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Barium Tagging in Solid Xenon for the nEXO Experiment CHRISTOPHER CHAMBERS, ADAM CRAYCRAFT, TIMOTHY WALTON[1], WILLIAM FAIRBANK, Colorado State University, NEXO COLLABORATION — The proposed nEXO experiment utilizes a tonne-scale liquid xenon time projection chamber to search for neutrinoless double beta decay in xenon-136. Positive observation of this decay would determine the nature of the neutrino to be a Majorana particle, as well as measure the absolute neutrino mass scale. A critical concern for any rare decay search is reducing or eliminating backgrounds that cannot be distinguished from signal. A powerful background discrimination technique is positive identification of the daughter atom of the decay, in this case barium. This technique, called "barium tagging" may be available for a second phase of nEXO operation, allowing for neutrino mass sensitivity beyond the inverted mass hierarchy. Development is underway on a scheme to capture the barium daughter in solid xenon with a cryogenic probe and detect the barium by laser-induced fluorescence inside the solid xenon sample. This presentation reports results on imaging of single barium atoms frozen in a solid xenon matrix, as well as the progress on the freezing and removal of a solid xenon sample from liquid xenon.

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