{16}O reaction. Because the energy range of these neutrons reaches E_n = 7.3 MeV, the inelastic scattering off ^{12}C to the 2^+ first excited state at 4.44 MeV can occur in the liquid scintillator for E_n exceeding 4.85 MeV. The neutron from the inelastic scattering is indistinguishable from the neutron of interest in the anti-neutrino detection process $\bar{\nu}$ + p $\rightarrow$ e^+ + n, and the subsequent γ from the deexcitation mimics the positron. Using the Shielded Neutron Source at TUNL with a gamma ray detection setup, we have measured the differential gamma-ray production cross section for this reaction. Clover detectors were placed 62°, 90°, and 135° from the incident pulsed neutron beam direction at distances of 9.75 cm, 5.7 cm, and 9.2 cm respectively from a 0.75" diameter by 1.0" high graphite cylinder. The differential cross section was measured at neutron energies of 6.20 and 6.34 MeV with an energy spread of 0.14 MeV.

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