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Metastable states in the HeNe* excimer CRISTIAN BAHRIM, Department of Physics, Lamar University — The adiabatic electronic potential wells of the HeNe* excimer include a series of vibrational states for internuclear distances R < 6 au. A set of vibrational-electronic transitions were proposed by Bahrim and Hunt [1]. The electronic potentials have been generated using a detailed model potential for the description of the Coulomb and spin-orbit interactions between Helium and Neon many-electron atoms and were tested in the analysis of atomic depolarization processes for both anisotropic and isotropic collisions. The vibrational modes within each potential well have been calculated using a Morse potential model accounting for the anharmonic motion of the atoms in collision. We propose a scheme where the HeNe* excimer initially excited on a vibrational state is further excited using a short duration IR pulse on another vibrational state of a different molecular potential well. We look for an upper vibrational state with a metastable character. In our analysis we assess the influence of the avoided crossing regions between adiabatic molecular states. Our goal is to trap the HeNe* excimer on long-lived (metastable) vibrational-electronic states which could be used as upper levels for new lasing transitions in IR.

[1] Bahrim, Cristian and Hunt, Joseph 2006 J. Phys. B: At. Mol. Opt. Phys. vol. 39, pp. 4683-4700.

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