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Probing the Mystery of Neutrino Mass with CUORE LARISSA EJZAK, University of Wisconsin-Madison, CUORE COLLABORATION — Understanding the nature of neutrino masses will require physics beyond the long-standing Standard Model of particle physics. CUORE, the Cryogenic Underground Observatory for Rare Events, will be a next-generation experiment at Gran Sasso National Laboratory investigating neutrino masses through the mechanism of double beta decay. It will operate on the principle of bolometric calorimetry; the detector will consist of an array of 988 TeO_2 crystals with a total mass of 207 kg of ^{130}Te , maintained at 10 mK. CUORE's particular focus is the search for neutrinoless double beta decay, which, if observed, would indicate that neutrinos have Majorana masses – meaning that they are their own antiparticles, and in turn implying that lepton number, which so far has appeared to be a good symmetry of the Standard Model, is violated. CUORE will also be able to place improved limits on the absolute neutrino mass scale and possibly to determine the mass hierarchy of the three neutrino mass eigenstates. We will discuss the status of the CUORE project and present the latest results from CUORICINO, a prototype experiment currently running at Gran Sasso.

Larissa Ejzak
University of Wisconsin-Madison

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