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### **Shedding light on heavy actinides - laser spectroscopic investigations of Es and Fm isotopes in Mainz**

Laser spectroscopy probing the atomic level structure allows a precise determination of different atomic properties and in turn also of the chemical behavior of an element. Due to their limited availability the atomic structure of the heavy actinides is only scarcely investigated. For actinides up to einsteinium (Es,  $Z=99$ ) fluorescence light from macroscopic samples was investigated in the last century. At present, only 32 atomic levels are reported for neutral Es. For fermium (Fm,  $Z=100$ ) only 7 atomic transitions were identified by laser spectroscopy about 15 years ago.

Here we will present recent laser spectroscopic investigations of the heavy actinide elements einsteinium and fermium performed at the RISIKO separator in Mainz. The long-lived isotopes Fm-257 and Es-253-255, byproducts of the Cf-252 production cycle in the HIFR reactor at Oakridge, TN, USA, became available in minute amounts provided by Florida state university. These samples were radiochemically prepared in the institute of nuclear chemistry for experiments at the RISIKO setup in the institute of physics. From these measurements new information on the atomic level structure of fermium and einsteinium were obtained, while for einsteinium also information on the nuclear spin and moments could be inferred. For the first time laser spectroscopic investigations of Fm-257 were performed demonstrating the potential for measurements available only in lowest quantities. These results complement ongoing laser spectroscopic investigations on lighter actinides in Mainz and experiments on the heaviest actinides nobelium (No,  $Z=102$ ) and Lawrencium (Lr,  $Z=103$ ) at GSI Darmstadt.