

COMPLEX ATOMIC SPECTRA MADE EASY - -
A MULTICHANNEL QUANTUM DEFECT TREATMENT
AND PROPOSAL FOR EXPERIMENT

By

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Non-polarized one photon excitation in atoms from a lower state with non-zero total angular momentum J will always reach opposite parity final states with three different total angular momentum, $J' = J, J \pm 1$. In the case of heavy elements, e.g. Rare Earth or Actinides atoms, there are more than two electrons in the un-occupied open valence shells and in turn, many series are generated for one J' alone. All these make the population of levels close to ionization potential to be extremely dense, besides, accidental degeneracy will further defy the resolution and identification of the levels. An experiment is proposed to select final states with one J only and therefore simplifies the spectra by a factor of 3. The J -selection spectroscopy incorporated with Multichannel Quantum Defect Theory can thus make the complex spectral analysis easy. Uranium spectra is investigated as an example.