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Production of $^{236}\text{U}/^{238}\text{U}$ Reference Standards for Accelerator Mass Spectrometry Measurements

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^{236}U is a rare isotope of uranium, naturally occurring with an abundance of less than 100 parts per trillion. The ability to detect it and make isotopic ratio measurements has applications ranging from nuclear forensics and nonproliferation to energy production and environmental protection. Currently, Accelerator Mass Spectrometry (AMS) is the only technique sensitive enough to accurately measure $^{236}\text{U}/^{238}\text{U}$ isotopic ratios as they exist in naturally occurring ores in the range of $^{236}\text{U}/^{238}\text{U} = 10^{-14}$ – 10^{-10} . Some AMS facilities have demonstrated their capabilities to make these measurements already, however the lack of any known reference standard has required the use of absolute measurements, notoriously difficult to do using AMS, resulting in increased uncertainties in measurements and a reliance on knowledge of systematic effects. Using a reference standard prepared for other forms of mass spectrometry, we are attempting to create a series of AMS suitable standards through dilution with depleted uranium. The techniques used to produce these materials and analysis of them using AMS will be discussed. Additionally, changes to our time of flight detection system and how they improve our detection limits will be presented alongside a call for collaboration with other facilities to help validate our technique and isotopic ratios.

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Student Submission

Yes

Primary author: BAILEY, Thomas (University of Notre Dame)

Co-authors: LUND, David (University of Notre Dame); BACALL, Calvin (University of Notre Dame); Dr BURNS, Peter (University of Notre Dame); MULCAHY, Griffin (University of Notre Dame); PEELER, William (University of Notre Dame); Dr SIGMON, Ginger (University of Notre Dame); COLLON, Philippe (University of Notre Dame)

Presenter: COLLON, Philippe (University of Notre Dame)

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