

OBSERVATION OF DRESSED MOLECULES IN NEAR INFRARED-RF DOUBLE RESONANCE SPECTROSCOPY OF CH₃I

CHIKAKO ISHIBASHI, RYUJI SANETO, and HIROYUKI SASADA, *Department of Physics, Faculty of Science and Technology, Keio University, 3-14-1 Hiyoshi, Kohoku-ku, Yokohama, 223-8522, Japan.*

Near infrared-radio frequency (rf) double-resonance spectroscopy of the vibrational overtone band of CH₃I molecules has been carried out. To record saturated absorption lines of the near-infrared transitions, we employed an optical Fabry-Perot cavity absorption cell ^a and a frequency modulation technique ^b. The rf field tuned with the hyperfine transition was applied through a pair of copper plates inserted in the Fabry-Perot cavity cell. Then the saturated absorption lines were split into two components separated by 1 MHz due to the ac-Stark effect. Two types of crossover resonances were also observed; one appears at the center frequency of the two near-infrared transitions that share either upper or lower level of the rf transition, and the others lie at the middle of the two components split by the ac-Stark effect. Quantum interference phenomena were also observed. All the spectral features have been well expressed in terms of the dressed-molecule picture of a four-level system ^c.

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^cC. Cohen-Tannoudji, J. Dupont-Roc, and G. Grynberg, "Atom-Photon Interactions", Wiley Interscience, New York (1992).