Contribution ID: **35** Type: **Instrumentation/Hardware**

Developing an In-Gas Laser Ablation Ion Source for Ba-Tagging

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The proposed nEXO detector aims to search for neutrinoless double beta decay ($0\nu\beta\beta$) in a five-tonne enriched liquid Xe-136 time projection chamber (TPC). The search in a TPC offers the unique possibility to locate, extract from the detector volume, and identify the $\beta\beta$-decay daughter Ba-136. The addition of the ba-tagging technique in a future upgrade to nEXO has the potential to eliminate essentially all background events, except those from $\beta\beta$-decays. The approach being explored by Canadian groups uses a capillary to first extract the candidate Ba ion with a small volume of liquid Xe from the detector. The liquid Xe then undergoes a phase change before the daughter ion is guided by an radio-frequency (RF) carpet to an RF funnel, where it will be separated from neutral particles and transported to vacuum. The ion is then transported to a linear Paul trap and a multi-reflection time of flight mass spectrometer for identification and mass confirmation respectively.

To characterise the in-gas ion transport, an In-Gas Laser Ablation Source (IGLAS) is being developed to study the production of ions in a controlled environment. A pulsed 532 nm Nd:YAG laser is focused on a metal target to ablate ions from the surface. Ions are drifted by an applied electric field and collected. The IGLAS has been previously tested in vacuum while studies on ion production and transport in high-pressure Xe and Ar gas are ongoing. The status of the IGLAS will be discussed.

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