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Cross sections for excitation of the metastable levels of Kr[1] R. O. JUNG, TOM STONE, JOHN B. BOFFARD, L. W. ANDERSON, CHUN C. LIN, University of Wisconsin — The heavy rare gases (Kr,Xe) differs from the lighter ones (Ne,Ar) in that the energy levels for each excited configuration are split into two separate tiers. This energy difference is due to the large spin-orbit splitting of the $^2P_{3/2}$ and $^2P_{1/2}$ ion cores. We have measured excitation cross sections out of the two metastable levels of the Kr $4p^5 5s$ configuration and into the levels of the $4p^5 5p$ configuration by detecting the radiation from these levels induced by electron collisions. The atomic beam effusing through a hole in a hollow cathode discharge contains Kr atoms in both the J=2 and J=0 metastable levels as well as atoms in the ground level. The electron energy is low enough so that excitation into the $4p^5 5p$ levels can occur only from the metastable levels. The J=2 and J=0 metastable levels are each associated with a different ion core. To determine the cross sections out of the two metastable levels separately we utilize laser quenching. Cross sections from the J=2 metastable level ($^2P_{3/2}$ ion core) are largest into $4p^5 5p$ levels with the same ion core. Likewise, values for the J=0 metastable level ($^2P_{1/2}$ ion core) are largest into excited levels with the same ion core. This is true even for the $J = 2$ level of the $4p^5 5p$ ($^2P_{1/2}$) configuration, which is a dipole-forbidden transition from the J=0 metastable level but dipole-allowed from the J=2 metastable level.

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