QUASI-MICROWAVE SPECTROSCOPY OF NON-POLAR DIATOMIC MOLECULE BY USING OPTICAL PHASE-LOCKED LASERS.

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A new type optical-optical double resonance (OODR) experiment was developed by using phase controlled light source. The difference frequency between two single-mode lasers was stabilized to a MW frequency synthesizer by using an optical phase-lock loop. The difference frequency can be continuously scanned from 0.1 to 18GHz. This system was applied to the B $^1\Pi_u$-X $^1\Sigma_g$+ transitions of Cs_2 molecule. Double resonance signals corresponding to the rotational transitions of the ground state or the excited state are measured in sub-Doppler condition and those frequencies are determined as accurate as MW spectroscopy. Furthermore heterodyne detection makes it possible to measure the real and imaginary part of the third order susceptibility of the B-X transition at the same time. This means we can detect the phase of the polarization in the molecular system coherently generated by the phase-locked two lasers.