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Extreme Cold and the Slowest Process Ever Measured

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Why is there something instead of nothing? How did the Universe come to be dominated by matter over anti-matter? This is the question of the baryon asymmetry of the Universe, and it is one of the great unanswered questions in modern physics. Can neutrinos — the most elusive particles in the Standard Model — shed any light on this question? CUORE is a ton scale bolometric detector operating a mile underground in Gran Sasso, Italy, searching for a process called Neutrinoless Double-Beta Decay. If observed, this would give concrete evidence that the neutrino is its own anti-particle — unique amongst the fermions in the Standard Model — and open the possibility that neutrinos played a role in the dominance of matter in our Universe. In this talk, I will give a brief outline of the physics involved in the CUORE experiment, and summarize the achievements made during the first phase of CUORE, called CUORE-0.