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In-gas cell laser spectroscopy of neutron-deficient silver isotopes

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In-gas cell laser spectroscopy has been developed at the Leuven Isotope Separator On-Line (LISOL) set-up using heavy- and light-ion induced reactions. The recoiling reaction products are thermalised in a buffer gas cell filled typically with 300 to 500 mbar of argon. They are subsequently resonantly photoionized using a two step laser ionization scheme, extracted from the gas cell, injected into the front-end of LISOL, analysed according to their A/Q value and sent towards a detection station where their radioactive decay is observed [1,2]. By measuring the number of atoms arriving at the detection station as a function of the first step laser frequency, the atomic hyperfine structure of the atomic ground and/or excited state can be measured and charge radii, magnetic dipole and electrical quadrupole moments extracted. Recently the magnetic moment for a number of neutron deficient copper isotopes, including 57Cu (N=28), were determined [3].
In recent experiments a study of the neutron deficient silver isotopes produced via 92Mo(14N,pxn)AAg and 64Zn(36Ar,pxn)AAg reactions was pursued and the magnetic moments of a number of them were obtained, including the semi-magic N=50 isotope 97Ag. These results will be presented and the gas cell performances to study indium and tin isotopes as well as heavier isotopes will be discussed. As an outlook, the opportunities of using this technique at the S3 facility at SPIRAL-2 GANIL will be presented.
[1] T. Sonoda et al., NIM B 267, 2918 (2009)
[2] Y. Kudryavtsev et al., NIM B 267, 2908 (2009)
[3] Th. Cocolios et al., PRL 103, 102501 (2009)., PRC 81, 014314 (2010)

Summary

Co-author(s) : PAUWELS, D. (Instituut voor Kern- en Stralingsfysica); RADULOV, D. (Instituut voor Kern- en Stralingsfysica); DE WITTE, H. (Instituut voor Kern- en Stralingsfysica); SAVAJOLS, H.; DARBY, I.G. (Instituut voor Kern- en Stralingsfysica); DIRIKEN, J. (Instituut voor Kern- en Stralingsfysica); ELSEVIERS, J. (Instituut voor Kern- en Stralingsfysica); HUYSE, M. (Instituut voor Kern- en Stralingsfysica); VENHART, M. (Instituut voor Kern- en Stralingsfysica); BREE, N. (Instituut voor Kern- en Stralingsfysica); KESTELOOT, N. (Instituut voor Kern- en Stralingsfysica); VAN DEN BERGH, P. (Instituut voor Kern- en Stralingsfysica); VAN DUPPEN, Piet (Instituut voor Kern- en Stralingsfysica); FERRER, R. (Instituut voor Kern- en Stralingsfysica); FRANCHOO, S. (IPN); ROGER, T. (Instituut voor Kern- en Stralingsfysica); COCOLIOS, T.E. (Instituut voor Kern- en Stralingsfysica); DEXTERS, W. (Instituut voor Kern- en Stralingsfysica); KUDRYAVTSEV, Yu. (Instituut voor Kern- en Stralingsfysica)

Presenter(s) : VAN DUPPEN, Piet (Instituut voor Kern- en Stralingsfysica)

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