



# PHYSICS AND ASTRONOMY COLLOQUIUM

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## “EXO & the Quest for Majorana Neutrino Masses”

### Abstract

With the definitive evidence for neutrino oscillations collected in the last decade, we now believe that neutrino masses are non-zero. Oscillation measurements, however, only measure mass differences and give us little information about the absolute values of neutrino masses. The hypothetical phenomenon of neutrino-less double-beta decay can probe the neutrino mass scale with exquisite sensitivity. This process, if observed, would also imply that neutrinos, unlike all other spin-1/2 particles, have only two component wave functions and that lepton number is not a conserved quantity. Following the well known principle that there is no free lunch in life, interesting half-lives for neutrino-less double-beta decay exceed  $10^{25}$  years (or  $\sim 10^{15}$  times the age of the Universe) making experiments rather challenging. I will describe the EXO program that is developing the tools to search for this rare