Int. Workshop “Shapes and Dynamics of Atomic Nuclei: Contemporary Aspects”
ed. Nikolay Minkov, Heron Press, Sofia 2023

Lifetime measurements of the ^{103}Ag $13/2^+$ and $11/2^+$ states via the RDDS method

Ir.B. Vasilev[1] **L. Atanasova**[2] **D. Ivanova**[3,4] **S. Kisyov**[5] **S. Lalkovski**[1] **C. Mihai**[6] **A. Turturica**[6] **S. Calinescu**[6] **C. Clisu Stan**[6] **D. Grigorova**[5] **R. Marginean**[6] **N. Marginean**[6] **L. Stan**[6] **E. Stefanova**[7] **I. Stiru**[6] **G. Stoev**[5] **S. Toma**[5] **O. Yordanov**[7]

[1]Faculty of Physics, Sofia University “St. Kliment Ohridski,” Sofia 1164, Bulgaria
[2]Medical University, Sofia 1431, Bulgaria
[3]Military Medical Academy, Sofia 1606, Bulgaria
[4]University Hospital ”Prof. Dr. Alexander Tschirkov”, Sofia 1431, Bulgaria
[5]Lawrence Livermore National Laboratory, Livermore, CA 94550
[6]Horia Hulubei National Institute for Physics and Nuclear Engineering, IFIN-HH, 077125, Bucharest-Magurele, Romania
[7]Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences, 1784 Sofia, Bulgaria

Abstract

The most prominent feature of the Ag isotopic chain’s structure is the irregular ordering of the lowest-lying 7/2$^+$ and 9/2$^+$ states, an effect known as the ”$j-1$ anomaly”. In order to study the effect we have performed lifetime measurements for two excited states of the j^{-3} multiplet. The experiment was conducted in IFIN-HH (Romania) in July 2023 aiming at the lifetimes of the $13/2^+$ and $11/2^+$ states in ^{103}Ag. The silver nuclei were populated in ^{94}Mo(^{12}C,p2nγ) reaction with a 56-MeV ^{12}C beam, provided by the 9 MV Tandem Van de Graaff accelerator. The ^{94}Mo 0.94 mg/cm^2-thick target was mounted on the Bucharest Plunger. The recoils were stopped in 5 mg/cm^2-thick Au stopper. The emitted γ-rays were detected by the hybrid multidetector RoSPHERE array, which comprises 20 HPGe detectors with BGO anti-Compton shields arranged in 4 rings at $\pm 35^\circ, \pm 70^\circ$ forward and backward angles with respect to the beam axis. In addition, 5 LaBr3 scintillator detectors were mounted in a ring at 90°. The signals were processed by digital electronics and data were recorded in triggerless mode. Events where at least two HPGe detectors were fired in coincidences were constructed and $E_\gamma - E_\gamma$ coincidence matrices incremented for both backward and forward angles. To obtain the half-lives, γ-ray spectra were projected from the matrices, gated on the shifted feeding transitions. The half-lives were then evaluated by using intensity ratios of the shifted and unshifted components of transitions of interest. Preliminary results from this study will be presented and discussed within the empirical shell model and triaxial model calculations.

This work is partially supported by the Bulgarian National Science Fund under contracts KP-06-N68/8. ES and OY are supported by KP-06-N48/1.