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Progress towards barium daughter tagging in Xe^{136} decay using single molecule fluorescence imaging AUSTIN MCDONALD, Univ of Texas, Arlington, NEXT COLLABORATION — The existence of Majorana fermions is of great interest as it may be related to the asymmetry between matter and anti-matter particles in the universe. However, the search for them has proven to be a difficult one. Neutrino-less Double Beta decay (NLDB) offers a possible opportunity for direct observation of a Majorana Fermion. The rate for NLDB decay may be as low as ≈ 1 $count/ton/year$ if the mass ordering is inverted. Current detector technologies have background rates between 4 to 300 $count/ton/year/ROI$ at the 100kg scale which is much larger than the universal goal of 0.1 $count/ton/year/ROI$ desired for ton-scale detectors. The premise of my research is to develop new detector technologies that will allow for a background-free experiment. My current work is to develop a sensor that will tag the daughter ion Ba^{++} from the Xe^{136} decay. The development of a sensor that is sensitive to single barium ion detection based on the single molecule fluorescence imaging technique is the major focus of this work. If successful, this could provide a path to a background-free experiment.

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