

## NEW CONCEPTS IN SCIENCE

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### ABSTRACT

Science is the Art of discovering hidden knowledge. It is also the technology of using the known knowledge for the benefit of society. It can as well work against society. How concepts of science can be used for the benefit and survival of society is discussed and amplified in some detail.

## QUASI-PARTICLE ENERGY OF A MIXTURE OF BOSONS AND FERMIONS

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### ABSTRACT

The quasi-particle energy of a mixture of interacting bosons and fermions has been calculated by diagonalizing the model Hamiltonian for such a mixture. The model Hamiltonian contains the scattering length  $a_{BF}$  for interaction between bosons and fermions, and the scattering length  $a_{BB}$  for interactions between the bosons. Due to Pauli's principle, the scattering length  $a_{FF}$  between the fermions is not considered since such collisions are ruled out. The model Hamiltonian  $H$  is diagonalized by using a canonical transformation meant for an assembly that is a mixture of bosons and fermions. From the diagonalized Hamiltonian, the quasi-particle energy is obtained in terms of  $a_{BF}$  and  $a_{BB}$ , and other parameters, such as the mass of the particles and the particle number density of the components. In the lowest energy state, the assembly will be in the superfluid state, and the expression for the quasi-particle energy displays how phase separation of the two phases (bosons and fermions) can take place by changing the sign of  $a_{BF}$  and  $a_{BB}$  by Freshbach resonance method. When  $a_{BF}$  is positive, it corresponds to repulsive interaction, and when  $a_{BF}$  is negative, it corresponds to an attractive interaction between bosons and fermions. Repulsive interaction ( $+a_{BF}$ ) leads to phase separation, and attractive interaction ( $-a_{BF}$ ) leads to an overlap of the two phases.

## EVOLUTION MODELS OF THE INITIALLY HYDRIDE EARTH

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### ABSTRACT

A modern view of the properties of chemical elements has practically confirmed the theory of the hot origin of the Earth. The next step in the development of this theory was the hypothesis of the initial hydride Earth. In this work, we attempted to find additional evidence for this hypothesis and show additional effects that flow from it. The effect of the physical properties of atoms and

ions on their behavior during the formation of the Earth was studied. The maximum contribution to the distribution of elements was made by those elements whose content in the original protoplanets of the disk was maximum. A correlation dependence is obtained, which allows one to calculate the distribution of elements in the protoplanetary disk. It was shown that the main element contained in the proto substance located in the zone of the Earth's formation was hydrogen. In this case, the formation of various chemical compounds took place, most of which were represented by hydrogen compounds - hydrides. Since the pressure inside the Earth is 375 GPa, this factor forces the chemical compounds to adopt stoichiometry and structure that would not be available in atmospheric conditions. It is shown that many chemical elements at high pressure in a hydrogen medium form not only simple hydrides but also superhydrides - polyhydrides with high hydrogen content. Pressure leads to a higher density of matter inside the planet. Considering the possibility of the formation of polyhydrides, the possibility of binding about 49.3 mol. % of the initially available amount of hydrogen. Given the possibility of the formation of polyhydrides, the possibility of binding of about 49.3 mol was shown. % of the initially available amount of hydrogen. Young Earth could contain about 10.7 masses. % of hydrogen in the form of hydrides, polyhydrides, and in adsorbed form, which is almost two times higher than previous estimates. This is an additional fact confirming the theory of the initial hydride Earth. In hydrides, the occurrence of the phenomenon of superconductivity was discovered. Polyhydrides were shown as potential superconductors with a high critical temperature above 200 K. Based on these data, we hypothesized the presence of superconducting properties in the Earth's core, which explains the presence of a magnetic field in the Earth, as well as the unevenness and instability of this field and the possibility of migration of the Earth's poles. The fact that the Earth has a hydroid core causes its change in time, due to the instability of hydrides. Arranged several possible models of the destruction of the Earth's core. Two of these models allow a quantitative assessment of changes in the parameters of the Earth, mantle, and core. The calculations showed that both models give close results. These results give predictions that can be measured. The proposed models also made it possible to estimate the initial size of the Earth. Several options are proposed for describing changes in the Earth's system using systems of differential equations. These models showed the possibility of manifestation of temporary and spatial structures in the zones of the Earth's internal structure. Possible ways of further testing the hypothesis of the initially hydride Earth are shown.

## PHYSICAL REALITY IN COLLOID PHYSICS OF OXYHYDRATE GELS

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### ABSTRACT

The paper makes far-reaching assumptions about the *quantum-colloid representation of matter as a macrosystem*: a microscopic entangled system becomes a boundary macroscopic (for example) oxyhydrate system, that is, a special quantum form of composite correlations, that is, electro-Magnetic *noise entangled states* (entangled states) of cluster colloid systems. The entanglement of oxyhydrate systems is a special quantum form of correlations of composite systems that does not have a classical analog. It occurs in a system consisting of two or more interacting subsystems (or interacting previously and then separated) and is a superposition of macroscopically different States. In this case, fluctuations of individual parts are interconnected, but not through classical interactions (correlations), but non-local quantum correlations. An experimental method is proposed for estimating the size of third clusters of oxyhydrate systems in a dispersion medium, taking into account entanglement as a special quantum form of correlations of composite systems that does not have a classical analog. It occurs in a system consisting of two or more interacting subsystems and is a superposition of macroscopically different States. In this case, fluctuations of

individual parts are interconnected, but not through classical interactions (correlations), but non-local quantum correlations.

## ON THE GRAVITATIONAL FORCE

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### ABSTRACT

There are a lot of approaches to the explanation of the gravitational phenomenon. Until now none of them explains the real nature of gravitation. The model of the ethereal medium is constructed so that it is good to be a transmitter of gravitation. An action of a gradient medium on the body immersed in it is considered. Bodies of different sizes that are in a gradient medium are demonstrated to acquire the same acceleration. Creating the gradient of the ether elastic pressure by a physical body in the vicinity of another physical body that also creates the gradient of the ether elastic pressure in the vicinity of the first body results in the rise of an attractive force called gravitation. The closeness of the experimental gravitational constant and the value obtained from the theoretical analysis is shown. Two forces are acting on physical bodies. One force is acting through the direct contact on the outer shell of the physical body. Another force (the ether) is exerted to every elementary mass (nucleus, electron, etc.) within the physical body shell.

## ON UNITY AND DIVERSITY OF FORCE FIELDS

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### ABSTRACT

By generalizing the law of conservation of energy, it is proved that any force fields are generated by an uneven distribution in the space of material carriers of the corresponding form of energy, and the sign of the force and its value is determined by the gradient of their density. At the same time, considering the vibrational form of motion reveals the presence of gravitational and gravikinetic components in gravitational energy, which blurs the line between it and other forms of interaction. On this basis, short-range analogs of the laws of Newton and Coulomb for continuous media are found, cutting their difference with the origin, sign, and size of gravitational and electromagnetic forces. "Maxwell-like" equations of the processes of conversion of any form of energy are obtained, which confirm the unity of nature and the interconvertibility of gravitational, electromagnetic, and optoacoustic fields, as well as structured and unstructured matter

## **NEW PHYSICS AND DARK MATTER**

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### **ABSTRACT**

**New physics is born at a time of crisis in theoretical physics and the entire scientific paradigm. The article proposes to substantiate the concept of quantum vacuum (dark matter) in New Physics and its participation in all fundamental interactions.**

## **SENESCENCE AND DISEASES OF CIVILIZATION AS POST-GENOMIC DISEASE OF THE HEMATOPOIETIC STEM CELLS**

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### **ABSTRACT**

**Contemporary views on the senescence and onset of the diseases of civilization (DCs) have been reviewed using the information approach and proteomic mapping and profiling of molecular-biological characteristics of the human stem cells (SCs). The review led to the evolutionary-epigenetic concept according to which the senescence and DCs are systemic age-related evolutionary acquired and epigenetically inherited post-genomic diseases of the hematopoietic stem cells (HSCs) that limit average life expectancy. Senescence and DCs manifest in the quantitative deficit and multi-directed qualitative phenotypic changes of the molecular-biological structure and consequent death of HSCs. The changes are induced by a broad range of pathogens of the environment and lead to the disorder of the regulatory function and immune memory and incapability of the adequate emergency systemic immune response to any pathogen. C/EBP $\beta$  proteins are the "bookmarks" of antigens in the epigenome; they are molecularly bound with CCAAT sequence with which the transcription factors activate the SMP30 gene of senescence. Every repeated activation of response to the pathogen ages the HSCs. Molecular-biological pathogenic changes in HSCs induce chronic immune insufficiency that launches systemic biology of senescence or DCs. For active longevity it is recommended to isolate autologous HSCs at a young age; they will be excluded from the process of aging and administered to the host in old age to restore immunopoiesis and hematopoiesis and extend active life by 10 to 15 years.**