Abstract Submitted
for the DAMOP06 Meeting of
The American Physical Society

Quantum-optical Space-time Wave Frames: When light coordinates itself coherently WILLIAM HARTER, JUSTIN MITCHELL, University of Arkansas — Careful re-examination of details of quantum and classical optical wave interference leads to a more precise and elegant logic for two of the foundations of modern physics, special relativity and quantum theory. This provides a transparent unified development of both subjects together in a few simple logical steps with improved intuition and fewer "mysteries." The first step is an Occam razor reduction of Einstein's axiom to a spectral form based on linear dispersion or, "All colors go c." Then wave nodal planes of interfering CW beams or optical cavity modes provide their own space-time coordinate frames with a reciprocal per-space-time lattice.[1] These clearly display Lorentz-Poincare symmetry and hyperbolic dispersion characteristic of quantum matter with very simple Compton recoil analyses. Accelerated coordinate frames made by cavity chirping are used to relate Compton effects to the relativistic shifts and horizons that are present in an Einstein elevator and shows them to be an elegant result of wave interference. [1] W. G. Harter, J. Mol. Spect. 210, 166 (2001)

William Harter
University of Arkansas

Date submitted: 15 Mar 2006 Electronic form version 1.4