Two Mathematically Equivalent Versions of Maxwell's Equations

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Abstract

In the first part of this talk I review the canonical proper-time approach to relativistic mechanics and classical electrodynamics. This version is mathematically equivalent, but not physically equivalent to the standard formulation of Maxwell's equations. It fixes the clock of the field source for all inertial observers (simultaneity). However, the (natural definition of the effective) speed of light is no longer an invariant for all observers, but depends on the motion of the source. This version allows us to account for radiation reaction without any of the problems associated with the Abraham-Dirac-Lorentz four-vector force. This version provides a new invariance group, is a nonlinear representation of the Lorentz group. The corresponding particle theory is independent of particle number and non-invariant under time reversal (arrow of time), while the canonical Hamiltonian associated with the clock of the source is positive definite and directly compatible with quantum mechanics.

In the second part of this talk I show that the new version is naturally compatible with the existence of antimatter and requires Santilli's iso-dual numbers. I also show that this theory suggests that light may reach us from much farther away and with more intensity than is traditionally expected, so that we may well be looking at some galaxies that are not as close and others that are not as far as predicted from conventional theory.