EVALUATION OF 1s2l2l/4P/2P, 2P/2P, 2D/2P RATIOS FROM COLLISIONS OF MIXED STATE (1s^2 1S, 1s2s 3S) He-LIKE ION BEAMS WITH H\textsubscript{2} AND He TARGETS

E. P. Benis\textsuperscript{a}, I. Madesis\textsuperscript{b,c} and T. J. M. Zouros\textsuperscript{b,c}

\textsuperscript{a}Dept. of Physics, University of Ioannina, GR 45110 Ioannina, Greece.
\textsuperscript{b}Dept. of Physics, Univ. of Crete, P.O Box 2208, GR 71003 Heraklion, Greece.
\textsuperscript{c}Tandem Accelerator Laboratory, INPP, NCSR Demokritos, GR 15310 Ag Paraskevi, Greece.

New results are presented on the ratio R of 4P/2P populations of Li-like 1s2s2p quartet and doublet P states formed in energetic ion-atom collisions by single 2p electron transfer to the metastable 1s2s 3S component of the He-like ion beam. Spin statistics predict a value of R=2 mostly in disagreement with reported measurements of R=3-10 [1-2]. A new technique is used in the evaluation of R which avoids the need for the normalization of the measured cross sections and allows for the determination of the separate contributions of ground- and metastable-state beam components to the measured spectra. Applying our technique to older zero-degree Auger projectile spectra from 4.5 MeV B\textsuperscript{3+} [3] and 25.3 MeV F\textsuperscript{7+} [4] mixed state (1s^2 1S, 1s2s 3S) ion collisions with H\textsubscript{2} targets, we report values of R=3.5±0.4 for boron and R=1.8±0.3 for fluorine. In addition, also reported for the first time are the ratios of 2D/2P and 2P/2P populations from either the metastable and/or ground state beam component, which provide a sensitive indicator of the importance of other active processes that can affect the overall intensities of the measured Auger spectra. They are evaluated in the same technique and compared to previously reported results for carbon collisions on helium [1].

Figure 1: Theoretical and experimental ratios. The carbon on helium results are from [1].

References