

FAKULTÄT für PHYSIK  
LUDWIG-MAXIMILIANS-UNIVERSITÄT  
MÜNCHEN/GARCHING

PHYSIK-DEPARTMENT  
TECHNISCHE UNIVERSITÄT MÜNCHEN  
MÜNCHEN/GARCHING

## MLL-KOLLOQUIUM

Donnerstag, 14.07.2016, 16<sup>15</sup> Uhr

Hörsaal der LMU in Garching, Am Coulombwall 1  
Treffen zum gemeinsamen Kaffee 16 Uhr

Dr. Mustapha Laatiaoui

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Darmstadt)

### Laser spectroscopy of the element nobelium ( $Z=102$ )

A stringent test of modern atomic theories addressing relativistic and quantum electrodynamic effects is provided by investigating the spectral lines of the heaviest elements. This motivated large optical spectroscopy research programs for many years. However, the elements beyond fermium ( $Z=100$ ) so far remained out of reach for such an experimental approach, as they are typically produced at large accelerator facilities by heavy ion-induced fusion-evaporation reactions yielding low rates.

Laser spectroscopy of the element nobelium ( $Z=102$ ) has long been anticipated at GSI in Darmstadt. To this end, neutral atoms are ionized by an element-selective laser ionization technique. The fusion products of interest are separated from the primary beam by the Separator for Heavy Ion reaction Products (SHIP) and thermalized in a buffer-gas stopping cell. Those remaining in a positive charged state are accumulated on a catcher filament where they are neutralized. In a subsequent step, the fusion-product beam is turned off. Then, the accumulated atoms are evaporated from the filament, laser ionized and finally guided by suitable electric fields to a silicon detector where they are unambiguously identified via their unique radioactive decay fingerprint. In my talk I will summarize the pioneering work in this field of research and highlight the first foray of laser spectroscopy into the region of the transfermium elements.

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