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Characterization of an in-gas Laser Ablation Ion Source through SIMION Simulations

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The nEXO (next Enriched Xenon Observatory) collaboration is searching for lepton-number violating neutrinoless double beta decays ($0\nu\beta\beta$) in Xe-136. A positive observation would require the neutrino to be its own antiparticle, i.e. the neutrino has to be a Majorana particle, and shed light on various open questions in neutrino physics and physics beyond the standard model.
A Ba-tagging technique is being developed at McGill with the focus on the extraction and identification of Ba-ions from xenon gas to push the sensitivity of the detector further in order to clearly distinguish the $\beta\beta$ events from the background events. The in-gas laser ablation ion source (IGLAS) is built to create laser-driven ions in a gaseous environment for the purpose of systematic studies and calibration of various components of the Ba-tagging scheme. Simulations of the current geometry of the IGLAS were performed in the software SIMION to study the efficiency of ion transport, the time of flight and mobility of Cu+ ions in Ar and Xe gas in various conditions.

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