An Addendum on Our Previous Demonstration of Wave Function Collapse in Quantum Mechanics

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Abstract : In this brief note we introduce only some further technical detail on the demonstration that we have given in previous years on the algebraic and physical manner in which the wave function of quantum mechanics collapses.

Key words : quantum wave function collapse, foundations of quantum mechanics, Clifford algebra .

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The aim of such brief note is to expose an aspect that of course is and was implicit in our demonstration that in past years we have given on the manner in which the wave function of quantum mechanics collapses. Our demonstration started to be exposed in our previous book entitled Biquaternion Quantum Mechanics that was edited in Italy by Pitagora Editrice (ISBN 88-371-1189-4, copyright 2000). Subsequently a detailed demonstration on the manner in which the collapse of wave function happens was given in the Chapter 1 of the book of this author entitled Advances in Application of Quantum Mechanics in Neuroscience and Psychology : A Clifford Algebraic Approach , Nova Science Publishers Inc. New York (ISBN978-1-61470-325-9) 2011 , following previous publications , one on International Journal of Theoretical Physics entitled A Reformulation of von Neumann's postulates of quantum mechanics by using two theorems in Clifford Algebra (IJTP, 2010,49, 587-614) and one as special issue entitled Quantum Theory : Reconsiderations of Foundations with a paper entitled A proof of von Neumann's postulates in quantum mechanics (American Journal of Physics 1232,201-205, 2010 doi 10.1063/1.3431489) . The book published by Nova , also if essentially devoted to applications of quantum mechanics to Neuroscience and Psychology , contains the first chapter devoted to such previous mentioned demonstration. In essence our demonstration is based on the use of two theorems that we give proof evidencing that the quantum mechanical wave function collapse is a transition from the standard three basic anti commuting elements Clifford algebra $A(S_i)$ having the basic elements direct isomorphism with the well known spin Pauli 2x2 matrices, to the dihedral Clifford algebra $N_{i,\pm 1}$.

This author asks the reader to deepen the subject-matter on the basis of all the publications that have been quoted above in which he exposes the theory in the light of all possible profiles both under a strictly mathematical and physical feature and includes in particular many examples in which it is proved as the collapse of the wave function really happens and also studies the temporal evolution of the system in accordance with the Schrodinger equation.

The note that is important to confirm here is that when the author in the demonstration considers the Clifford algebra $A(S_i)$, introduces the nilpotents $(e_1 + ie_2)$ and $(e_1 - ie_2)$ that of course are reduced to zero as consequence during the collapse of the wave function in the Clifford algebra $N_{i,\pm 1}$.

It is important to observe here that such nilpotents in the realized algebraic structure are the well known fermion creation and annihilation operators of quantum mechanics having the well known established action on quantum states. As consequence of such important counterpart existing of fermion operators with the Clifford algebra $A(S_i)$ that transitates to Clifford algebra $N_{i,\pm 1}$ during the wave function collapse ,and reducing nilpotents to zero , it does not result difficult to realize a model and an actual arrangement of a device really interacting with the quantum system to induce the expected collapse.