RESONANCE-ENHANCED MULTIPHOTON IONIZATION SPECTROSCOPY OF CH_3 and CD_3. TWO-PHOTON ABSORPTION SELECTION RULES AND ROTATIONAL LINE STRENGTHS OF THE ν_3- AND ν_4- ACTIVE VIBRONIC TRANSITIONS

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To explore the possibility of *K*-level resolved, 2+1 resonance-enhanced multiphoton ionization (REMPI) processes of the methyl radical, the two-photon absorption selection rules and rotational line strengths of the 3_0^1 and 4_0^1 vibronic bands of the transition $np \leftarrow \tilde{X}$(*n*=3 or 4) were reported. Stringent selection rules, which were imposed upon these two-photon transitions, are the initial $K'' = 3p\,(p = 0, 1, 2, \ldots)$, $\Delta K = \pm 2$, $\Delta U = \pm 3$ and $\Delta N = 0, \pm 1, \pm 2$ (*O*, *P*, *Q*, *R*, and *S* branches). The previously assigned 2_2^2 vibronic band of the methyl radical should be studied by the REMPI with a better spectral resolution and analyzed by the newly derived two-photon absorption selection rules and rotational line strength formulas.