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### Abstract

In the cosmological discussion it has during the last few decades been taken for granted that the Lemaitre-Gamov cosmology - usually referred to as the Big Bang is the only acceptable one. The Universe must have been created ex nihilo in a singular point. Criticism of the Big Bang hypothesis is usually answered by: And how do you create the Universe? Most people seem to be ignorant of the history of science and philosophy that they do not remember that most scholars have considered the Universe to be "ungenerated and indestructible". The only exceptions seem to be some Christian theologians in the first centuries AD and their school, to which Lemaitre and Gamov and their Big Bang hypothesis belongs.

It is demonstrated that there are no observational facts which unquestionable speak in favour of the Big Bang hypothesis. The "Sputnik revolution" makes it necessary to revise important parts of astrophysics, and is also fatal to the Big Bang. It seems necessary to turn back to the view of an "ungenerated" (and indestructible) Universe.

# HAS THE UNIVERSE AN ORIGIN?

by

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## 1. Cosmology During the Ages

In *Scientific American* (Vol. 257, September, 1987), I have been listed as one of a number of Big Bang Bashers. Now I have been kindly invited to present my view "*of the origins and fate of the universe*".

This immediately raises the question: *Has the universe an origin?*

### 1.1. Aristotle and the Holy Scriptures

Aristotle, the most famous scientist and philosopher in history, said that the universe is "ungenerated and indestructible". This was also the view expressed in most of the Holy Scriptures of the different religions. It should be observed that

when they spoke about "creation" this means usually "putting a cosmic order in a preexisting chaos"<sup>[1]</sup>.

## 1.2. Creatio Ex Nihilo

The present meaning of "creation" was introduced in the first centuries AD but *not* because of pressure from philosophers or scientists.

The Christian Church was fighting a number of "heresies", including the gnostic "heresy", which aimed at incorporating parts of Platonic philosophy. In this fight, the church found it necessary to boast the prestige of God by making him so powerful that he - alone of all gods - could create the whole world *ex nihilo*. This clever ecclesiastic policy has made creation *ex nihilo* a very important dogma of the Catholic Church<sup>[2]</sup>.

During medieval times this constituted a controversy between the Aristotelean philosophers and the church. This was "solved" by St. Thomas who "remodeled" the Aristotelean philosophy in accordance with the ecclesiastical doctrine (with the stake in the background!).

However, St. Thomas confessed that *reason could only be satisfied with the assumption that the world has no beginning*. The doctrine of a beginning or "the non-eternity of the world" is to be received "*sole fide*", in deference to authority.

## 2. The Big Bang

The Belgian mathematician and physicist, Abbé Lemaitre, was an expert in the general theory of relativity. He had a serious personal dilemma because as a prominent member of the Catholic hierarchy he must believe in St. Thomas' creation ex nihilo, but as a prominent student of general relativity he had difficulties in reconciling this with science. He solved this in an ingenuous way by identifying the singular point which appears in some solutions of general theory of relativity with the creation ex nihilo. When I met him at the Astronomical Union in 1938, he was trying to get this cosmology, called "the primeval atom", generally accepted, but with little success. There was a general reluctance to mixing science and religion which often occurs at the expense of science.

Then came the war which as always produced a surge in religiosity and then came George Gamov. He was a very intelligent and charming physicist, but a still better propagandist. Several of his textbooks and popular science books are excellent. He introduced a new style in popularizing science.

In his Mr. Tompkin books, he presents the new physics in a way which scientists find both correct and fascinating. However, the general public easily gets the impression that science consists of a number of absurdities which should not be understood but accepted (sole fide!) at the authority of famous scientists. The limit between popular science and science fiction became erased. In his "Biography of the Earth" he says that the moon has been kicked out of the Pacific Ocean. When Kuiper met him he reproached him harshly "George, do you really believe that the moon

originated in the Pacific Ocean?" He answered: "No, of course not, but it makes such a nice story!".

When I learned that Gamov had become interested in Lemaitre's theory, I thought that he had found another "nice story" on which he liked to test his tremendous charm and his ability to convince people to believe in absurdities. This theory was later called *Big Bang* and was enthusiastically received by those who loved Mr. Tompkin's absurdities.

Very long ago the church father, Tertullian said "Credo Quia Absurdum". He understood that to religious people the truth is not so essential as it is to believe in miracles and wonders, something which is as far as possible from their daily troubled and trivial life. Gamov also understood this. The fascination of the Big Bang was that it was so far from what astronomers usually reported. Four-dimensional space, a singular point where no ordinary laws of nature were valid, all that could not be criticized by ordinary people. It was *so absurd that it must be believed*.

Gamov and I had discussed the relations between science and religion and the dangers of mixing them. I wrote to Gamov and congratulated him on his fascinating science fiction story but realized soon that the general enthusiasm that the Big Bang caused had made also himself accept that it was *the* truth about the universe. So my letter came too late to save his soul.

Gamov claimed that the Big Bang gave an excellent account of *all* the properties of the universe, the Hubble expansion, the 3°K background radiation, the origin of all the elements, etc. Many of his theories turned out to be basically unreasonable.

Better observations have shown that one after the other of his prediction have turned out to be wrong<sup>[3]</sup>. The Big Bang believers to today claim only support from the background radiation and possibly the production of one or two of the several hundred nuclei which Gamov claimed to have predicted. A critical analysis shows that these phenomena can be explained also in other and simpler ways. Especially important is to observe the drastic revolution in astrophysics which now is caused by recent space research discoveries ("Plasma Universe")<sup>[4]</sup>.

### 3. A Science Fiction Establishment

The Big Bang believers have rapidly gained power. Observers of cosmical phenomena often complain that if their results do not support the Big Bang Theory, they are labeled as incompetent observers with all that follows of cancelled support for their work, whereas if their results can be claimed to support the Big Bang, their work is generously funded. Together with many others, I know that it is difficult to get objections published, and if I succeeded, not even the existence of my objections are usually mentioned in the cosmological discussion. I have published more than 30 papers, and a part of the fourth and the whole sixth chapter of my monograph *Cosmic Plasma* is devoted to an analysis of cosmology. Has anyone heard about this? Only in lists of Big Bang Bashers!

In discussions about cosmology one often hears: We must believe in big bang because there does not exist any other cosmology. Indeed it may appear so, and the reason is that alternatives are ruthlessly suppressed. When I started to criticize Big

Bang I was listed as a crank. I am still treated as a crank by powerful sections of the scientific establishment.

#### 4. Observational Approach to Cosmology

It is true that *if* there has been a Big Bang, the observed Hubble expansion would result. But it is a logical mistake to conclude that the observed Hubble expansion proves that there was a Big Bang. (From "all dogs are animals" one cannot conclude that "all animals are dogs").

From the Hubble expansion we can conclude that the meta-galaxy (what the Big Bang believers call the Universe) earlier was smaller.

##### 4.1. Hubble Expansion

Fig. 1 shows a conventional Hubble diagram. At the first look it gives the impression that all dots are located very close to a straight line as the Big Bang theory requires. However, the diagram is logarithmic and a detailed inspection shows that for individual galaxies, the Hubble parameter differs by 20% or even more.

These differences may be due to observational errors but we cannot exclude that they are due to differences in longitudinal or transverse Doppler effect. An analysis of some samples shows that there is no convincing argument against the view that at an early time there was such a spread in the velocities that the size of metagalaxy was much larger than extrapolated from the Hubble expansion. Hence, preceding the Hubble expansion there was a contractive phase (as has been discussed many times).

The result is that the metagalaxy had a minimum size that can be estimated to about  $10^9$  l.y., about 0.1 of the present size. *There is no observational fact that indicates that the metagalaxy ever was smaller than this.*

#### 4.2. Euclidean Cosmology

A calculation of the density during the contraction demonstrates that the difference between a treatment by general relativity formulae - which of course should be used - and Newtonian mechanics amounts only to a few percent. Hence, with reasonable demands on accuracy, a treatment in Euclidian geometry is satisfactory. *We need not use general relativity formulae in studies of metagalactic evolution.*

However, we can call our model a Big Bang, but this is a Bigger Big Bang with a minimum size of one billion l.y.

### 5. Alternative Cosmologies

#### 5.1. Symmetric Cosmology

Of the alternatives to the Big Bang, I think there are two who deserve more attention. One is the *Symmetric Cosmology*.

When Dirac had demonstrated the general matter-antimatter symmetry, Oskar Klein suggested in 1960 that the universe should be matter-antimatter symmetric. This, of course, requires that the universe is highly inhomogeneous, so that the two kinds of matter do not annihilate each other more than to a limited extent.

The development of astrophysics during the last decades has seen most of the earlier homogeneous models collapse. We now envisage space as penetrated by a network of electric currents which give it a cellular structure. Two adjacent cells can very well contain different kinds of matter, separated by "Leidenfrost layers" in which under quiescent conditions, only a very small amount of annihilation radiation is developed. On the other hand, in the cosmological model discussed in matter-antimatter annihilation can release energy enough to produce the Hubble expansion at the turning from contraction to expansion. Hence, we need no extra hypothesis in order to explain the Hubble expansion.

There is no *convincing* proofs that the Universe is symmetric, but neither is there any proof that it is asymmetric. In my monograph I have discussed this controversy.

## 5.2. Hierarchial Cosmology

In his monograph, Gamov<sup>[5]</sup> mentions Charlier's "hierarchial" cosmology as "intriguing" but that, unfortunately is outside the possibility of observational study. This is not valid today. After an observational study of the distribution of galaxies, deVaucouleurs<sup>[6]</sup> gives strong arguments in favor of a hierarchial cosmology. I have discussed this in my paper entitled "On Hierarchial Cosmology"<sup>[7]</sup>.

My view is that a synthesis of the symmetric and the hierarchial cosmologies may serve as a theoretical structure into which the observational facts should be injected.

## 6. Conclusion

So after this little sightseeing in a four-dimensional curved and singular point universe, we are back home again, home in the Hellas of Aristotle and Euclid.

## 7. References

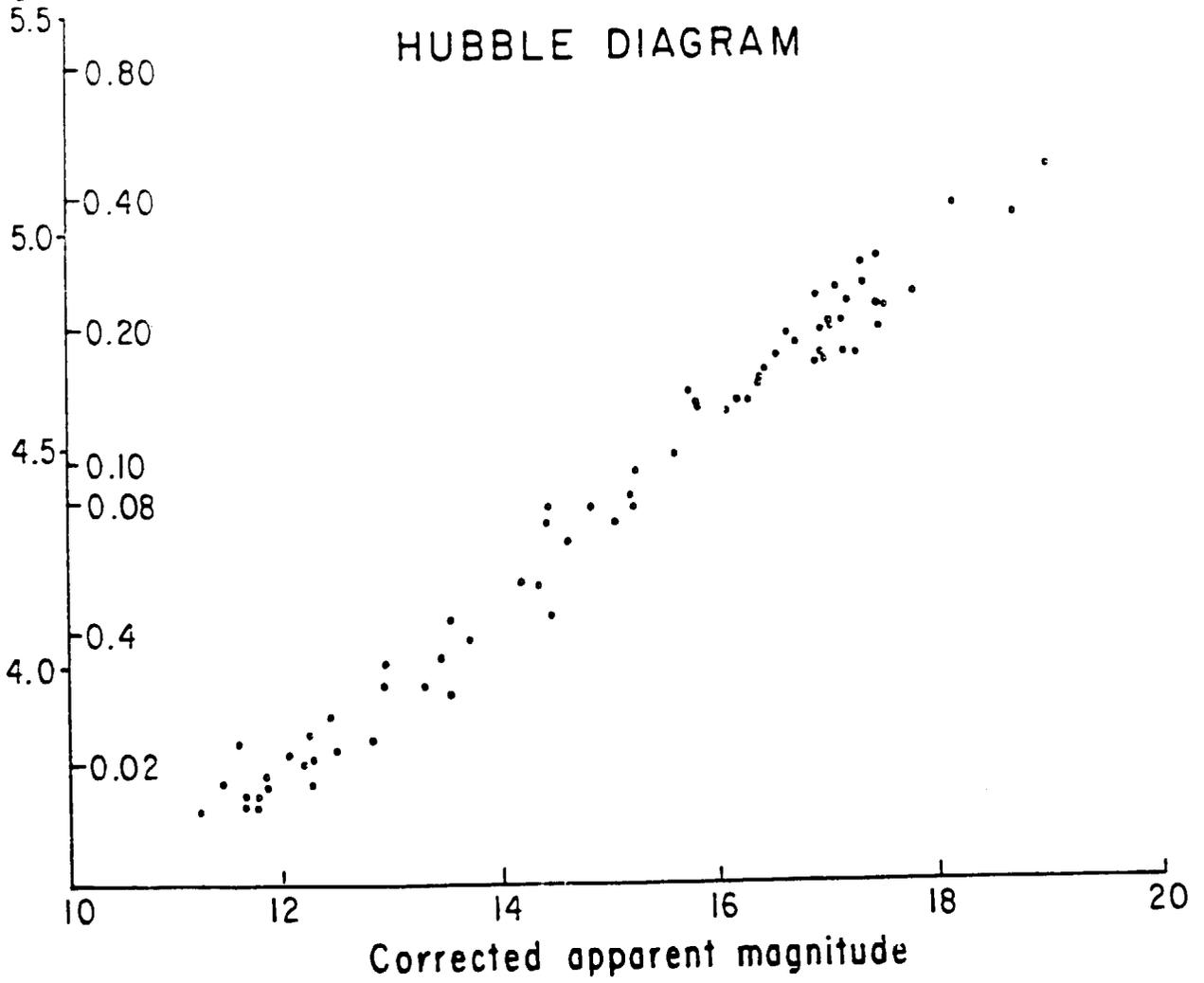
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Key words: Charlier-de Vaucouleur's hierarchical cosmology, Cosmologies, Creation ex nihilo, Dirac-Klein symmetric cosmology, Enclidean vs general relativity approach to cosmology, History of science, Science fiction establishment.