

Spinors and Pre-Metric Electromagnetism

David Delphenich

Abstract. The basic concepts of the formulation of Maxwellian electromagnetism in the absence of a Minkowski scalar product on spacetime are summarized, with particular emphasis on the way that the electromagnetic constitutive law on the space of bivectors over spacetime supplants the role of the Minkowski scalar product on spacetime itself. The complex geometry of the space of bivectors is also summarized, with the intent of showing how an isomorphic copy of the Lorentz group appears in that context. The use of complex 3-spinors to represent electromagnetic fields is then discussed, as well as the expansion of scope that the more general complex projective geometry of the space of bivectors suggests.

Keywords. Pre-metric electromagnetism, complex structures, complex 3-spinors, representations of the Clifford algebra of Minkowski space, complex projective geometry.

David Delphenich
Physics Department
Bethany College
Lindsborg, KS 67456 USA
e-mail: delphenichd@bethanylb.edu

Received: October 11, 2005

Accepted: June, 2006