On the production of the 1s2s2p ^{2,4}P states in collisions of 0.5-1.25 MeV/u He-like mixed ($1s^2\ ^1S$, $1s2s\ ^3S$) ionic states with gaseous targets.

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Single electron capture (SEC) observed in collisions of fast He-like ions delivered in mixed ($1s^2\ ^1S$, $1s2s\ ^3S$) states with gaseous targets has recently received attention. Various secondary processes, such as dynamic Pauli exchange mechanism[1] and/or selective cascade feeding[2], have been proposed to explain the measured ratio $R_m=\sigma(1s2s2p\ ^4P) / \sigma(1s2s2p\ ^2P)$ of transfer cross sections which has been reported to be 3-4 times larger than the expected spin statistics value of 2[2,3]. An important parameter in the evaluation of R_m is the accurate determination of the effective solid angle for the detection of the long-lived ^4P state, which is crucial in the interpretation of the data. Recently, we have published a study on the effective solid angle, based on Monte Carlo simulations within the SIMION8.1 ion optics simulation package, for our zero-degree Auger projectile spectroscopy (ZAPS) experimental setup[4]. At the heart of the setup is our hemispherical spectrograph which is equipped with an entry zoom lens and a 2-D position sensitive detector. In addition, we have also reported on a new technique for obtaining R_m that utilizes two independent measurements of the *same* projectile Auger spectrum, but having different 1s2s ^3S metastable fraction[5]. Typical spectra obtained using this method are shown in Fig. 1. Our new technique allows for the determination of R_m even in cases when it is not possible to obtain a *pure* ground state He-like ion beam, as required in older methods[1].

Our final results are not in agreement with earlier reports on C^{4+} ions[1] and indicate that our R_m values are close to the statistical value of 2. Details of our calculations and measurements will be presented.

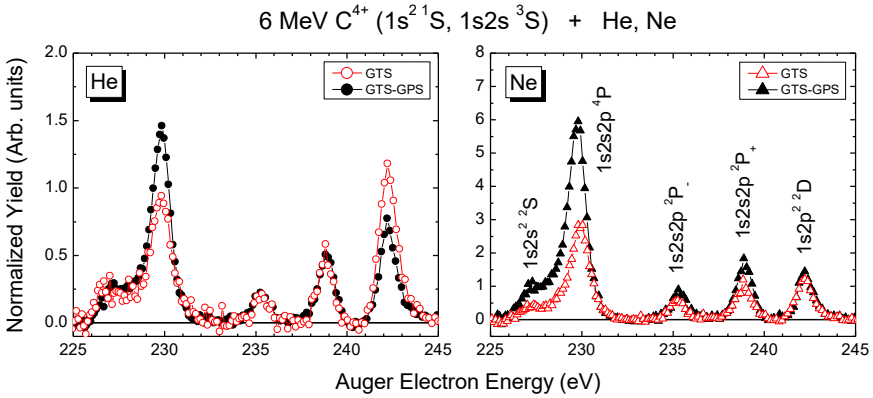

Figure 1: C^{4+} (1s2l2l′) Auger electron spectra obtained in collisions of mixed state 6 MeV C^{4+} ($1s^2\ ^1S$, $1s2s\ ^3S$) ion beams with He and Ne gas targets. The ionic beam state can be delivered in different mixture percentage depending on the stripping method, i.e. direct gas terminal stripping (GTS) inside the Tandem Van der Graff accelerator or GTS followed by post-stripping in gas targets (GTS-GPS). The latter results in a higher percentage of the 1s2s ^3S metastable component, as evident from the enhancement of the 1s2s2p ^4P peak for both He and Ne targets.

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