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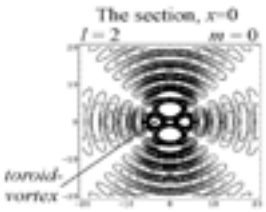
The shell-nodal structure of the atoms

Analyzing particular solutions of a three-dimensional (not Schrodinger's) wave equation in spherical polar coordinates, we have found that they contain information about the atomic structure. Considered as the wave formations, atoms have a quasi-spherical shell-nodal structure coincident with the nodal structure of standing waves in three-dimensional wave space-field. Their nodes, filled with paired hydrogen atoms, are bound by strong interaction. Each atom with $Z \geq 2$ represents a specific elementary molecule of hydrogen atoms, to which we refer proton, neutron and protium. The shell-nodal structure of the atoms was verified in different ways. All of them completely confirmed the trueness of the found structure. A unique opportunity for the direct verification of the discovery gave us graphene. According to the modern data, a two-dimensional hexagonal lattice of graphene has a six-fold axis of symmetry. Hence, in full agreement with a basic symmetry theory, physical properties of graphene must be isotropic in a plane perpendicular to this axis, in particular, electrical conductivity. However, our studies have shown that graphene actually has a two-fold axis of symmetry, due to the shell-nodal structure of carbon atoms, and is an anisotropic crystal. Along the main axis of anisotropy, there are empty potential-kinetic polar nodes (invisible for modern devices), which form a specific channel conducive to the "ballistic" motion of charges in it. In this direction, graphene behaves like a metal. In a perpendicular direction graphene exhibits semiconducting properties. Laboratory tests completely confirmed the predicted feature of graphene, following from particular solutions of the wave equation. Polar diagrams of conductivity of one-atom thickness graphene layers, measured along a plane in all directions, have a characteristic elliptical form for all test samples (they had a round shape) which are inherent in anisotropic materials. Experiments performed by polarized Raman spectroscopy also confirmed the above feature of graphene, found theoretically. Thus, "atoms" are the wave formations. Having the shell-nodal structure, they represent elementary molecules of hydrogen atoms.



$$\hat{\psi}_{\rho} = A\sqrt{\frac{\pi}{2\rho}}J_{l+1/2}(\rho)\Theta_{l,m}(\theta)e^{\pm i\omega\rho}$$

Figure: *A particular solution*

Biography

Georgi Shpenkov has completed his PhD in 1968 from Ioffe Physico-Technical Institute of RAS (Leningrad) and DrSc degree in 1991 (Tomsk, RAS). He is a retired Professor, an Honorary Member of the Russian Physical Society. He has published 9 books and more than 100 papers in different issues. His main achievements are the discoveries of the nature of mass and charge of elementary particles, the Shell-Nodal (molecule-like) structure of the atoms, the microwave background radiation of the hydrogen atom, the Dynamic Wave structure of the elementary particles, the fundamental period-quantum of the decimal code of the universe, the fundamental frequencies of the atomic, subatomic and gravitational levels, the true nature of the Lamb shift, etc.

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