New Feature for Resonant ionization Laser Ion Source Development at GANIL

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SPIRAL2 is a research facility under construction at GANIL for the production of Radioactive Ion Beams (RIB) by Isotope Separation On-Line (ISOL) methods and low-energy in-flight techniques. Resonant ionization Laser Ion Source (RILIS) will be one of the main techniques to generate the radioactive ion beam. GISELE (GANIL Ion Source using Electron Laser Excitation) is a test bench developed to study a fully operational laser ion source available for Day 1 operations at SPIRAL2 Phase 2. The aim of this project is to find the best technical solution which combines high selectivity and ionization efficiency with small ion beam emittance and stable long term operation. Latest results concerning the new ion source geometry will be presented.

Results

1.4 nA Zn⁶⁴ beam was generated using the method described above. The ionization scheme used a non-resonant final step. Background was given to be around 10% of the main peak intensity. Also, temperature calibration was performed for LISBET ion source up to 1800°C.

Different species were observed, most of them created by surface ionization. However, when the laser beams were set into the hot cavity, the natural isotopes of Zn were ionized and detected. Other elements were also observed by surface ionization like Na, Al, K, and Rb, although those elements were eliminated by mass spectrometer.

References

E. Petit, 2nd Int. Part. Accelerator Conf. (IPAC2011), San Sebastian, Spain, 2011
F. Schwindt et al. N. Inst. and Meth. in Physics Research B 267, 1856-1861, 2006
V.N. Fedosee et al. Hyperfine Interactions, 2005

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