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Classical U (1) and SU (3) gauge theories in Weyl 2-spinor form and quark-gluon field induced equations of motion

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Starting with a not very much known relation between the Lorentz group and the Lorentz Force in plain words, between the Geometry of Minkowskian spacetime and electromagnetic forces, we generalize this idea to Weyl 2-spinor space and obtain a coupled linear spinor first order differential equations equivalent to the Lorentz Force. We discuss some solutions which have no counterpart within the tensor formalism describing intrinsic spin $\frac{1}{2}$, it is known that every tensor equation can be written in 2-spinor form while the opposite assertion is not necessarily true. Next, a Lagrangian density having units of energy per unit length defined along the classical path of the particle and a U (1) local gauge symmetry with a field coupling in terms of the field strength quantities (instead of the usual four potentials) is proposed. Next, we extend the former description to SU (3) non-abelian symmetry and obtain classical spinor equations describing the dynamics, in the classical, high energy limit, of quark-quark (or antiquark) interactions mediated by gluonic color forces. From the eight gluon fields associated with SU (3), it is shown that two of them (colorless but not in a single combination) give rise to the same kind of interaction described by electrodynamics. We end the presentation, with an informal discussion about an eventual reformulation of the standard model in the 2-spinor language having, as a classical limit, the spinor equations that have been previously considered.

Biography

J Buitrago is a Professor of Physics at the University of La Laguna in Tenerife, Spain. His research activities have been on a wide range of disciplines such as General Relativity, Relativistic Quantum Theory, Gauge Theories, Cosmology, some areas of Astrophysics, Gravitational Waves and Cosmology. He has imparted undergraduate and graduate courses on Astrophysics, Nuclear Physics, General Relativity, Cosmology and Gauge Theories. He has directed five doctoral thesis and published more than 30 articles. He was also visiting fellow during six months at the University College of Cardiff as well as three months in Cambridge.

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