The Map of Physics and Missing Phase Equations of Quantum Mechanics DOUGLAS SWEETSER, quaternions.com of Acton, MA — Minkowski's vision was that we would - someday - never think of space without time, nor correspondingly, energy without momentum. One way to enforce the vision is to write physics equations using quaternions that require 4 slots to be filled even if they are zeros. Do this for a number of physics equations,and patterns appear: if a quaternion physics equation has zeros or constants, then that equation is classical. If all the space and time terms are on equal footing, then the equation is relativistic. This rule clarifies why the Schrdinger equation belongs to classical quantum mechanics, but the Klein-Gordon equation is relativistic quantum mechanics. The need to take a norm is what distinguishes an equation is quantum versus non-quantum. The uncertainty principle derivation uses the Cauchy-Schwarz inequality which requires taking a norm. Applied consistently to the Klein-Gordon equation, a quaternion physics expression insist there should be three more equations that are not part of the canon of modern physics. I have yet to put such equations to productive use, but am willing to point them out.

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