

Pursuing New Superheavy Elements: Progress Update from Berkeley Lab

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The last time that an element was discovered in the US was seaborgium in 1974. Since that time, all new elements were discovered in other countries, although the US was involved in the discoveries of superheavy (SHE) elements 114 - 118 by providing the targets needed to make those elements. There is growing interest in returning the US to the forefront of element discovery. However, substantial obstacles exist in discovering elements beyond E118. First, the heaviest elements known to exist were all discovered using ^{48}Ca beams impinging on actinide targets. The resulting cross sections were surprisingly high, with production rates on the order of atoms-per-week or higher. However, pushing beyond E118 requires using heavier beams, such as ^{50}Ti , ^{51}V or ^{54}Cr , which could result in cross sections on order of magnitude or lower than those for ^{48}Ca +actinide reactions –resulting in production rates of atoms-per-year or even less. Second, producing these beams at the high intensities required for SHE production is a challenge, as these elements all have high melting points and chemical properties that make them difficult to produce. Third, the predicted half-lives of elements beyond E118 are short, maybe only tens of microseconds or less. Over the last several years, efforts have been made at Berkeley Lab to update our experimental facility from ion source to the target setup to the detector and electronics to demonstrate the ability to produce and detect elements beyond E118. This abstract provides an update on Berkeley Lab's progress towards unveiling new elements, highlighting advancements and prospects in the search for the elusive SHE.

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