On the Sources of the Cosmic Microwave Background Radiation

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In this paper another explanation of the Cosmic Microwave Background Radiation is proposed.

Keywords- Cosmic Microwave Background Radiation, Relict Radiation, Big Bang

One of the main evidences of the Big Bang is meant the discovery of the Cosmic Microwave Background Radiation (so-called the Relict Radiation of the Universe). However the presence of the background radiation can also be explained by other natural factors acting at present time. One of such explanation is presented here.

In the last decade, the astronomers found that in the conditions of a cold and rarefracted interstellar medium (in articular, in HII regions which are very ditributed in the Galaxy) the process of recombination of electrons and ions can be accompanied with the birth of highly excited atoms of hydrogen and other light elements with the quantum number until n = 1000. The atoms born in this process are stable, because their hitting the particles which could destroy them is very improbable while the neutral atoms move freely between the electron orbit and the nucleus of the highly excited atom without production of any influence.

The levels of large n are inhabited due to the recombinations mainly. The spectral recombinational radiolines (RRL), radiated in the transfers, lie in the radio-scale. At present the RRL are found in the cosmos in the scale from the infrared to the metre scale, with $n = 10\ldots300$ [1]. With higher levels of excition than these, radi-lines were registered in absorbtion only.

As is known, spectrum of the Cosmic Microwave Background Radiation meets spectrum of the blackbody heat radiation of ~3K temperature, see Fig. 1.

Assume there in the cosmic medium a thermal equlibrium exists among the substance and the radiation (among the hydrogen, in the atomic and molecular state, and photons), while the electrons of the hydrogen atoms can move with equal probability along all levels from 10 to 300.

In this case the complete frequent distribution of the formula

$$\lambda = (1/R)\, m^2 n^2 / (m^2 - n^2)$$

(the Balmer-Rydberg formula), under one-by-one examination of n and m from 10 to 300, will take the form shown in Fig.2. Here R is Rydberg's constant equal to 1.097*10^7 1/m.

Magnitude of the peaks and density of their distribution along the radiation spectrum are proportional to probability of the appearance of the specific wavelengths in the spectrum. The maximum of radiation under the given conditions appears in the transits between levels in the hydrogen atom with n ≈ 25…110; it meets the maximum of the Cosmic Microwave Background Radiation. Shape of the graph does not principially dependent on the method used with creation of the frequent distribution.

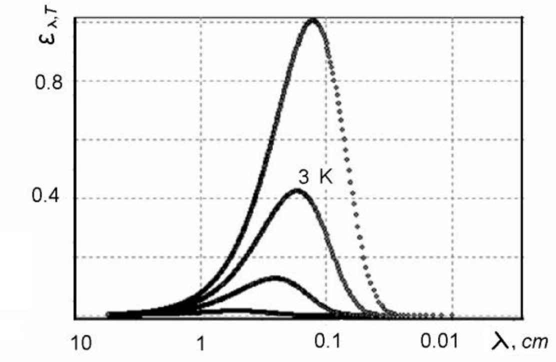

Fig.1. Distribution of energy in the absolute blackbody spectrum according to Planck's formula, T = 1…4 K

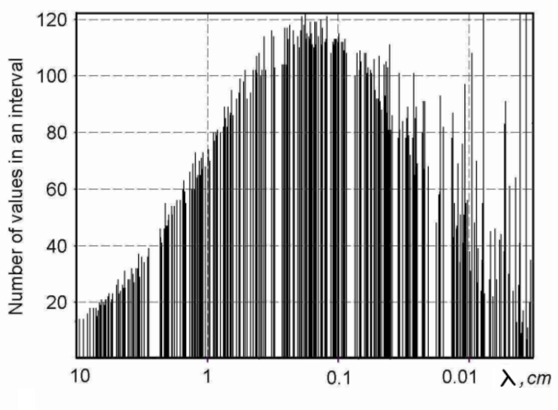

Fig.2. Frequent distribution of the Balmer-Rydberg formula of hydrogen radiation, with m, n = 10…300. Total number of the numerical values is 42,000, nonzero intervals along the x-axis are 350.

Of course, the presence and the intensity of the spectral lines of specific sources depend on not only the combinatory factors, and are different. Therefore only *small segments* of the common distribution will be realized.

It would be interesting to find, could the *averaging with respect to many sources in large space and time scales* (infinite scales as an ultimate case) produce the current shape of the sectrum?

CONCLUSION

Thus, at least the shape of the spectrum of the Cosmic Microwave Background Radiation can be explained by the natural factors acting in the present epoch. Of course, the problem of the other differences of the “really relict” microwave radiation, connected with the above suggestion, remains open.

It is clear that Balmer's formula and, accordingly, the frequent distributions can be corrected according to a specific substance and specific physical conditions (the number of electrons in the atom, the presence of restricted transfers, etc.).

In conclusion, I would like to note that Balmer's formula was obtained in 1885 that is earlier than the constant named later after Max Planck. Therefore, distribution of energy in the blackbody spectrum can be explained by the correct interpretation of the Balmer series formula in already before as Planck constant was introduced.

REFERENCES

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