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Precision (n,γ) cross-section measurement of Cu at 8 and 12 MeV for shielding designs for the next generation of 0$\nu\beta\beta$ decay experiments. M. ANTONACCI, St. Vincent, A. CHYZH, N.C. State Univ., J.H. ESTERLINE, Duke Univ., S. ELLIOT, LANL, B. FALLIN, Duke Univ., A. HIME, LANL, C.R. HOWELL, A HUTCHESON, Duke Univ., H.J. KARWOWSKI, Univ. of N.C., J.H. KELLEY, N.C. State Univ., M.F. KIDD, Duke Univ., D. MEI, LANL, B. SPAUN, Whitworth, A.P. TONCHEV, W. TORNOW, Duke Univ., MAJORANA COLLABORATION — Renewed interest in observing 0$\nu\beta\beta$ decay reactions has sparked efforts to experimentally verify the existence of such decays, and produce new physics beyond the Standard Model. These reactions, with half-lives around 10^{27} years, require an extensive understanding of background sources. The potential for neutron induced excitation of the shielding and detector materials is important for understanding and designing future 0$\nu\beta\beta$ decay experiments. Gamma transitions at 2041, 2615, and 3062 keV directly obscure 0$\nu\beta\beta$ decay detection of ^{76}Ge at 2040 keV. Due to lack of experimental information in the nuclear database, high-resolution γ-ray spectra from the interaction of mono-energetic and pulsed neutrons were measured at TUNL. The emitted gamma rays were detected with 3 HPGe segmented clover detectors at 62°, 90°, and 135°. From these data, partial cross-sections for prominent γ transitions in ^{63,65}Cu were derived at En=8 and 12 MeV. This experimental information will also help to understand the existing 0$\nu\beta\beta$ data and serve as a benchmark for statistical model calculations. Supported in part by DOE grant DE-FG02-97ER41033 and NSF grant NSF-PHY-05-52723.

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