Some words about fundamental problems of physics

Part 7: Cosmic microwave background

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The next of the important shortcomings of modern physics, to which I would like to turn attention of article readers, is a lack of convincing arguments and, hence, groundlessness of linking the origin of the cosmic microwave background (CMB) radiation to the mystic "Big Bang".

In 2006 two researchers from the U.S. (John Mather and George Smoot) were awarded the Nobel Prize in Physics. They were the initiators of the project and led a large team of researchers and engineers having implemented the unique project on measuring the CMB radiation. The measurements showed that its spectrum is characterized by a relatively high degree of isotropy (up 0.01%) and almost perfectly matches the spectrum of a blackbody radiation with the temperature of around 2.73 K.

For the first time this radiation was found by radio physicists in 1965. At the same time astrophysicists-theorists, adhering to G. A. Gamow's hypothesis of 1946, and developing it, felt certain to an existence of the CMB radiation in this region of the spectrum because this followed from their favourite hypothesis. Therefore, without thinking twice, they at once unhesitatingly took his hypothesis as the basis for explaining the found radiation. Since then the fantastic hypothesis came to the fore of astrophysics. In accordance with the modern standard cosmological model, the CMB is considered as a residual thermal radiation of continuously expanding and, hence, cooling cosmic space (across the Universe). This is going on allegedly after the hypothetical "Big Bang" of the so-called cosmological 'singularity', a region characterized by infinite density, temperature and curvature; but saying simply, out of nothing!

The "Big Bang", as is believed resulted in the birth of the Universe, happened (according to the latest estimates) approximately 13.7 billion years ago. An extravagant idea of the Big Bang has received wide publicity. At the present time a bad manner is considered even to question the reality of the hypothetical event allegedly happened in the above mentioned time in the far past. Brainwashing by the media proved so successful that the word "hypothesis" has almost disappeared from circulation. And the majority of innocent people, including children, pupils and students, took for granted (as dogma) that myth.

In the last century theoretical physicists were guided by a strange logic (in Part 1 it has been called the schizophrenic logic, "schizologic"). As soon as experimenters discovered a new phenomenon, theorists immediately put forward fantastic ideas (by the way, this approach is still preserved) instead of calmly study the nature of the phenomenon. As a result, they left so much a mess and have complicated all to such a degree (see, e.g., Parts 1 - 6 of this article) that new generations of open-minded physicists would be long examine debris left after them, to clean physics from these.

Sources of electromagnetic radiation in a wide spectral band of frequencies, including optical and microwave, are excited atoms. Among them, following the logic and common sense, without imagination, it was necessary to seek the cause of the CMB radiation. Unfortunately, theorists, confusing physics with science fiction, taking over a dead-end abstract method of virtual physics from their predecessors, continued the construction of the virtual world.

After analyzing the faults of the past and trying to fill the gap arising as a result in physics, and following the logic of common sense, we have gone through the search for truth, excluding myths and fairy-tale scenarios. In this 7th Part of the article, I will tell readers about the solution revealing, in our opinion, the true origin of the CMB radiation.

So in the case of the CMB we deal with objectively existing radiation in cosmic space, which is equilibrium and almost isotropic, whose wavelength in maximum is about $\lambda = 0.1\,cm$. This value lies within the maximum of the spectral density of the equilibrium blackbody radiation corresponding to the absolute temperature of about 2.7 K [1].

Assuming that a source of this radiation are likely to be excited atoms, let us ask, which of the elements of the periodic table can actually be considered responsible for the observed microwave radiation in space? No one, apparently, will be surprised that we have chosen hydrogen as the most likely source of the microwave background radiation. Why? Hydrogen is the most abundant element in the Universe (about 92%), being the main constituent of stars and interstellar gas. Therefore, our assumption that hydrogen emits and absorbs not only in optical, but also in the microwave region of the spectrum and, hence, is responsible for the CMB radiation, had a common sense.

We know quite a lot about the emission and absorption spectra of hydrogen, but probably not everything, so our assumption seemed logical and plausible. Hydrogen is the most studied element, however, about its possible radiation in the microwave region of the spectrum has not been even a hint in the literature of physics. Looking ahead one must say that hydrogen, considering by us as an elementary electronic system of the atomic scale, "noises" (like any electronic device on the threshold of sensitivity) while being in the unexcited equilibrium state. But it makes a “noise” in its own way, continuously emitting and absorbing electromagnetic waves of the microwave frequency range. The fact that nobody still did know about it should not be surprising. Do not forget, at the present stage of the development of our civilization, far imperfect, natural sciences, including physics, are still at the beginning stage of the infinite way to knowing nature.

Results of the study of the CMB radiation have given a large impulse for a comprehensive verification of the idea on that hydrogen - the most common element of space - is its only source. In the first stage it was necessary to try to find a single universal formula of the spectra of the hydrogen atom, which implies all its spectral lines currently known from observations. However, such a problem (like many others, as mentioned in the previous six Parts of this article) could not and cannot be solved in principle in the framework of modern abstract-mathematical theories such as quantum mechanics and elementary particles physics, and in general, by the fitting method as it is done in modern theories of the Standard Model. The solution of the above problem requires a qualitatively another level of the relevant theories and the knowledge of the physical (not abstract mathematical) structure of the atom and its constituent elementary particles, as far as possible close to the truth.

Therefore, we have constructed a new physical theory on the basis of the real postulate. According to which all phenomena and objects in the Universe have a wave nature (with this fact most physicists must agree) and, consequently, their behaviour must obey the universal wave equation (see Part 6, Eq. (3)).

As a result, relying on the solution [2] of the universal (classical) wave equation and the wave Dynamic Model of elementary particles (DM) [3], as well as on the Shell-Wave Model of the atom (SWM) [4], we found that elementary classes of optical spectra in the general case are determined by the Universal Formula of Energy Transitions. Here is its general form:

$$\frac{1}{\lambda}=R\left(\frac{\left|\hat{e}_p(z_{p,m})\right|^2 z_{p,1}^2}{z_{p,m}^2}-\frac{\left|\hat{e}_q(z_{q,n})\right|^2 z_{q,1}^2}{z_{q,n}^2}\right), \qquad (1)$$

where

$$\hat{e}_p(z_{p,s})=\sqrt{\frac{\pi z_{p,s}}{2}}\left(J_p(z_{p,s})\pm iY_p(z_{p,s})\right); \qquad (1a)$$

$z_{p,m}$, $z_{q,n}$, ... are roots (zeros) of the Bessel functions, $J_p(z_{p,s})$ and $Y_p(z_{p,s})$, i.e., the right solutions of the radial component of the wave equation; *R* is the Rydberg constant.

As particular cases, the various classes of spectra follow from Eq. (1). For example, for *p*=*q*=0, zeros of the Bessel functions $J_{0+\frac{1}{2}}(z_{0,s})$ are equal to $z_{0,s}=j_{\frac{1}{2},s}=s\pi$. Hence, at such solutions (roots), we have

$$\left|\hat{e}_0(z_{0,s})\right|^2=1. \qquad (2)$$

Under this condition, Eq. (1) is transformed into the well-known elementary spectral formula of the hydrogen atom

$$\frac{1}{\lambda}=R\left(\frac{1}{m^2}-\frac{1}{n^2}\right). \qquad (3)$$

From the universal formula (1) it also follows the low-frequency spectrum generated by the zero (background) wave perturbation [5, 6]:

$$\frac{1}{\lambda}=R\left(\frac{1}{n^2}-\frac{1}{(n+\delta n)^2}\right), \tag{4}$$

where

$$\delta n=\sqrt{\frac{2Rh}{m_0 c}}\cdot\frac{e_p(z_{p,s})}{Z_{p,s}}-\beta_n\frac{r_e^2}{r_0^2}\sqrt{\frac{2Rh_e}{m_0 c}}\cdot\frac{e_m(z_{m,n})}{Z_{m,n}} \tag{4a}$$

is the relative measure, $\delta n=\frac{\delta r}{r_0}$, of the background perturbation δr of the orbital (Bohr) radius r_0 at the zero level of exchange. The remaining parameters are: r_e is the theoretical radius of the wave spherical shell of an electron; m_0 is the associated mass of a proton; c is the basis speed of the wave exchange at the atomic and subatomic levels, equal to the speed of light in vacuum; $h_e=2\pi m_e \upsilon_0 r_e$ is the orbital action of an electron (analogous to the Planck constant h) caused by its rotation along own center of the mass with the Bohr speed υ_0; β is the constant factor ($\beta\geq 1$, depends on the type of the transition, see Tables 1 and 2 below). It should be noted that r_e, h_e, m_0, and c (just its meaning) are unknown earlier physical parameters originated from the DM.

For $p=m=0$ the zero of the second kinetic wave shell is $z_{0,2}=y_{0,2}=3.95767842$. Substituting the values of all above parameters into (4), we obtain that the most probable perturbation of the steady state ($n=1$) of the hydrogen atom at the zero level of exchange (interaction) causes the equilibrium radiation of the wavelength

$$\lambda=0.106315cm \tag{5}$$

The zero level of the wave exchange (interaction) with environment is not perceived visually and integrally characterized by the absolute temperature of the zero exchange. It exists as a standard energetic medium in the Universe. Actually, the wave (5) is within an extremum of the spectral density of the equilibrium cosmic microwave background. An absolute temperature of the zero level radiation with this wavelength is

$$T=\frac{0.290(cm\times K)}{\lambda}=2.72774K \tag{6}$$

The resulting value is fully consistent with the temperature of the so-called "relict" background radiation measured by NASA's Cosmic Background Explorer satellite (COBE) (and also by other apparatuses) to four significant digits ($2.728\pm 0.002K$) [1]. Accordingly, the almost complete coincidence of both values indicates that the measured cosmic microwave background is not a "relict" (direct proofs of this will never be), but rather it is a natural background formed by the equilibrium zero (at a noise level) emission of hydrogen atoms distributed in the cosmic space.

The microwave background spectrum of hydrogen atoms has the form of the Planck distribution (subject to Planck's law of blackbody radiation). We have considered this feature of the spectrum in [2, 5].

For the sake of completeness of the relevant information, the data calculated by the formula (4) are presented below in Tables 1 and 2 (taken from the author's work [6]).

Table 1. Terms, 1/λ, of the background spectrum (4) of the hydrogen atom; n = 1 [6].

s	$Z_{p,s}$	$Z_{m,n}$	β_n	1/λ, cm^{-1} Eq. (4)	λ, cm	T, K	T_{exp}, K [1]
1	$y_{0,1}$	$y'_{0,1}$	β_1=1.0	41.751724	0.023951	12.10805	
2	$y_{0,2}$	$y'_{0,1}$	β_1=1.0	9.40602023	**0.106315**	**2.72774**	**2.728 ± 0.002**
	$j'_{0,2}$	$j'_{1/2,1}$	β_1=1.203068949	9.67863723	**0.103320**	2.80680	
3	$y_{0,3}$	$y'_{0,1}$	β_1=1.0	5.240486	**0.190822**	1.51974	
	$j'_{0,3}$	$j'_{1/2,1}$	β_1=1.203068949	5.255841	**0.190265**	1.52419	

Таблица 2. Terms, 1/λ, of the background spectrum (4) of the hydrogen atom; n = 2 [6].

s	$Z_{p,s}$	$Z_{m,n}$	β_n	1/λ, cm^{-1} Eq. (4)	λ, cm	T, K
1	$y_{0,1}$	$y'_{0,1}$	β_2=1.0	5.219748	**0.191580**	1.5137
2	$y_{0,2}$	$y'_{0,1}$	β_2=1.0	1.1758681	0.850436	0.3410
	$j'_{0,2}$	$j'_{1/2,1}$	β_2=1.018671584	1.211154	0.825659	0.3512
3	$y_{0,3}$	$y'_{0,1}$	β_2=1.0	0.6550701	1.526554	0.18997
	$j'_{0,3}$	$j'_{1/2,1}$	β_2=1.018671584	0.6582849	1.519099	0.1909

The results presented here, along with others not mentioned above the unique data, indicate that the source of the microwave background radiation detected in space really is hydrogen - the most abundant element in the Universe, the basic element of the stars and interstellar gas.

The anisotropy of the CMB in different directions in the sky, observed experimentally, consists of the small temperature fluctuations ($\pm 0.00335K$) in the distribution of the temperature background corresponding to the blackbody radiation. Obviously, they are associated with fluctuations in the distribution of hydrogen in space, correlating with the heterogeneity of the distribution of matter in it.

Thus, the Dynamic Model of elementary particles and the Shell-Wave Model of the atom led us to the discovery of the spectrum of the microwave background radiation of hydrogen atoms (4). Now this discovery is among the most important facts disproving the “Big Bang” hypothesis [7].

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