Abstract Submitted
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Evolution of Molecular Alignment in a Background Plasma ANDREW PEARSON, University of Maryland, THOMAS ANTONSEN — We study numerically the behavior of rotational revivals in a molecular gas when subject to the fluctuating electric field of a background plasma. We model a molecule as a rigid rotor and couple it to an electric field using permanent and induced multipole interactions. The evolution of the density matrix for the molecule is calculated for a short, intense laser pulse, followed by a fluctuating electric field. A broad superposition of angular momentum eigenstates of a molecule is created by the laser field, and the result is a set of recurring peaks in the probability density for observing a particular orientation – the so-called 'rotational revivals.' Experimentally, this effect is manifest as a variation in the refractive index of the gas [1]. The fluctuating field is created using the dressed particle method, and the result is a loss of coherence between the phases of the basis states of the molecule, which causes a decreasing amplitude for subsequent alignment peaks. Modern short-pulse lasers operate with sufficient intensity to make this effect relevant to experiments in molecular alignment. This work was supported by the Department of Energy.

[1] Y.-H. Chen et. al., Optics Express Vol. 15, No. 18, 11341 (2007)

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