

Barium Tagging for EXO

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In order to perform a background-free measurement of neutrinoless double-beta decay in xenon, the EXO collaboration is developing several techniques to recover and identify the barium daughter nucleus. Resonance Ionization Spectroscopy (RIS) has been shown to be both efficient and selective, both favorable aspects for a barium-tagging system. We have constructed a test setup for extracting barium ions from liquid xenon using RIS. Barium daughter ions adsorb as neutral atoms on a metallic surface, which we remove to a separate vacuum chamber for identification. These atoms are thermally desorbed from the surface into vacuum using an infrared laser, then re-ionized by RIS and drifted down a time of flight spectrometer. This system offers both optical spectroscopic and mass spectroscopic confirmation of the barium daughter.

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