

# ATOM PROPERTIES AND STRUCTURE RESEARCH

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*Striking and strange is not that electrons in atom form a Bose-condensate, but that we till now for some reason «did not guess» about it and accordingly did not consider this factor as fundamental in the atom theory conception!*

*Where else if not in atom, there is the most suitable place for electrons «condensation»? In fact under «normal conditions» around us, energy of thermal movement is very small (about 0,03 eV) in comparison with that deep potential well (several units, tens and even hundreds of eV) in which atom electrons exist. Many tens of electrons are «squeezed» in few cubic angstroms of atom volume!*

It is important that the conclusion about electrons «Bose-condensation» in electron shells of atoms was a direct result of the analysis of experimental reference data accumulated in the course of decades (the articles [1-3] were actually devoted to atom properties and atom structure study).

It turns out that many-electron shells shape the spherical structure. The sum of ionization potentials of such electron shell meets (in view of the virial theorem) the energy of a charged sphere of the same radius with the superficial charge equal to the sum of charges of all electrons of the shell.

That is, all electrons, belonging to one and the same shell, *are constantly located* on the common spherical surface!

At the same time, in all atom kinds (except for hydrogen) the very first electron shell (nearest to nucleus), including two electrons, is representing the Cooper pair underlying all subsequent electron shells formation.

This «base» Cooper pair is the first resonant shell with the main quantum number equal to unit value i.e. containing one period. High accuracy data and calculations have shown [2], that electrons of the «pair» are situated symmetrically at opposing sides of nucleus in antinodes of the resonance ( $n=1$ ).

Next «revelation» which has brought the analysis of experimental data, was common fraction figure values of main quantum numbers proper to many electron shells, both in ground and excited states (at excited energy levels).

The atom of lithium is meaningful in this respect. The main quantum number of external electron in the ground state is equal 8/5, and at high-levels this fraction «is supplemented» with a series of fractional numbers increasing by unit: 13/5, 18/5, 23/5, 28/5, 33/5, etc. Such harmonious unity of spectra is characteristic and for other atoms that testifies to excitation of electron shells resonances on multiple harmonic components. In aggregate with integer numbers «parallel» sequences of fractional values of the main quantum number determine spectral variety of atoms.

All atom structure appears to be based on resonant interactions, as well as mechanism of electron shells formation as a Bose-condensate.

Moreover, multi-electron shells of atoms have the spherical form because electrons settle down on equipotential surfaces, «aspiring» to get the common frequency and «to join» the general shell resonance.

On the other hand, any resonance, as is known, is accompanied by an intensive energy exchange between different parts of resonating system. Therefore in resonant electron shells of atoms also there is an intensive internal *exchange of energy (mass) between electrons*. It means occurrence of centrifugal force counterbalancing the force of electrostatic attraction of electrons to atom nucleus!

Thus, electrons can motionlessly hang above atom nucleus, that removes the known contradiction associated with «inevitable» falling of rotating on orbit (and, hence, radiating) electrons on a nucleus.

Atom structure representation got as a result of the research even vaguely does not resemble existing nowadays atom depiction showing electron likelihood orbital, «spread» in all the space.

The quantum mechanics «has attributed» to microparticles of matter *universal wave properties* which actually are only one of all the effects caused by particle-particle interaction. Such simplification has sharply lowered opportunities of the analysis, and the quantum-mechanical theory of atom developed on this basis actually has appeared erroneous.

Electron in atom structure is in constant interaction with nucleus and others electrons experiencing powerful influence of a wide spectrum of oscillation frequencies including multiple harmonics (it is clearly indicated by the occurrence of resonances).

The irrefutability of the findings based on reliable experimental data, and that precipice which was disclosed between analysis results and the existing «speculative» theory of atom, speak for them.

What we have to do with all it? To turn away and try not to notice it, but it wouldn't be a good idea!

However the main difficulty consists not in the necessity to reexamine almost everything regarding the theory of atom. The basic problem is inertia of thinking, necessity of reconsideration of the stereotypic representations about a microcosm used during decades.

«Remarkable» example of such sort are Grotrian diagrams in which *fractional values of the main quantum number* of excited states are marked by integer numbers and «are associated» with certain quantum states of atomic core and of electron at the excited energy level.

The new microcosm theory should be based on the analysis of *real wave and oscillatory processes* - the form and the mode of being of microscopic particles.

Transition from domination of formalism to real analysis of microcosm wave and oscillatory processes, undoubtedly, will be a powerful stimulus to develop both fundamental science and applied researches. Cardinal revolutionary overthrows of scientific concepts in the past always caused powerful surge of researches and new achievements in scientific progress.

The present stage of reconsideration of the microcosm nature will cause consequences which can surpass all previous «revolutions» in the science.

New approaches (including resonant microcosm phenomena concept), undoubtedly, will help to find new principals of clean energy production, to improve methods of creation of chemical compounds and materials, to develop brand-new high-temperature superconductors, etc.

Let's cite here once again the laws which were formulated on the basis of experimental reference data characterizing atom properties.

#### ***Laws of atomic electron shells formation:***

**1.** Atomic electron shells are resonant formations which can be excited both on the fundamental frequency, and on harmonic components. Thus the main quantum number accordingly can be integer or fractional number.

**2.** Many-electron shells of atom have the spherical form, owing to what the sum of all ionization potentials of the shell meets (subject to virial theorem) the energy of a charged sphere of the same radius and with electric charge determined by the quantity of electrons in the shell.

**3.** Electrons In atomic electron shells are integrated in the common resonance, losing their individual properties; therefore the electron shell gains properties of a Bose-condensate.

#### ***Laws of atomic spectrum formation:***

**1.** Atomic spectrum is determined by the resonant interaction of electronic excited states with atomic core oscillations; therefore the harmonic unity and specifically expressed individuality of each atomic spectrum is formed.

**2.** Fractional values of the main quantum number indicate the excitation of electronic energy states on multiple harmonics and make, as a rule, sequences of fractional numbers increasing by unit and determining (alongside with integer values) a harmonic basis of atom spectrum.

It is natural, that above cited formulations of laws characterizing structure and properties of atoms are related with the context of articles from which they are taken. Therefore at occurrence of questions on interpreting or physical essence of these laws it is necessary to refer to these articles.

In conclusion it is necessary to notice, that the research has touched upon the most basic questions, having defined contours of the future atom theory. So in the near future number of articles devoted to atom theory, undoubtedly, will increase.

#### **References**

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