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# Linear Paul Trap for Ba-tagging (nEXO)

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nEXO aims to search for neutrinoless double-beta decay of Xe-136. Detection of such an event significantly improves our understanding of the nature of the elusive neutrinos, showing that they are Majorana particles (their own antiparticle). Additionally, this would mean the violation of lepton number conservation, opening new avenues for physics beyond the Standard model. To facilitate this, nEXO aims to implement Ba-tagging for explicit detection of Ba-136 ions present in the detector volume resulting from the double beta of Xe-136 as a potential future upgrade. Ions traps are of great importance in particle physics research for filtering, cooling, channeling and detection of charged particles. The Nobel prize winning Paul Ion Trap uses rapidly oscillating electric fields for ion confinement. The Linear Paul Trap, to be used in Ba-tagging uses quadrupole electrodes for applying hyperbolic potential for radial confinement and axial DC field at the end for trapping. The stream of particles being injected will be filtered by passing them through the first section which is a quadrupole mass filter based on the charge to mass ratio of expected barium ions. They would then be cooled using helium as buffer gas, collected and trapped briefly in an ion buncher for performing laser spectroscopy. The bunched ions would then be injected into an MR-TOF (multiple reflection time-of-flight mass spectrometer) for precise identification of barium ions.

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