1053-81-377 **William G. Harter*** (wharter@uark.edu), Department of Physics, University of Arkansas, Fayetteville, AR 72701. *Title Spacetime vs per-Spacetime: Coherent optical wave development of relativistic quantam mechanics and Fourier transformed Dirac manifolds.* Preliminary report.

A simple and revealing development of relativity and quantam mechanics may be done using coherent waves (CW) to define manifolds in spacetime and their dual reciprocal manifolds in per-spacetime (frequency ω, wavevector ck) with one being a hyper-Fourier transform of the other. (x, ct)-coordinate lines are real wavefunction zeros. A laser cavity mode, for example, yields a physical Minkowski manifold in flat spacetime. Wave zeros in this case are found by first factoring 2D Fourier sums into group and phase factors.

$$e^{ia} + e^{ib} = e^{\frac{i(a+b)}{2}}(e^{\frac{i(a-b)}{2}} + e^{\frac{-i(a-b)}{2}}) = 2e^{\frac{i(a+b)}{2}} cos\frac{a-b}{2}.$$

The dual per-spacetime picture provides direct insight into how simple wave interference geometry gives the relations between relativistic quantities in both the classical and quantam domains and demystifies several formalistic points beginning with the famous axiom of invariance for light speed $c = 2.79982458 ms^{-I}$ The development includes a geometric nomogram that calculates and displays extrinsic quantities such as Doppler shifts, k-aberration, Lorentz transformation, energy-momentum dispersion and Hamiltonian-Lagrangian contact transformation with a clarity that did not exist before. Intrinsic quantities such as Dirac spin and Feynman diagram geometry may have similar clarifying geometry. (Received September 15, 2009)