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Quest for Neutrinoless Double Beta Decay of ^{130}Te with the CUORE Detector THOMAS O'DONNELL, Physics Department, University of California Berkeley and Nuclear Science Division, Lawrence Berkeley National Lab, CUORE COLLABORATION — The CUORE experiment, in the advanced stages of construction at Laboratori Nazionali del Gran Sasso (LNGS), aims to search for $0\nu\beta\beta$ decay of ^{130}Te with unprecedented sensitivity: $T_{1/2}^{0\nu} = 9.5 \times 10^{25}$ yr at 90% C.L. The detector will consist of 19 towers, each comprising 13 planes of four, 125 cm^3 , cubic TeO_2 crystals. This amounts to a total mass of 206 kg of ^{130}Te . When cooled to an operating temperature of ~ 10 mK such crystals function as highly sensitive bolometers with energy resolution better than 5 keV demonstrated near the $0\nu\beta\beta$ decay Q-value (2527.518 ± 0.013 keV). In this talk I will describe the expected reach of CUORE considering the rigorous cleaning, materials handling, and ultra-pure assembly techniques developed by the collaboration. I will also report on the status of CUORE-0, a single CUORE-like tower where many of these background mitigation techniques were deployed during assembly. CUORE-0 represents a new $0\nu\beta\beta$ experiment which is already operating at LNGS and will surpass the sensitivity of the previous generation experiment (Cuoricino) before CUORE begins operating.

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