

XXV International Baldin Seminar on High Energy Physics Problems "Relativistic Nuclear Physics and Quantum Chromodynamics"



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Relativistic Nuclear Physics & Quantum Chromodynamics

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Nature of Nuclear Physics

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The absence of really new physics demonstrates that the Nature has put screen to the "large sledgehammer" (LHC) and one can conclude that to put experiment at the forefront in definite sense is similar "to look for lost keys under lantern because it is more lightly at this place." Really, the Nature does not operate with lines, clocks, accelerators and uncountable set of other devices which provide observers with not uniquely defined representations about Nature. There is Nature and our representations about Nature.

If so, it is time to think about a dual scientific paradigm to discover laws of Nature itself which should not to have approximate and temporal character in comparison with those that observers invented in the framework of the current scientific paradigm. But how to realize this possibility?

We put forward an idea that the mathematics (science of numbers) is a base form of internal organization of Nature and consider this as a dual paradigm. In accordance with the universal role of gravity we also pay attention on the seminal work of Einstein and Grossmann published in 1913 (Einstein A. // Z. Math. und Phys., 1913, 62, 225–261. (Mit M. Grossmann)) and Einstein's next year work (Einstein A. // Sitzungsber. preuss. Acad. Wiss., 1914, 2, 1030–1085). On this ground we formulate the first principle of the dual paradigm which is intended to unravel secrets of ordered connection of internal notions and laws according to which the Nature itself is organized.

To find a way that leads from electromagnetism to an internal time of Nature itself in the framework of the dual paradigm, we restore the fundamental notions of electric and magnetic fields, derive the general covariant Maxwell equations for these fields and recognize that the general covariant fundamental notion of the interval is determined

not the Lorentz group but a general covariant bilateral symmetry. With this, we have possibility to give definition of an internal time of Nature itself as well recognize that there are two different internal times. The dual internal time clearly demonstrates that in certain sense the well-known idea of rotating rigid body of classical mechanics is as fundamental as the idea of massive point, i.e., the first concept can be reduced to the second one at the fundamental, field-theoretical, level (Ivanhoe B. Pestov. // New Fundamentals for Particle Physics. Emergent Spin and Duality of Time. // In: Horizons in World Physics, Volume 302, Chapter 4, pp. 77–118. Nova science publishers, Inc, New York, 2020; Preprint JINR E2–2022–57, Dubna, 2022). This explains why nucleus exist in Nature and opens completely new possibilities to explain nature of nuclear matter.

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