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标题: Infrared-terahertz double-resonance spectroscopy of CH3F and CH3Cl at atmospheric pressure
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摘要: A method for highly selective remote sensing of atmospheric trace polar molecular gases is described. Based on infrared-terahertz double-resonance spectroscopic techniques, the molecule-specific coincidence between the lines of a CO2 laser and rotational-vibrational molecular absorption transitions provide two dimensions of recognition specificity: infrared coincidence frequency and the corresponding terahertz frequency whose absorption strength is modulated by the laser. Atmospheric pressure broadening expands the molecular recognition "specificity matrix" by simultaneously relaxing the infrared coincidence requirement and strengthening the corresponding terahertz signature. Representative double-resonance spectra are calculated for prototypical molecules CH3F and CH3Cl and their principal isotopomers from which a heuristic model is developed to estimate the specificity matrix and double-resonance signature strength for any polar molecule.
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