THE ELECTRONIC SPECTRUM, MOLECULAR STRUCTURE, AND QUANTUM BEAT SPECTROSCOPY OF GERMYLIDENE (H_2C=Ge), THE SIMPLEST UNSATURATED GERMYLENE

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Strong S_2 - S_0 fluorescence has been observed in LIF spectra of jet-cooled germylidene, H_2C=Ge, produced by fragmentation of tetramethylgermane in a pulsed discharge. The ground and excited state molecular structures have been obtained from rotational analyses of the 0_0^0 bands of H_2C^{74}=Ge and D_2C^{74}=Ge. The vibrational structure of the spectrum is much more complicated than expected due to the prevalence of both vibronically induced bands and bands involving even quantum number changes in antisymmetric modes. The fluorescence decays of single rotational levels of the 0_0^0 band of H_2C^{74}=Ge exhibit molecular quantum beats for about 70% of the levels surveyed. Density of states arguments show that most of the beats originate from interactions with high rovibronic levels of the ground state, although accidental coincidences with excited triplet state levels also occur.