

Abstract Submitted
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Benchmarking resonance Phenomena in Atomic Photoionization and Recombination¹ ANIL PRADHAN, SULTANA NAHAR, MAXIMILIANO MONTENEGRO, The Ohio State University — Resonances are crucial in the study and applications of atomic photoionization and electron-ion recombination. They form naturally at quantum energies with increment of the effective quantum numbers by unity and bring out the features characteristic to atomic system and its state. A number of highly accurate experimental measurements of atomic photoionization cross sections are being carried out with accelerator based advanced light sources and in synchrotrons, and of electron-ion recombination of heavy ions in storage rings, in addition to studies of Rydberg series of resonances and threshold behavior. We will present theoretical results from ab initio calculations using the unified and self-consistent relativistic R-matrix method for several atomic systems with detailed comparisons with these experiments of resonance structures in both photoionization and electron-ion recombination. We will describe further extensions of the method to complex and heavy atoms and ions with multiple series of overlapping and correlated resonances. As an example, we will present the preliminary results on Fe IV photoionization cross sections where the overlapping Rydberg series of 16 core states bars identification of individual series and compare with the experiment measurement at ALS.

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