ON CELLULAR AUTOMATA REPRESENTATION OF SUBMICROSCOPIC PHYSICS: FROM STATIC SPACE TO ZUSE'S CALCULATING SPACE

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"Digital Mechanics is a discrete and deterministic modeling system which we propose to use (instead of differential equations) for modeling phenomena in physics.... We hypothesize that there will be found a single cellular automaton rule that models all of microscopic physics; and models it exactly. We call this field Digital Mechanics." - Edward Fredkin

ABSTRACT

In some recent papers (G. 't Hooft and others), it has been argued that quantum mechanics can arise from classical cellular automata. Nonetheless, G. Shpenkov has proved that the classical wave equation makes it possible to derive a periodic table of elements, which is very close to Mendeleyev's one, and describe also other phenomena related to the structure of molecules. Hence the classical wave equation complements Schrödinger's equation, which implies the appearance of a cellular automaton molecular model starting from classical wave equation. The other studies show that the microworld is constituted as a *tessellation* of primary topological balls. The tessellattice becomes the origin of a submicrospic mechanics in which a quantum system is subdivided to two subsystems: the particle and its inerton cloud, which appears due to the interaction of the moving particle with oncoming cells of the tessellattice. The particle and its inerton cloud periodically change the momentum and hence move like a wave. The new approach allows us to correlate the Klein-Gordon equation with the deformation coat that is formed in the tessellatice around the particle. The submicroscopic approach shows that the source of any type of wave movements including the Klein-Gordon, Schrödinger, and classical wave equations is hidden in the tessellattice and its basic exciations – inertons, carriers of mass and inert properies of matter. We also discuss possible correspondence with Konrad Zuse's calculating space.

Keywords: Schrödinger equation, Klein-Gordon equation, classical wave equation, Shpenkov's interpretation, periodic table of elements, molecule, cellular automata, submicroscopic concept, tessellattice, inertons, Konrad Zuse

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