EFFECTS OF SUPERFINE STRUCTURE LEVEL-CLUSTER CROSSING ON AMPLITUDE AND PHASE REVIVAL DYNAMICS: COMPARING TETRAHEDRAL AND OCTAHEDRAL SPHERICAL ROTORS WITH ICOSAHEDRAL ROTORS

WILLIAM G. HARTER, and ALVASON ZHENHUA LI, *Department of Physics, University of Arkansas, Fayetteville, AR 72701*.

Quantum revivals or super-beats are predicted to occur when angularly localized symmetric tops states are free to evolve. Similar types of dynamics are expected to involve spherical top superfine and superhyperfine level clusters that are labeled by induced representations of octahedral or tetrahedral symmetries for XY_4, XY_6, and related molecules. A considerably more complicated set of effects are expected for the icosahedral molecule C_{60} and its related isotopomers. An important difference for icosahedral symmetry is that its superfine splitting ratios are most-irrational (Golden-ratio) fractions that preclude perfect Poincare recurrence of quantum phase while the octahedral splitting ratios are rational.[a]

[a] William Harter and Justin Mitchell, International Journal of Molecular Science, 14, 714 (2013).