Octonionic Geometry

Merab Gogberashvili

E-mail: Merab.Gogberashvili@tsu.ge

Chair of Elementary Particles and Quantum Fields,
Department of Physics,
I. Javakhishvili Tbilisi State University,
3 Chavchavadze Ave., Tbilisi 0179, Georgia &
TSU E. Andronikashvili Institute of Physics,
6 Tamarashvili St., Tbilisi 0177, Georgia

We model physical signals using elements of the algebra of split octonions over the field of real numbers [1-5]. Using explicit representations of the automorphisms on split-octonions, which form the non-compact form of Cartan's smallest exceptional Lie group G2, it is shown that octonionic geometry naturally exhibit properties of conventional (3+1)-theory (e.g. number of dimensions, existence of maximal velocities, Heisenberg uncertainty, particle generations, etc.) [6]. G2 generates specific rotations of (3+4)-vector parts of split octonions and in infinitesimal limit imitates the standard Poincare transformations, where translations are represented by the non-compact Lorentz-type rotations towards the extra tree time-like coordinates. In our approach elementary particles are corresponded to the special elements of the algebra that nullify octonionic norms (zero divisors). It is shown that the particle spectrum of Standard Model naturally follows from the classification of the independent primitive zero divisors of split octonions [7].

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