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Time required: 15 min
Session Categories (Keywords) by Relevance: Pedagogy — Fundamental physics — Theory and Computation — Dynamics and kinetics — Radicals
Mini-Symposia Requested: None — None
Competing for Rao Prize? No
Competing for Miller Prize? No
Comment: *Please schedule this immediately before P598.*

"SIMPLEST MOLECULE" CLARIFIES MODERN PHYSICS I. CW LASER SPACE-TIME FRAME DYNAMICS

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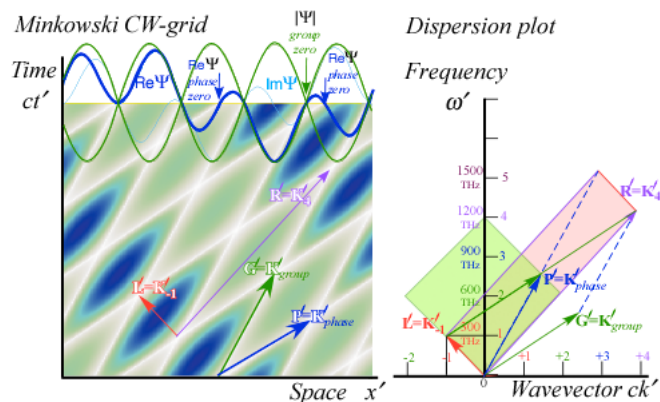
Molecular spectroscopy makes very precise applications of quantum theory including GPS, BEC, and laser clocks. Now it can return the favor by shedding some light on modern physics mysteries by further unifying quantum theory and relativity.

We first ask, "What is the simplest molecule?" Hydrogen H_2 is the simplest <u>stable</u> molecule. *Positronium* is an electron-positron (e^+e^-)-pair. An even simpler "molecule" or "radical" is a photon-pair (γ, γ) that under certain conditions can create an (e^+e^-)-pair.

To help unravel relativistic and quantum mysteries consider CW laser beam pairs or TE-waveguides. Remarkably, their wave interference immediately gives Minkowski space-time coordinates and clearly relates eight kinds of space-time wave dilations or contractions to shifts in Doppler frequency or wavenumber.

Modern physics students may find this approach significantly simplifies and clarifies relativistic physics in space-time *(x,ct)* and inverse time-space *(ω,ck)*. It resolves some mysteries surrounding super-constant *c=299,792,458m/s* by proving "Evenson's Axiom" named in honor of NIST metrologist Ken Evenson (1932-2002) whose spectroscopy established c to start a precision-renaissance in spectroscopy and GPS metrology.

The following Talk II applies this approach to relativistic quantum mechanics.

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