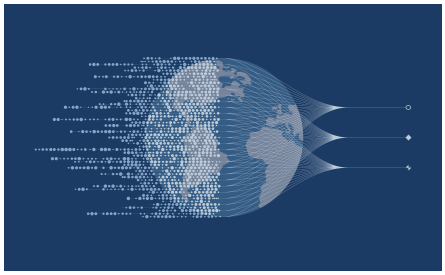

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-precision stable xenon isotope ratio measurements of atmospheric samples

IMS nuclear explosion monitoring systems rely primarily on the radioxenon to detect illicit nuclear events. However, these systems require prompt event detection since the main isotopes of interest (^{131m}Xe, ^{133+133m}Xe, and ¹³⁵Xe) have half-lives between 11.9 days and 9.14 hours. Here, we present a complimentary tool for detecting fission events utilizing high-precision stable xenon (¹³¹Xe, ¹³²Xe, ¹³⁴Xe, ¹³⁶Xe) isotope measurements that can be used as a long-lived, persistent signature for detection. This talk will focus on the development of a measurement methodology, employing a Thermo 253 Ultra dual-inlet dynamic mass spectrometer, that can achieve 10 permeg measurement precision (where permeg is the relative difference, in parts per million, of the isotope ratio of an unknown compared to a reference standard). In addition, we will discuss practical considerations for the collection of samples for these measurements as well as sample purification. We will also present an initial dataset of atmospheric background measurements conducted in northern New Mexico, United States.

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