

Did 'Big Bang' Really Happen?

Amitabha Ghosh

Emeritus Scientist

Indian National Science Academy, New Delhi and

Honorary Scientist

The National Academy of Sciences, India, Allahabad

2022-01-28

The basic nature of the universe--finite and evolving as a whole or infinite and quasi-static--is still not fully established, although mainstream scientists have accepted the standard 'Big Bang' model. Only a small group of people continues to struggle against this dogma, seeking to replace the standard model with an infinite quasi-static universe. Considerable discussion takes place in specialized workshops and meetings, but unfortunately, this group has not been successful in its quest to see the standard model discarded. This group consists of persons who are not professional scientists, but also recognized, trained professional astrophysicists and cosmologists.

It is very interesting to note that the situation is much like the one that existed during the Medieval period. Even after the theory of a heliocentric model was proposed by Copernicus and then Kepler, the new proposal failed to gain acceptance. The geocentric model was a dogma, as is the standard Big Bang model of the universe. It had the endorsement of giant scientist-philosophers and astronomers, like Aristotle, Hipparchus and Ptolemy. Although a heliocentric model did solve a number of difficulties faced by the geocentric model (which were pushed under the carpet, as is always done with data that are troublesome for an accepted scientific theory), the underlying physics was not yet in place. Until the law of inertia of motion was proposed and demonstrated, the scientific community (and the public) could not accept the notion that Earth is hurtling through space at a tremendous speed (yet not felt on the earth). Even after the invention of the astronomical telescope by Galileo and the discovery of the moons of the Jupiter and the phases of planet Venus, there was still no general agreement; and the subsequent history is known to all. The clinching evidence of an orbiting earth came from the demonstration of the parallax of the stars. Because of the enormous distances to stars and the limited power of the early telescopes, the scientific community had to wait more than a century before parallax could actually be observed!

Thus, dethroning a dogma that enjoys the blessings of the giants in the scientific community is not easy, and requires very direct counterevidence that is understandable to common people. Removing a dogma requires not just an alternate theory, but decisive evidence against the accepted theory. The problem is not a purely scientific one, it is predominantly a social one. A dogma

conditions the mindset of the public, which depends primarily on the preaching of highly respected grand 'gurus' in the field. A student from his/her school days learns about an expanding universe, presented in *all* text books as an 'established truth'. When these students take up science as their profession, all of their scientific work is conditioned and influenced by the 'fixed ideas' burnt into their brains during their school days.

Thus, when a member of an alternate cosmology group presents a new theory on cosmological red-shift, invariably the members of the audience are puzzled, since in their understanding the red-shift amount should be then double the observed value; they reason that the red-shift due to expansion has to be there (according to the popular belief and understanding) over and above that due to any 'new theory'!

Therefore, reaching out to the general public (who are in general absolutely indifferent on the issue of whether the universe is expanding or not) is very important. This was exactly the situation that prevailed in Medieval Europe; it hardly mattered to the public (and also the king) whether Earth orbited the sun or vice versa.

Hence, discussions within select groups and deliberations over the theories proposed by the members may have a very limited impact and may not be very successful in overthrowing a dogma like the Big Bang theory, supported by influential persons in the scientific community. It has to be remembered that the role of science is no longer the pursuit of truth, instead, it is now primarily about making a carrier. Furthermore, a major advancement in technology is essential before old theories can be uprooted. For example, once the ability to detect the red-shift of an astronomical object of the order of $10^8/10^9$ becomes possible, contradictions with the existing theory may emerge. Similarly, when the slowing of the rotation rate of the planet Mars (which does not have a large moon to deprive the planet of its angular momentum) is detected from the ongoing InSight mission of NASA, it may force people to think of new avenues. The discovery of the moons of Jupiter and the phases of Venus and the discovery of the law of inertia of motion forced the scientific community to take a heliocentric model seriously.

Alternate cosmology group members must consider that informing the general public about possible cosmologies other than the big bang model can play an important part in putting doubts in the minds of general public. This could make people aware of the fact that alternate theories of the universe exist, and that the big bang model is ONLY A THEORY. In cosmology, the theories and hypotheses are based not upon observations, but on INTERPRETATIONS of observations. This fact is also generally unknown to students of science and the general public. The same was the case with astronomy in the Medieval period.

Once this freedom of interpretation is given to scientists, they are capable of erecting any theory to explain observations. Another important matter must be kept in mind. Complete freedom to choose any number of 'free parameters' when devising a theory must also be taken with a grain of salt. A good theory should be able to explain observations of various unconnected phenomena without requiring too many free parameters to match its quantitative results with observation.

It is commonly argued by scientists that, in explaining some observation, no NEW Physics should be invoked. Yet mainstream scientists feel free to bring in new concepts like dark matter, dark energy etc. to explain observations.

Finally, it is very important to organize large discussion sessions with students of science and present alternate ideas. And care must be taken to remind them that the 'big bang' and 'expansion of the universe' are only HYPOTHESES, not observed phenomena!