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Study on laser resonance photoionization of Molybdenum atoms

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In the framework of the research and development activities of the SPES project, and regarding the optimization of the radioactive beam production the Hollow Cathode Lamp Spectroscopic technique, is nowadays a solid based application to study resonant laser ionization.

By means of this instrument, it is possible to test resonant laser ionization processes of stable species, and in this work, the study is applied to Molybdenum atoms.

The three-step, two color ionization schemes have been tested. The “slow” and the “fast” optogalvanic signals were detected and averaged by an oscilloscope as a proof of the laser ionization inside the lamp.

As results, several wavelength scans across the resonances of ionization schemes were collected with the “fast” optogalvanic signal. Some comparisons were made of ionization efficiency for different ionization schemes. Furthermore, saturation curves of the first excitation levels have been obtained.

Molybdenum, in its isotope 99 it is used to produce ^{99}Tc , which is the paramount radionuclide for diagnostic and cure in modern nuclear medicine; thus the interest of the study even if not a real SPES element.

In this framework, MOLAS project (Molybdenum production with Laser technique at SPES) has recently been introduced and this study will be the first milestone for the project.

Primary author: SCARPA, Daniele

Co-authors: Dr IANNELLI, Martina (Department of Electrical, Computer and Biomedical Engineering, University of Pavia); Prof. TOMASELLI, Alessandra (Department of Electrical, Computer and Biomedical Engineering, University of Pavia); Prof. EMILIO, Mariotti (CNISM, University of Siena DSFTA, Siena); Prof. NICOLOSI, Piergiorgio (Dept. Information Engineering - University of Padova); ANDRIGHETTO, alberto (INFN-LNL)

Presenter: MONETTI, Alberto (Inl infn)

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