Formation mechanisms of the 1s2s2p ^4P_J metastable state in 12 MeV C^{4+} ($1s^2\ ^1S$, $1s2s\ ^3S$) collisions with H_2, He, Ne and Ar

E.P.Benis[1,*], I.Madesis[2,3], A.Dimitriou[2,3], A.Laoutaris[4], B.Sulik[5], O.Sise[6] and T.J.M.Zouros[2,3]

[1]*Dept. of Physics, Univ. of Ioannina, GR 45110 Ioannina, Greece.*
[2]*Dept. of Physics, Univ. of Crete, P.O Box 2208, GR 71003 Heraklion, Greece.*
[3]*Tandem Accelerator Laboratory, INPP, NCSR Demokritos, GR 15310 Ag Paraskevi, Greece.*
[4]*Dept. Of Applied Physics, National Technical University of Athens, GR 15780 Zografou, Greece*
[5]*Institute for Nuclear Research (MTA ATOMKI), Bem tér 18/c, H 4026 Debrecen, Hungary.6*
[6]*Dept. of Science Education, Faculty of Education, Suleyman Demirel Univ., 32260 Isparta, Turkey.*

*mbenis@uoi.gr

The formation mechanisms of the 1s2s2p ^4P metastable state in energetic collisions of He-like ionic projectiles (Z=3-9) of pure $1s^2\ ^1S$ ground state and mixed $1s^2\ ^1S$, $1s2s\ ^3S$ ground and metastable states with gaseous targets are investigated through its Auger decay at 0^0 with respect to the projectile direction [1]. The ratio $R = {}^4P/({}^2P_+ + {}^2P_-)$ of the measured yields sheds light on the population mechanism of the ^4P state [2,3] of recent interest as large departures from the expected statistical value of R = 2 have been reported lending themselves to various explanations. Here, we present recent results from the benchmark collision system of 12 MeV C^{4+} ($1s^2\ ^1S$, $1s2s\ ^3S$) on H_2, He, Ne and Ar gas targets obtained within our collaboration [4]. Our technique includes recent progress on the accurate determination of the effective solid angle correction for long-lived states, based on our ion-optics Monte Carlo simulation approach, necessary for the correct determination of the ^4P yield.

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