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AC-Stark effect in a semiconductor self-assembled quantum lens<sup>1</sup> AREZKY H. RODRÍGUEZ, L. MEZA-MONTES, Instituto de Física, Universidad Autónoma de Puebla, C. TRALLERO-GINER, Dept. of Theoretical Physics, Univ. of Havana, S.E. ULLOA, Dept. of Physics and Astronomy, Ohio Univ. — We present a theoretical study of the effects of an ac electric field applied along the direction of axial symmetry of quantum dots with lens shape. This geometry has been found to realistically describe semiconductor quantum dots grown by self-assembly [1]. Using the Floquet formalism, the time-dependent Hamiltonian in the effective mass approximation is solved. A conformal analytical image is designed to map the quantum dot boundary into a dot with semi- spherical shape, allowing one to obtain a complete set of orthonormal functions to characterize the physical problem, while keeping the full lens symmetry. The Hamiltonian for a carrier confined in the quantum lens is correspondingly mapped into an equivalent operator and the corresponding Dirichlet problem is analyzed. We show that the Hilbert space of solutions is separated into orthogonal subspaces with different z- component of angular momentum. We give an explicit analytical representation for the quasi-energy spectrum and electronic states as function of the lens parameters and electric field intensity. [1] M. Muoz et al., Appl. Phys. Lett. 83 4399 (2003).

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