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**Control of spin-dependent rotational decoherence of ultracold polar molecules in optical potentials**[1] SVETLANA KOTOCHIGOVA, ALEXANDER PETROV, KOSTAS MAKRIDES, Physics Department, Temple University, TEMPLE UNIVERSITY TEAM — We investigate the internal rovibronic and hyperfine quantum states of ultracold fermionic ground-state KRb polar molecules, when static magnetic, static electric, and trapping laser fields are simultaneously applied. Understanding the effect of changing the relative orientation or polarization of these three fields is of crucial importance for creation of decoherence-free subspaces built from two or more rovibronic states. We also evaluate the imaginary part of the polarizability, due to spontaneous emission from excited electronic states. Here, the imaginary part is calculated assuming that excited vibrational levels have a linewidth evaluated by either using the linewidth of atomic K or Rb or using an optical-potential approach. Moreover, we evaluated the induced dipole moment of the internal rovibronic and hyperfine quantum as a function of external electric field. With this precise value of the dipole moment one can investigate of how interactions between molecules in the different optical lattice sites depend on the relative orientation of the applied fields. Our theoretical research efforts are closely linked to ongoing experiments with ultracold KRb molecules.

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