COMBINED ANALYSIS OF THE $\widetilde{A}^2E'' - \widetilde{X}^2E'$ GAS-PHASE EXCITATION AND EMISSION SPECTRA OF Ag_3

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Metal clusters are of considerable interest as they bridge the atomic and solid states. Among the heavier homonuclear coinage metals is silver trimer Ag_3, a particularly interesting molecule in that although the orbitally degenerate $\widetilde{X}^2E'$ and $\widetilde{A}^2E''$ D_{3h} states can undergo Jahn-Teller (JT) distortion to C_{2v} states, spin-orbit splitting may partially quench this distortion. Both laser-induced fluorescence (LIF) and dispersed fluorescence (DF) spectra have been reported for Ag_3. Preliminary JT analyses for the $\widetilde{A}^2E''$ and $\widetilde{X}^2E'$ states have been based, respectively, on the LIF and DF data. However the interpretation has been subject to some ambiguity. High level *ab-initio* calculations have been performed with the express purpose of estimating the Jahn-Teller constants and spin-orbit effects in both states. These theoretically predicted molecular parameters initiated the Jahn-Teller simulations of the LIF and DF spectra, leading to an overall understanding of the spin-vibronic structure in each case.