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Unlocking Neutrinoless Double-Beta Decay through Radon Deposition ANDREW DUNTON, University of South Carolina, MAJORANA COLLABORATION — In our universe, there is a preponderance of matter over antimatter. Neutrinoless double-beta decay would serve as a potential mechanism by which this phenomenon, called the asymmetry of matter and antimatter, occurs. In a single beta decay, a proton decays into a neutron and releases a beta particle (electron) and an electron neutrino. In a theoretical double-beta decay, two protons would decay, and two electrons would be released, but no neutrinos would be detected. This would mean the electron neutrino is its own antiparticle, a Majorana particle. In order to observe this phenomenon, one requires a large collection of nucleons prone to beta decay far away from any potential sources of interference. Thus, the MAJORANA experiment consists of 40kg of Germanium buried undergrounded and encased in lead shielding. One of the potential background interference sources is alpha radiation from radon gas, which permeates the earth and air around us. Its interference levels in the first trial runs of the experiment were much higher than expected, and so reducing radon's presence has become a priority. In order to do this, we must understand how it attaches itself to various materials and in various conditions, and how best to remove it.

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