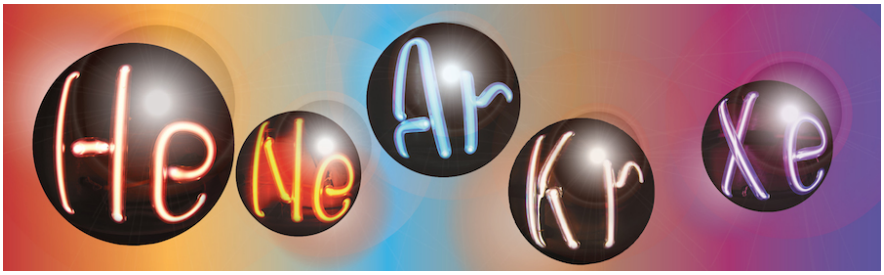


Contribution ID: **25** Type: **Poster**

# Muon spallation on xenon in the KamLAND-Zen search for 0νββ

Searches for neutrinoless double beta decay (0νββ) require extremely low backgrounds, especially as detectors move toward larger isotope masses and longer exposures. A potentially limiting background is muon-induced spallation of the isotope used for the search, especially at moderate underground depths such as Kamioka, where xenon spallation is currently the dominant background in KamLAND-Zen. Muon interactions with xenon can produce many long-lived radioactive isotopes, with lifetimes from hours to days, making simple time-based vetoes impractical. In this poster, I present an improved KamLAND-Zen tagging strategy for muon-induced xenon spallation. I will discuss the limitations of the existing tagger, new correlations with neutron captures and other shower products, and a machine-learning transformer model that shows improved background rejection on simulated data. Understanding and tagging this background is important for future xenon-based rare-event detectors, where spallation can influence sensitivity projections, background budgets, and decisions on detector location and underground depth.

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