Cubic Dresselhaus Spin Orbit Coupling in Small Quantum Dots
JACOB J. KRICH, BERTRAND I. HALPERIN, Harvard University — Due to the suppression of linear spin-orbit effects in small quantum dots in two-dimensional electron systems, the cubic Dresselhaus spin-orbit coupling can play a significant role in such phenomena as the variance of conductance through a dot. We characterize the different spin-orbit coupling terms by the strength of the anti-crossings they induce in the eigenstates of a closed quantum dot as an in-plane magnetic field is increased, and we perform numerical simulations in a chaotic billiard model to estimate the RMS anti-crossing energy. We investigate the conditions under which the cubic Dresselhaus effects may be measurable and significant for realizable dot configurations.

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