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Title:High degree of molecular orientation by a combination of THz and femtosecond laser pulses
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Abstract:We propose a method for achieving molecular orientation by two-step excitation with intense femtosecond laser and terahertz (THz) pulses. First, the femtosecond laser pulse induces off-resonant impulsive Raman excitation to create rotational wave packets. Next, a delayed intense THz pulse effectively induces resonant dipole transition between neighboring rotational states. By controlling the intensities of both the pulses and the time delay, we can create rotational wave packets consisting of states with different parities in order to achieve a high degree of molecular orientation under a field-free condition. We numerically demonstrate that the highest degree of orientation of $\cos\theta$ >0.8 in HBr molecules is feasible under experimentally available conditions.
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