# UNIVERSAL HUYGENS PRINCIPLE OF SYNCHRONIZATION AND COORDINATION IN THE DNA AND CELL MOLECULES

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Many objects in Nature - elementary particles, nuclei, atoms, molecules,... DNA, proteins, etc. are built as self-consistent hierarchical systems and have the same homological constructions in the sense that they are found by the same fundamental physical laws: energy-momentum conservation law and sectorial conservation law (the second Kepler law). Schrödinger [1] wrote that an interaction between microscopic physical objects is controlled by specific resonance laws. According to these laws any interaction in a microscopic hierarchic wave system exhibits the resonance character. Due to the above-said the corresponding partial motions are determinate. This determinism arises as a consequence of the energy conservation law. As the resonance condition arises from the fundamental energy conservation law, the rhythms and synchronization of the majority of phenomena to be observed are the reflection of the universal property of self-organization of the Universe. The Huygens synchronization principle is substantiated at the microscopic level (see, for details [2]) as the consequence of energy conservation law and resonance character of any interaction between wave systems. In this paper we have demonstrated the universality of the Huygens synchronization principle independent of substance, fields, and interactions for microsystems. Thereby, we bring some arguments in favor of the mechanism - ORDER from ORDER, declared by Schrödinger in [3], fundamental problem of contemporary science. We come to a conclusion [4] that a stable proton and a neutron play the role of a standard for other elementary particles and nuclei. They contain all necessary information about the structure of other particles and nuclei. This information is used and
reproduced by simple rational relations, according to the fundamental conservation law of energy-momentum.

We originated from the principles of commensurability and self-similarity [5]. The commensurability and self-similarity result in the very unity of the world. The principle of commensurability is displayed in phenomena in different branches of science [5]. All material objects (micro- and macrosystems) that are described by standing waves know all about each other. Each object is the scaled one of the other and it is not possible to say which is more "fundamental". In this work we have demonstrated that the structure of DNA and cell molecules can be calculated with some structure of a hydrogen atom. The interatomic distances in cell molecules are quantized according to the quantization rule of the fractional Hall effect. Therefore, we can conclude that the structure of DNA and cell molecules can be established from the analysis of hydrogen spectra using the quantization rule of the Hall effect and vice versa. The bridge between the structure of a hydrogen atom, cell molecules and the Hall effect exists!

It is very surprising that there are phenomena in Nature that are really described by simple rational relations. Only the fundamental conservation law of energy-momentum is responsible for this harmonic movement. We are now able to calculate and predict the structure of a cell molecule, and we invite people for cooperation (e-mail: gareev@thsun1.jinr.dubna.su).

The Huygens principle of synchronization became a fruitful interdisciplinary science of general laws of self-organized processes in different branches of physics. It is intriguing to speculate that many questions can be now formulated as a result of universality of the Huygens synchronization principle independent of substance, fields, matter, and interactions for micro- and macrosystems [6]. Information concerning important details of an ecosystem's evolution is contained in frequency spectra. Therefore matter turns out to be a form of organized information. The Universe was arranged according to number, harmony and perfect forms.

A new concept in evolution is *robustness*. One suggests simulating evolution of complex organisms constrained by the sole requirement of robustness in their expression patterns. Robustness in biophysics is defined as the ability to function in face of substantial changes in components. Robustness is implemented by constraining subsequent patterns to have *similar* expression patterns. Key properties of biochemical networks are robust, i.e. they are insensitive to

precise values of the biochemical parameters [7]. Robustness is an important ingredients in simple molecular networks and probably also an important feature of gene regulation. Bornhold S. and Sneppen K. [8] suggest considering *robustness* as an evolutionary principle. We came to the conclusion that the robustness principle can be understood in the framework of the universal Huygens synchronization principle.

**References**


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