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Optical Spectroscopy of the Heaviest Elements

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Following their discovery, great progress has been made in recent years in elucidating the atomic and nuclear properties of the superheavy elements, driven by the need to understand nuclear stability and how these atoms behave chemically.
Optical spectroscopy enables experimental exploration of the atomic structure of the elements and equally provides an alternative access to important nuclear properties, such as spins, moments, and changes in the mean squares of the charge radii. In this respect, however, the superheavy elements are still unexplored territory.
Even certain isotopes of fermium (Fm, $Z = 100$), which can still be obtained in macroscopic quantities, are challenging for such studies, not to mention transfermium elements that can be produced only at in-flight separator facilities.
In recent decades, laser resonance ionization spectroscopy has emerged as the method of choice for initial atomic level searches and subsequent hyperfine spectroscopy in the region of the heaviest elements. The successful application of this method to the element nobelium (No, $Z = 102$), has fueled efforts to study even heavier, more exotic radionuclides.
In this talk, I will present results from recent spectroscopy of $^{252-255}$No and $^{248-250,254,255,257}$Fm, followed by a brief outlook towards the spectroscopy of lawrencium ($Z = 103$).

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