Generalisation of the Hyperincursive Discrete Klein-Gordon Equation to Real 16-Spinors, Deduction of the Majorana Real 4-Spinors and the Dirac Real 8-Spinors as an Extension of the Hyperincursive Discrete Harmonic Oscillator

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Abstract. This paper begins with an extended formalization of the hyperincursive second order discrete Klein-Gordon quantum relativist equation which bifurcates to 16 real spinors giving 4 real 4-spinors equations. In this paper, we generalize to three spatial dimensions the one-dimensions Dubois-Ord-Mann real 4-spinors equation. We deduce the Dubois-Majorana real 4-spinors equation in one spatial dimension, which is similar to the Dubois-Ord-Mann equation. This hyperincursive equation bifurcates to 4 discrete incursive equations. These 4 discrete equations are then transformed to real 4-spinors partial differential equations which can be written under the generic form of the Dirac quantum relativist equation. The deduction of the Majorana real 4-spinors equation is made in considering simply a change of indexes of the functions. The hyperincursive discrete harmonic oscillator is the basis for formalizing the Majorana equation and even the Dirac equation, in giving an unification of discrete mechanics. New interpretation of the harmonic oscillator is proposed in view of Majorana real sponsors. The Dubois-Majorana discrete real 4-spinors equation shows explicitly that the Majorana equation is in fact composed of a discrete hyperincursive spatial oscillator entangled to a spatial harmonic anti-oscillator, related to the particle electron and anti-particle positron in Majorana. Finally, we show that the complex Dirac equation is a bifurcation of the real Majorana equation.

Keywords: Quantum relativist system, real sponsors, Hyperincursive system, Klein-Gordon, Dirac, Majorana