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The Broad Impact of Mass-Number Measurements for Heavy Element Studies

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Even after decades of research, still very little is known about the fundamental nuclear or chemical properties of the heaviest elements. These elements do not exist naturally on earth, so experimental studies are incredibly challenging. Theoretical work has already predicted where the “island of stability” should be and where the periodic table of the elements should end, but these regimes are not yet accessible experimentally. At Lawrence Berkeley National Laboratory, the recent installation of the FIONA spectrometer has sparked a new era of possible heavy element studies that utilize mass-number identifications.

First measurements have already shown the broad impact of this experimental technique. The production of the new isotopes ^{244}Md and ^{239}Es have already been confirmed. It has also been demonstrated that FIONA can be used to perform gas-phase chemistry. In these studies, the products of chemical reactions can be directly-observed via their mass. First measurements have already given insight as to the second-ionization potential of lawrencium. These and more-recent results will be discussed.

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