Abstract Submitted
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Photoionization of atomic chlorine near the K-edge Z. FELFLI, Clark Atlanta University, S. T. MANSON, Georgia State University, A. Z. MSEZANE, Clark Atlanta University — The photoionization cross section for atomic Cl in the vicinity of the 1s threshold has been investigated using R-matrix methodology. Specifically, the resonances leading up to the first two 1s ionization thresholds, the $1s2s^22p^63s^23p^5$ ^{3,1}P states of Cl^+, have been examined in detail. In addition to the $1s2s^22p^63s^23p^6$ ^{2}S resonance, which arises from a 1s→3p transition that is possible owing to the open shell nature of the Cl atom, there are six resonances series leading up to the two thresholds: $\{1s2s^22p^63s^23p^5$ ^{3,1}P$\}$np ^{2}S, ^{2}P, ^{2}D. The results show that the 1s→3p resonances is by far the strongest, as might be expected, and the energy and shape are in rather good agreement with experiment [1]. Furthermore, this lowest ^{2}S resonance "robs" oscillator strength from the resonances of the $\{1s2s^22p^63s^23p^5$ ^{3}P$\}$np ^{2}S series, which are very much weaker than their ^{2}P and ^{2}D counterparts; there is no 1s→3p resonance in the ^{2}P and ^{2}D manifolds. The next strongest resonances are the six 1s→4p excitations. Each pair ^{2}S, ^{2}P and ^{2}D n=4 resonances interact so that their separation is not the splitting of the ^{3}P and ^{1}P 1s ionization thresholds, and their quantum defects are very much larger than the asymptotic values and for the n=4, they are about 1.6 for the ^{2}P and ^{2}D while for the ^{2}S they are about 1.8, reflecting the fact that the n=4 ^{2}S resonances are also strongly affected by the $1s3p^6$ resonance; the higher resonances in all series exhibit quantum defects of about 0.9. [1] W. C. Stolte, *et al*, Phys. Rev. A **88**, 053425 (2013). Work supported by U.S. DOE.

Z. Felfli
Clark Atlanta University

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