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The Spectroscopy of Barium $6p_{1/2}nk$ Autoionizing States in Weak Electric Fields[1] JIRAKAN NUNKAEW, THOMAS GALLAGHER, University of Virginia — We have measured the Ba $6p_{1/2}nk$, $n = 17$, $5 \leq k \leq n-1$ Stark autoionizing states' photoexcitation cross sections and the autoionization rates in the low field regime by isolated core excitation (ICE) of the bound Ba $6snk$ Stark states. During ICE the Rydberg electron remains in the same state (nk) while the ion core is excited from the ground state Ba^+ $6s$ to the excited state Ba^+ $6p_{1/2}$. However, the change in the core yields the slight change in Coulomb potential and as the result the final wavefunction of electron is different from the initial wavefunction causing the shake up of the electron to other states. We have observed the shake up of electrons from nk to nk' states in the cross section. The observed cross section shows no transition of the electron from the k state to the k' states on the low energy side of k. This is due to the fact that in low field the bound and autoionizing Stark manifolds are incomplete; they are missing the low ℓ states with large quantum defects. Furthermore, they are different because they contain different numbers of ℓ states. The cross section can be theoretically described by treating the problem as discrete states embedded in one continuum state with finite lifetime.

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Jirakan Nunkaew
University of Virginia

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