STUDY OF DOUBLY IONIZED STATES IN ATOMIC POTASSIUM

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Electron spectroscopy is a well-established method for providing specific information about the electronic structure and dynamics in atoms, molecules and nanostructures. Presently the modern x-ray radiation sources; synchrotrons and free electron lasers (see e.g. Ref. [1]) together with the very high detection efficiency of the magnetic bottle - type of coincidence analyzers [2] provides a superior means to the experimental studies of photon-induced double and multiple photoionization.

In this poster, we present a study of single-photon-induced double photoionization in atomic potassium and rubidium. The experiment was carried out at SOLEIL synchrotron radiation source in Saint Aubin, France. The HERMES set up (High Energy Resolution Multi Electron Spectrometer) based on a 2 m long magnetic bottle time of flight electron spectrometer was used to collect all the emitted electrons from the sample. The measured data showed that many of the observed K^{2+} states are missing from the NIST database and also from Charlotte E. Moore's tables. Furhermore, when comparing the K^{2+} states to similar states in atomic rubidium, it was found that some of these states were listed inconsistently in these tables. In order to get predictions of the energies and indentifications of these unknown K^{2+} states, both multiconfiguration Hartree-Fock and Dirac-Fock calculations of the K^{2+} states were carried out. These obtained theoretical results will then be compared to experimental data as well as NIST reference data and Moore's tables.

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[2] J.H.D. Eland, O. Vieuxmaire, T. Kinugawa, P. Lablanquie, R.I. Hall, and F. Penent, Phys. Rev. Lett. **90**, 05003 (2003).