

On the Logical Origin of the Laws Governing the Fundamental Forces of Nature: a New Axiomatic Algebraic Approach

Ramin Zahedi

Institute: Hokkaido University, JAPAN
zahedi@let.hokudai.ac.jp

Abstract. This article is a summary of an expanded version of my previous publication [<https://inspirehep.net/record/1387680/>, 2015]. In part I (pp. 1-10) of this article, I provide an analysis and overview concerning discrete physics. In Part II (the main part, pp.11-97) of this article I present a new axiomatic matrix approach based on the ring theory (including the integral domains) and the generalized Clifford algebra. On the basis of this (primary) mathematical approach, by linearization (and simultaneous parameterization, as necessary algebraic conditions), followed by first quantization of the relativistic energy-momentum relation (defined algebraically for a single particle with invariant mass m_0), a unique and original set of the general relativistic (single-particle) wave equations are derived directly. These equations are shown to correspond uniquely to certain massive forms of the laws governing the fundamental forces of nature, including the Gravitational (Einstein), Electromagnetic (Maxwell) and Nuclear (Yang-Mills) field equations (formulated solely in (1+3) dimensional space-time), in addition to the (half-integer spin) single-particle wave equations such as the Dirac equation (which are formulated solely in (1+2) dimensional space-time). In particular, a unique massive form of the general theory of relativity – with a definite complex torsion – is shown to be obtained solely by first quantization of a special relativistic algebraic matrix relation. In addition, it is shown that the "massive" Lagrangian density of the obtained Maxwell and Yang-Mills fields could be also locally gauge invariant – where these fields are formally re-presented on a background space-time with certain complex torsion which is generated by the invariant mass of the gauge field carrier particle. Subsequently, in agreement with certain experimental data, the invariant mass of a particle (that actually would be identified as massive photon) has been specified ($m_\gamma \approx 1.470696 \times 10^{-41}$ kg), which is coupled to background space-time geometry. Moreover, based on the unique structure of general relativistic particle wave equations derived and also the assumption of chiral symmetry as a basic discrete symmetry of the source-free cases of these fields, it has been proven that the universe cannot have more than four space-time dimensions. In addition, an argument for the asymmetry of left and right handed (interacting) particles is presented. Furthermore, on the basis of definite mathematical structure of the field equations derived, it is also shown that magnetic monopoles (in contrast with electric monopoles) could not exist in nature.

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