Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Relativistic Effects in the Photoionization of Spin-Orbit Doublets Well Above Threshold[1] CHATHURANGA R. MUNASINGHE, REZVAN K. HOSSEINI, STEVEN T. MANSON, Georgia State University, PRANAWA C. DESHMUKH, IIT-Tirupati — In the absence of relativistic effects on the radial wave functions, the branching ratios of the photoionization cross sections of spin-orbit nl doublets must go to the nonrelativistic (statistical) value of $l/(l+1)$ at high energies where the energy splitting of the $j =$ $l1$ becomes negligible in comparison. Thus, deviations from the statistical values provide a quantitative measure of relativistic interactions. To study the situation, a theoretical investigation of the photoionization cross section branching ratios of all spin-orbit doublets from the ground states of the noble gases Ne, Ar, Kr and Xe has been initiated. The relativistic-random-phase approximation (RRPA) [1]is employed in the calculations since it is based upon the Dirac equation, so it includes relativistic effects *ab initio*, and it also includes significant aspects of correlation in both the initial and final states of the photoionization process. Preliminary results suggest that, even in Ne, the branching ratios are decreasing at high energy, indicating that relativity plays a role even for light elements. [1] W. R. Johnson and C. D. Lin, Phys. Rev. A **20**, 964 (1979).

[1]Work supported by DOE, Office of Science

Steven Manson
Georgia State University

Date submitted: 31 Jan 2020 Electronic form version 1.4