Contribution ID: **140** Type: **Poster**

Cosmogenic activation of TeO2 in the neutrinoless double-beta decay experiment CUORE

Wednesday, September 11, 2013 7:30 PM (2h 30m)

The Cryogenic Underground Observatory for Rare Events (CUORE) is an experiment that will search for the neutrinoless double-beta ($0\nu\beta\beta$) decay of 130Te. The CUORE detector, currently being constructed underground at the Gran Sasso National Laboratory in Italy, is an array of 988 high-resolution, low-background cryogenic bolometers. Each bolometer is comprised of a thermal sensor and a TeO2 crystal that serves as both a source and a detector of $0\nu\beta\beta$ decay. The $0\nu\beta\beta$ decay signature for 130Te is a peak at the Q-value 2528 keV. Observation of $0\nu\beta\beta$ decay requires that the background rate at the peak be ultra-low; CUORE is aiming for a rate less than 0.01 counts/keV/kg/y. Background-source identification and characterization are therefore extremely important.

One source of background that is poorly characterized is activation of the TeO2 crystals by sea-level cosmic-ray neutrons. This process, known as cosmogenic activation, produces long-lived radioisotopes that can obscure the $0\nu\beta\beta$ decay peak. Existing cross-section data is insufficient to estimate this background; therefore an additional cross-section measurement has been performed in which a TeO2 target is irradiated with a neutron spectrum similar to that of cosmic-ray neutrons at sea-level. The cross-sections obtained have been combined with Monte Carlo simulations of the CUORE detector to estimate the cosmogenic activation background that will be present in CUORE.

This work is supported by the U.S. Dept of Energy, Office of Defense Nuclear Nonproliferation (NA-22), LLNL under Contract DE-AC52-07NA27344, LBNL under Contract DE-AC02-05CH11231, and the Nuclear Forensics Graduate Fellowship from the U.S. Dept of Homeland Security under Grant Award Number 2012-DN-130-NF0001-02 (The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the US Dept of Homeland Security).

Primary author: WANG, Barbara (University of California, Berkeley)

Co-authors: Dr SMITH, Alan (Lawrence Berkeley National Laboratory); Dr NORMAN, Eric (University of California, Berkeley); THOMAS, Keenan (University of California, Berkeley); Dr PEDRETTI, Marisa (Lawrence Livermore National Laboratory); Dr SCIELZO, Nicholas (Lawrence Livermore National Laboratory); Dr WENDER, Stephen (Los Alamos National Laboratory)

Presenter: WANG, Barbara (University of California, Berkeley)

Session Classification: Poster Session

Track Classification: Double Beta Decay