QUANTUM VOICEPRINTS : WAVE DECOHERENCE AND REVIAL IN MODEL ROTOR SYSTEM AND LEVEL CLUSTER DYNAMICS

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Computer graphic simulations of quantum mechanical interference patterns provide an insightful visualization of atomic and molecular Fourier properties. A simple Bohr-ring rotor model exhibits erextraordinary space-time probability patterns for orbiting electrons as their amplitudes evolve in time. Nodal dynamics present the most salient observables: instances of low or zero probability evolve through a series of coherent localization revivals in between various kinds ofde-localization. Prior studies of systems with linear (harmonic-optical) or quadratic (Bohr-Schrodinger-Newtonian) dispersion functionsgives reliable timetables for their revivals. We now expand this work to systems having more general dispersion functions such as may occur in certain types of molecular rotors with rovibronic level clusters . It may be physically controllable in quantum dot or fiber optic systems. Beginning with a combination of the linear and quadratic terms, we discuss general methods for determining or producing different kinds of revival timetables. The possibility of having "designer dispersion functions," which exhibit unique quantum properties, might provide a crucial link in creating working quantum computing systems.