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Neutron background studies and results from the Cryogenic Dark Matter Search RAUL HENNINGS-YEOMANS, Case Western Reserve University, THE CRYOGENIC DARK MATTER SEARCH (CDMS II) COLLABORATION — Non-baryonic dark matter makes one quarter of the energy density of the Universe. The Weakly Interacting Massive Particle (WIMP) is a dark matter candidate with a scattering cross section with an atomic nucleus of the order of the weak interaction and a mass comparable to that of an atomic nucleus. Results of the two tower run from the Cryogenic Dark Matter Search (CDMS II), consisting of a total exposure of 34 kg-d for germanium and 12 kg-d for silicon, at the Soudan Underground Laboratory are presented. Also we present studies of the neutron background relevant for our upcoming 10-fold more sensitive 5-tower run, as well as for other experiments in search of dark matter. During the two-tower run, no nuclear-recoil events exceeding expected background were observed for a WIMP mass of 60 GeV/c^2. The limit from Ge (Si) is a factor of 2.5 (10) lower than previous results, allowing to set further constraints on the predictions of supersymetric models. Our further studies of the muon-induced neutron background based on Monte Carlo simulations show that by replacing part of the outer polyethylene of the CDMS II shield by a neutron multiplicity meter, for example by Gd-loaded liquid scintillator (0.5% gadolinium content) with a PMT read out would allow us to better predict the absolute number of unvetoed nuclear recoils compared with present methods which rely on multiple nuclear recoil events.

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