CHASING NONEXISTENT COMPOUNDS WITH LASERS: ELECTRONIC SPECTROSCOPY OF MAIN GROUP TRANSIENT MOLECULES, FREE RADICALS, AND IONS

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One of the important contributions of the science of high resolution molecular spectroscopy has been the identification and characterization of new molecules in the gas phase, whether they exist in the laboratory, in extreme terrestrial environments, or in outer space. Despite the innovative efforts of many dedicated spectroscopists, one can still easily visualize a large number of novel small molecules that remain to be discovered and investigated. In this talk I will review the efforts of our group in recent years to study the electronic spectra of some new, and some not so new but still challenging species, concentrating primarily on those that are made up of main group elements. The target molecules have been produced in a pulsed electric discharge at the exit of a supersonic jet, often using novel precursors which we have had to synthesize in the laboratory. Conventional laser-induced fluorescence as well as wavelength resolved emission, stimulated emission pumping, fluorescence depletion and LIF sync-scan techniques have been used to detect the species of interest. Examples of diatomic and polyatomic transient molecules, free radicals, and ions that we have recently explored will be discussed.