

The Auger-KLL spectrum of Carbon in 12 MeV C^{4+} + Ne collisions: Comparison of Experimental Measurements and SIMION simulations

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We are investigating the formation mechanisms of the $1s2s2p\ ^4P$ metastable state in energetic collisions of He-like ionic projectiles with gaseous targets through the study of their ionic Auger decay [1]. The lifetime of the $1s2s2p\ ^4P$ metastable state is long (in the 10^{-6} - 10^{-9} s) and thus the projectile ions can Auger decay well after their excitation in the gaseous target region, making it hard to determine the effective detection solid angle. The experimental setup involving a hemispherical deflector analyzer with injection lens and position sensitive detector is currently fully operational at the TANDEM Accelerator of the National Center for Scientific Research “Demokritos” in Athens under the ongoing APAPES research initiative [2]. So far we have used the SIMION 8.1 charged particle optics software package [3] to accurately simulate the experimental electron measurements and thus treat the problem of the determination of the effective detection solid in a Monte Carlo type calculation.

Here, we present first test measurements of the KLL Auger spectrum in the region of the $1s2s2p\ ^4P$ state obtained in collisions of 12 MeV C^{4+} with Ne gas targets also previously measured in [4]. In Fig. 1, SIMION simulation of the Auger electron yield are compared to the measurements showing a remarkable reproduction of the line features of the

experimental spectrum with emphasis on the line asymmetry of the 4P peak.

Based on these SIMION results the effective detection solid angle could be determined allowing for a preliminary estimation of the experimental ratio of the yields of the $^4P/(^2P_+ + ^2P_-)$ peaks that sheds light on the statistical population mechanism of the 4P state [4,5].

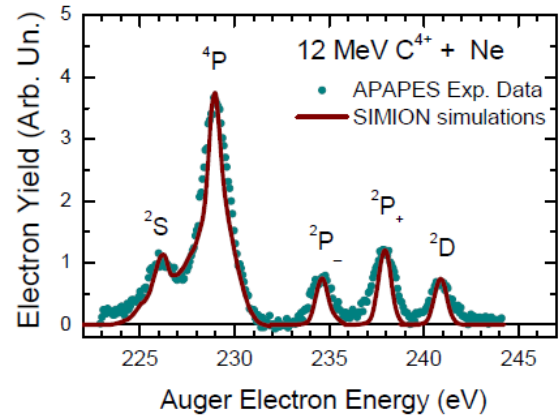


Fig. 1. The KLL spectrum of Carbon in collisions of 12MeV C^{4+} + Ne. SIMION 8.1 simulations are scaled to fit the experimental data.

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