

Abstract Submitted
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Two-Photon Ionization of a Low IP Molecule (TDAE) BYRON SMITH¹, ROBERT COMPTON², University of Tennessee, UNIVERSITY OF TENNESSEE CHEMICAL PHYSICS TEAM — Very low ionization potential molecules (< 6 eV) have been studied thoroughly for their use in low temperature plasmas, charge-transfer salts, and as an alternative to liquid scintillation in photomultiplier tubes. One such molecule is tetrakis(dimethylamino)ethylene (TDAE) with a previously measured IP of 5.2 ± 0.05 eV using electron and photon impact time of flight mass spectrometry.³ Two-photon ionization photoelectron spectroscopy of TDAE at 441 nm and 355 nm results in an IP of 5.22 ± 0.14 eV. In addition to the photoelectron peak associated with direct ionization, a peak was observed corresponding to thermal energy electrons (~ 0 eV). This has been previously assigned to an intense short-lived auto-ionizing state⁴ which quickly cools to a zwitterionic intermediate. We assign this state to a collective excitation as an alternative explanation of the source of the slow electrons. The collective state involves electron correlation within the parent molecule as well as the degeneracy of the auto-ionizing state.

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