Resonant Enhanced Multiphoton Ionization Studies of Atomic Oxygen

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In Resonant Enhanced Multiphoton Ionization (REMPI), an atom absorbs several photons making a transition to a resonant intermediate state and subsequently ionizing out of it. With currently available tunable, narrow-band lasers, the extreme sensitivity of REMPI to the specific arrangement of levels can be used to selectively probe minute amounts of a single species (atom) in a host of background material. Determination of the number density of atoms from the observed REMPI signal requires a knowledge of the multiphoton ionization cross sections. In the last year, we have been investigating REMPI of atomic oxygen through various excitation schemes that are feasible with available light sources. Using Quantum Defect Theory (QDT) to estimate the various atomic parameters, we have studied the REMPI dynamics in atomic oxygen incorporating the effects of saturation and a. c. Stark shifts. Results will be presented for REMPI probabilities for excitation through various $2p^3(^4S^o)\ np\ ^3P$ and $2p^3(^4S^o)\ nf\ ^3F$ levels.