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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

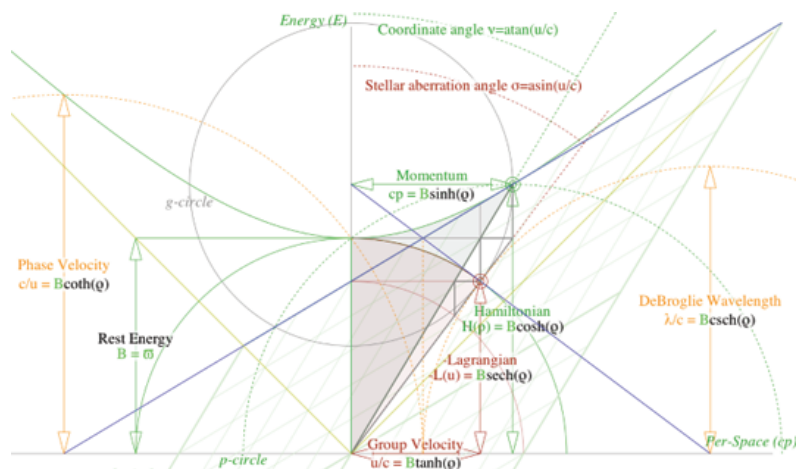
Comment: *Please schedule this immediately after P592.*

"SIMPLEST MOLECULE" CLARIFIES MODERN PHYSICS II. RELATIVISTIC QUANTUM MECHANICS

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A "simplest molecule" consisting of CW-laser beam pairs helps to clarify relativity in Talk I. In spite of a seemingly massless evanescence, an optical pair also clarifies classical and quantum mechanics of relativistic matter and anti-matter.

Logical extension of (x, ct) and (ω, ck) geometry gives relativistic action functions of Hamiltonian, Lagrangian, and Poincare that may be constructed in a few ruler-and-compass steps to relate relativistic parameters for group or phase velocity, momentum, energy, rapidity, stellar aberration, Doppler shifts, and DeBroglie wavelength. This exposes hyperbolic and circular trigonometry as two sides of one coin connected by Legendre contact transforms. One is Hamiltonian-like with a longitudinal rapidity parameter ρ (log of Doppler shift). The other is Lagrange-like with a transverse angle parameter σ (stellar aberration). Optical geometry gives recoil in absorption, emission, and resonant Raman-Compton acceleration and distinguishes Einstein rest mass, Galilean momentum mass, and Newtonian effective mass. (Molecular photons appear less bullet-like and more rocket-like.) In conclusion, modern space-time physics appears as a simple result of the more self-evident Evenson's axiom: "All colors go c."



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