BIG BANG MODEL? A CRITICAL REVIEW

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ABSTRACT

Inflationary hot Big Bang model is the generally accepted theory for the origin of universe. Nonetheless, findings of the observational astronomy as also the revelations in the field of fundamental physics over the past two decades question validity of the 'Big Bang' model as a viable theory for origin of the universe. This paper examines a few of the various factors which undermine the theory of the big Bang , including the organization of galactic superstructures, the Cosmic Microwave Background, redshifts, distant galaxies, age of local galaxies, and the gravitational waves.

Key Words : Big Bang, Redshifts, Cosmic Microwave Background Radiation, Concordance Model, WMAP, Superclusters, Sloan Digital Sky Survey , Gravitational - wave Background

1. Introduction

Majority of the astronomers favour inflationary hot Big Bang model as a viable model for origin and nature of the universe. The origin of Big Bang, as explained through extrapolation of Einstein's theory of general relativity, is a mathematically obscure state - a 'singularity' of zero volume that contained infinite density and infinitely large energy. It refers to the grand event at which not only matter but space-time itself was born. Why this singularity existed, how it originated, and why it exploded, remain unexplained so far; and this state of affair has led many scientists to question and challenge validity of the Big Bang theory (Arp et al. 2004; Eastman 2010; Lerner 1991: Ratcliffe 2010; Van Flandern 2002; Lal 2008).

Evidence of expansion and acceleration of the space between distant galaxies and the observer on the earth has been interpreted as supporting a Big Bang origin of the universe (Perlmutter et al. 1998; Schmidt et al. 1998). However, many cosmologists hold the view that the interpretation of redshifts as supporting the Big Bang model, is flawed and lacking validity (Arp et al. 2004; Lerner 1991; Ratcliffe 2010; Van Flandern 2002). The cosmological redshift observed on account of expansion of space between a distant galaxy and the observer on the Earth has been wrongly interpreted as Doppler effect by the cosmologists by and large. There is little evidence to support the belief that redshifts are accurate measures of distance or time (Arp et al. 2004; Ratcliffe 2010), and they are so variable and effected by so many factors that estimates of age, time, and distance can vary by up to 3 billion years following repeated measurements, over the just a few years, of the same star (Joseph 2010a).

There are also many opinions about the meaning of the isotropic cosmic microwave background radiation (CMB), believed to be relic of the Big Bang permeating the Universe. The CMB was first detected by Penzias and Wilson in a chance discovery in 1965, and subsequently confirmed by NASA's Cosmic Background Explorer (COBE) in 1991 and the Wilkinson Microwave Anisotropy Probe (WMAP) in 2003 (Benett et al. 2003). Many scientists believed that

the CMB weigh heavily in favour of the Big Bang model of the origin of the universe (Fig. 1 & 2). This discovery, and the interpretations of its meaning, in fact, convinced many who supported an infinite or "steady state" universe, that the Big Bang model was the correct one. Not all are convinced, however, and many have expressed their doubts (Arp et al. 1990; Lerner 1991; Ratcliffe 2010; Van Flandern 2002; Lal 2008).

The observed abundances of hydrogen, helium, and other lighter elements such as deuterium, and lithium believed to have been generated during the process of nucleosynthesis in the immediate aftermath of the Big Bang also apparently lends credence to the Big Bang model. The yet unexplained discrepancy between the calculated and the observed primordial lithium abundances however, poses challenge to the validity of the Big Bang Nucleosynthesis (BBN).

Van Flandern (2002), the former Chief Astronomer for the United States Naval Observatory, has detailed 30 major problems with the Big Bang theory, including its reliance on *ad hoc* theorizing to paper over glaring inconsistencies, its reliance on constantly adjustable parameters to prevent its falsification, and the fact that there are quasars, large scale structures, and globular clusters which are far older than the date given for the Big Bang.

Although the "Big Bang" is often presented as if it is proven fact, there is a wealth of data, including recent revelations of the several space probes and findings in fundamental physics, which tells a different story (Arp et al. 1990, 2004; Eastman, 2010; Lerner 1991; Ratcliffe 2010; Van Flandern (2002).

2. Redshift Controversy

A large number of redshift observations remain inexplicable by the Doppler effect till date. Turning blind eyes to the revelations made in this connection in Halton Arp's 1987 book "Quasars, Redshifts, and Controversies" as also in J.V. Narlikar's detailed 1989 review of "Non-cosmological Redshifts" is nothing but sheer reluctance on the part of the mainstream cosmologists to

accept the cosmological realities. The Doppler shift is a phenomenon in which the frequency and wavelength of a wave change for an observer moving relative to the source of wave. If a source of light is moving away from an observer, a 'redshift' is observed. Conversely, if a source of light is moving toward an observer, a 'blueshift' is observed. If the source moves away from the observer with velocity, v ($v<<c$), the redshift is given by $z \approx v/c$, where c is the speed of light.

As per Hubble's law, galaxies in the cosmos are observed to recede on account of expansion of universe. However, there remains nagging uncertainty whether the redshift calculated on the basis of Hubble's law gives true value of the receding galaxies. Some astronomers (Narlikar 1989; Parker 1993; Harrison 1993; Longair 1995) have serious reservations about the authenticity of the galactic velocities catalogued by astronomers using the Hubble's velocity-distance law, $v = Hd$. Expansion redshift does not arise from the Doppler effect, nor is the redshift related to velocity by the special relativistic relation, $1+z_d=[(1+v/c)/(1-v/c)]^{1/2}$ (Narlikar 1993). Einstein's relativistic Doppler formula merely applies to the motion of galaxies through space, it does not apply to the recession of galaxies (Seeds 2007). Moreover, Doppler redshift is bound by the laws of Einstein's special relativity, which dictates that an object cannot travel faster than the speed of light through a vacuum (i.e. $v<c$), whereas in the case of cosmological redshift, $v>c$ is possible since the space which separates the objects (e.g. a quasar from the Earth) can expand faster than the speed of light.

Under the cosmological redshift interpretation, galaxies are not receding simply by a physical velocity in the direction away from the observer; instead, the intervening space is expanding, which accounts for large-scale isotropy of the effect demanded by the cosmological principle (Harrison 1981). In the current cosmological model (Gray and Davies 2008), cosmological redshift is described as the observable time-dependent cosmic scale factor (a), governed by the

expression, $1+z = a_{now}/a_{then}$. Bondi (1947) defined cosmological redshift as the summation of the Doppler shift due to an object's motion through space, and the global gravitational shift (Einstein effect) due to the difference between the potential energy per unit mass at the source and the observer. Mathematically, cosmological redshift is expressed as $z_{cos} = z_{dop} + z_{grav,}$ where $1+ z_{cos} = [(1+v/c)/(1-v/c)]^{1/2} (1+\Delta\Phi/c^2)$, and $\Delta\Phi$ is the difference in gravitational potential between the points of emission and reception of a photon, which hints at the Doppler shift not being the correct measure of distance between the source and the observer. For cosmological redshifts of $z<0.1$, the effects of spacetime expansion are minimal, and the observed redshifts are determined by peculiar motion of galaxies relative to one another that causes Doppler redshifts and blueshifts (Gray and Davies 2008).

Some astrophysical observations (Burbidge 1973; Field 1974) have also raised doubts whether the large redshifts (Hubble redshift) related to the distant galaxies are due entirely to cosmological expansion. The strongest argument (Field et al. 1973) in favour of cosmological expansion is that there is no known hypothesis consistent with laws of physics (other than Doppler shift hypothesis) that can explain the observed redshifts. Crawford (1979) provides alternate explanation to the problem - the interaction of photon with curved space-time causes it to lose energy in the form of very low energy secondary photons, giving rise to the phenomenon of redshift. Marmet (1990) too was of the opinion that the cosmic redshifts could be explained without invoking the Doppler interpretation. According to him, photon, in its passage from a distant galaxy to the observer on the earth, loses some of its energy to the intergalactic medium. As such, the greater the depth of the intergalactic medium between a galaxy and the observer, the more its light gets shifted toward the low-energy (red) end of the spectrum (Marmet and Reber 1989). Interactions of photons with atoms in the intergalactic medium always result in the production of secondary photon (*bremsstrahlung photon*) at longer wavelength (Jauch and Rohrlich 1980). Julia

(2009) has attributed cosmological redshift of distant galaxies to the loss of energy of the photon with time through transfer of its energy (heat) to the intergalactic space whereby redshift is shown to increase exponentially with the distance, $z = e^{(H/c)d}$. These ideas suggest that the distant quasars might be much closer than their redshift would indicate if they have an 'intrinsic redshift' due to their being surrounded by a 'fuzzy' atmosphere containing free electrons and other material. This concentration of electrons produces the unusual redshift as the light travels through it, and loses energy to these electrons by the Compton effect (Grey and Davies 2008).

3. Big Bang Nucleosynthesis

The Big Bang Nucleosynthesis (BBN) is reckoned as one of the three evidences for the Big Bang model together with the expansion of the universe and the Cosmic Microwave Background (CMB) . Primordial abundances of the light elements - ^{4}He, D, ^{3}He, and ^{7}Li largely produced within the first three minutes of the Big Bang, when the universe was dense and hot enough (>10^9 K) for nuclear reactions to take place, provide good evidence for a hot Big Bang.

The anisotropies observed in the CMB with the help of WMAP satellite data have helped determine the baryonic density of the Universe ($\Omega_b h^2$) with very good precision. Using this value, the primordial abundances of the light elements could be calculated in the framework of the standard BBN model. While the deduced values of the primordial abundances for ^{4}He ($Y_P \approx 0.25$), D ($D/H \approx 2.5 \times 10^{-5}$) and ^{3}He ($^3He/H \approx 10^{-5}$), have been found to be in good agreement (Fig. 3) with the spectroscopic observations.The 'CMB+BBN' calculated abundance in respect of ^{7}Li($^7Li/H \approx 1.3\text{-}5.2 \times 10^{-10}$) however, has been found to be higher than the spectroscopic observations by a factor of ≈3. This cosmological discrepancy definitely challenges validity of the BBN.

4. Large - scale Structures in the Universe

In recent years, there have been a number of very serious challenges to the current theory of cosmic evolution and the belief that the universe began just 13.75 billion years ago. These include the observation of large chains of galaxies spread throughout the universe forming gargantuan stellar structures separated by vast voids. The system of galactic superclusters forms a network permeating throughout the space, on which about 90% of the galaxies are located.

The existence of these "Superclusters", "Great Walls" and "Great Attractors" could have only come to be organized and situated in their present locations and to have achieved their current size, in a universe which is at least 80 billion to 250 billion years in age. The largest superclusters e.g. "Coma", extend up to 100 Mpc!

In 1986, Brent Tully of the University of Hawaii reported detecting superclusters of galaxies 300 million light years (mly) long and 100 mly thick - stretching out about 300 mly across. At the speeds at which galaxies are supposed to be moving, it would require 80 billlion years to create such a huge complex of galaxies (Tully 1986).In 1989, a group lead by John Huchra and Margaret J. Geller at the Harvard- Smithsonian Center for Astrophysics discovered "the Great Wall"- a series of galaxies, lined up and creating a "wall" of galaxies 500 million light years (mly) long, 200 mly wide, and 15 mly thick. This superstructure would have required at least 100 billion years to form.

A team of the British, American, and Hungarian astronomers have reported even larger structures. As per their findings, the universe is crossed by at least 13 'Great Walls', apparent rivers of galaxies 100Mpc long in the surveyed domain of 7 billion light years. They found galaxies clustered into bands spaced about 600 mly apart. The pattern of these clusters stretches across about one-fourth of the diameter of the universe, or about seven billion light years. This huge shell and void pattern would have required nearly 150 billion years to form, based on their speed of movement, if produced by the standard Big Bang cosmology (Lerner 1990).

The "Sloan Great Wall" of galaxies, as detected by the Sloan Digital Survey (Fig. 4), has earned the distinction of being the largest observed structure in the Universe (Richard et al. 2005). It is 1.36 billion light years long and 80% longer than the Great Wall discovered by Geller and Huchra. It runs roughly from the head of Hydra to the feet of Virgo. It would have taken at least 250 billion years to form, if produced following a "Big Bang" creation event.

As summarized by Van Flandern (2002), "The average speed of galaxies (~300 km/s) through space is a well-measured quantity. At those speeds, galaxies would require roughly the age of the universe to assemble into the largest structures (superclusters and walls) we see in space, and to clear all the voids between galaxy walls. But this assumes that the initial directions of motion are special, e.g., directed away from the centers of voids. To get around this problem, one must propose that galaxy speeds were initially much higher and have slowed due to some sort of "viscosity" of space. To form these structures by building up the needed motions through gravitational acceleration alone would take in excess of 100 billion years."

Then there is the problem of gravity. "Hubble length" universe, which consists of those galaxies and stars which can be observed by current technology, appears, therefore, to be organized as titanic walls and clusters of galaxies separated by a collection of giant bubble-like voids. The ‘Great walls’ are far too large and massive to have been formed by the mutual gravitational attraction of its member galaxies alone.

Discovery of the Great Walls of galaxies and filamentary clumping of galactic mater has greatly upset the traditional notion that galactic matter should be uniformly distributed. If the universe began with a Big Bang 13.75 billion years ago, the awesome size of these large-scale structures is baffling because there is apparently not sufficient time available for such massive objects to form and to become organized.

Based on the cosmological principle, which is one of the cornerstones of the Big Bang model, cosmologists predicted the distribution of matter to be homogeneous throughout the universe, implying thereby that the distribution of the galaxies would be essentially uniform. There would be no large scale clusters of galaxies or great voids in space. Instead, contrary to the "Big Bang" universe, we exist in a very "lumpy" cosmos.

5. Age of Universe

Based on the findings of the WMAP, astronomers at NASA's Goddard Space Flight Center proclaimed the age of Universe as 13.7 billion years (Benett et al. 2003). They claim that the WMAP data along with the complementary observations from other CMB experiments like CBI (Cosmic Background Imager) and DASI (Degree Angular Scale Interferometer) confirm the inflationary Big Bang model of the Universe (Fig. 1 and 2).

However, these claims are based on interpretations of data which are guided by the belief that there is no alternative explanation. Hence, rather than the data shaping the theory, the theory of the "Big Bang" dictates how data are interpreted and even which data should be included vs. ignored. For example, it has been claimed that temperature fluctuations in the CMB are as little as one-millionth of a degree, and these are caused by variations in the density of the infant Universe at an epoch 380,000 years after the Big Bang, after which the universe rapidly cooled.

Supposedly, the universe rapidly cooled when radiation first decoupled from matter, creating vast hot and cold spots. Differences in temperature and matter creation supposedly led to clumping and eventually the formation of galaxies, stars and planets.

However, recent research studies undertaken by the scientists at CERN and Case Western University in the US have questioned the authenticity of the WMAP interpretations (Schwarz et al. 2004). Although most cosmologists think

that the tiny variations in the temperature of the CMB are related to quantum fluctuations in the early universe, Starkmen and Schwarz (2005) have reported that some of these variations are due to processes occurring in our solar system. According to their findings, the tiny temperature variations (0.00003ºC) detected have a strong statistical connection with the solar system, and has nothing to do with a Big Bang.

In fact, the claim for uniformity in the CMB, is just not true. Instead of variations which are as little as one-millionth of a degree, there are regions of space, vast voids, where the temperature of the CMB fluctuates significantly from the surrounding space (Rudnick et al., 2007). For example, a black hole (Joseph 2010a) or void, over a billion light-years across, in the constellation of Eridanus, has apparently swallowed up all galaxies, gas, and light, including radiation from the CMB (Rudnick et al., 2007) . Based on an analysis of the NRAO VLA Sky Survey (NVSS) data, Rudnick et al. (2007) discovered that there was a significant absence of galaxies in the constellation of Eridnus which was also sucking in thermal energy and even consuming the cold from the CMB which is dragged inside. Joseph (2010a) argues for the presence of a "black hole", that he estimates, must have gravity-mass of thousands of entire galaxies, such that even the energy of the CMB can be captured as the temperature of the hole is lower than the CMB. Holes of all size permeate the universe, according to Joseph (2010). If correct, then the overall temperature of the CMB and its fluctuations would have nothing to do with a Big Bang, but would be due to holes in space time which consume matter, gravity, energy, and some of which emit thermal energy in the process (Joseph 2010a,b).

Van Flandern (2002) also notes that the "Big Bang offers no explanation for the kind of intensity variations with wavelength seen in radio galaxies", which he believes must be a function of absorption by unknown stellar material within deep

space: "The amount of radiation emitted by distant galaxies falls with increasing wavelengths, as expected if the longer wavelengths are scattered by the intergalactic medium. For example, the brightness ratio of radio galaxies at infrared and radio wavelengths changes with distance in a way which implies absorption. Basically, this means that the longer wavelengths are more easily absorbed by material between the galaxies. But then, the microwave radiation (between the two wavelengths) should be absorbed by that medium too, and has no chance to reach us from such great distances, or to remain perfectly uniform while doing so. It must instead result from the radiation of microwaves from the intergalactic medium. This argument alone implies that the microwaves could not be coming directly to us from a distance beyond all the galaxies, and therefore that the Big Bang theory cannot be correct."

In addition, the WMAP, which supports the "concordance (Λ-CDM) model" of the Universe with up to 73% dark energy, 23% dark matter and bare 4% comprising all the matter in observable universe, has been under attack in recent years. Critics have complained that claims for the existence of invisible, unknown forces, to support a theory where it is admitted that 96% of the universe it seeks to explain cannot even be detected, hardly seems worthy of being called "science." Cosmologists hitherto remain clueless about the exact nature of the dark matter and the dark energy.

Surveys of distant cluster of galaxies undertaken by an international group of astronomers, European Space Agency's XMM-Newton satellite observatory has also cast doubt on the existence of dark energy itself (Vauclair et al. 2003). Moreover, it was found that clusters of galaxies in the distant universe were not found to be similar to those located closer to Earth. They seem to release more x-rays. These findings also indicate that the universe must be a high-density environment which is a clear contradiction to the popular "concordance model."

6. Early Galaxies

Combining Advanced camera for Survey (ACS) and the Infrared Camera for Multi-object Spectrometer (NICMOS), the Hubble Ultra Deep Field (HUDF) has

revealed presence of estimated 10,000 fully formed galaxies in a patch of sky in the constellation, Formax - a region just below the constellation, Orion (NASA News Release 2005). According to the NASA interpretation, these fully formed galaxies emerged just 700 million years after the Big Bang, when the universe was barely 5% of its current age ($z \sim 7$).

Also, using ISAAC near- infrared instrument aboard ESO's Very Large Telescope(VLT), and the phenomenon of gravitational lensing, a team of French and Swiss astronomers using Very Large Telescope (VLT) of the European Southern Observatory, have identified an extremely faint galaxy, Abell 1835 IRI 1916 at $z \approx 10$ (Pello et al., 2004). According to their interpretations (Pello et al., 2004), Abell 1835 must have formed just 460 million years after the universe was born, during the "Dark Age" when the first stars and galaxies were supposedly being born. The deepest-ever near-infrared view of the universe-the 'HUDF09' image produced out of the data from the Hubble's new infrared camera, the Wide 'Field Camera 3' (WFC3) is suggestive of presence of primitive galaxies between redshifts(z) 7 and 8.5 corresponding to the lookback times of ~12.9 - 13.1 billion light years (American Astronomical Society 2010). Both the examples of early galaxies are indicative of formation of galaxies much earlier than predicted in most of the theoretical models.

However, there are many problems with these interpretations. First and foremost, they are based on an Earth-centered universe (Joseph 2010a); all estimates of time are based on how distant these galaxies are from Earth. As Earth is not "ground zero" for the Big Bang, then distance from Earth have nothing to do with the age of these galaxies (Joseph 2010a). Second, the claims that these are "primitive" galaxies are based on spectral signatures that are interpreted to suggest they are metal poor. Metal poor, it is claimed, indicates a young, primitive galaxy. However, our own Milky Way galaxy is orbited by two very old metal poor dwarf galaxies, Sagittarius Dwarf Elliptical Galaxy and the Canis Major Dwarf Galaxy (Chou, et al., 2009; Ibata et al., 1997; Majewski et al., 2003; Martin et al., 2004) whereas the Milky Way is believed to be ~13.6 billion years

in age (Pasquini et al., 2005). ‘Metal poor’ is not an indication of ‘primitiveness" or ‘youthfulness’ as fully formed ancient galaxies near our Milky Way are also metal poor (Van Flandern 2002). In fact, lots of metal have been detected in distant quasars and galaxies (Van Flandern 2002), and if distance is related to age, this means that many of the oldest, most distant galaxies are metal rich; and this defies the predictions of the Big Bang model since it requires that stars, QSOs, and galaxies in the early universe be “primitive”, meaning mostly metal-free. It requires many generations of supernovae to build up metal contents in the stars. The observations, on the contrary, show the existence of even higher than solar metallicities in the earliest QSOs and galaxies (Fan et al. 2001; Becker et al.2001; Constantin et al. 2002; Simon et al. 2007).

In view of the above, there is every likelihood of fully formed distant galaxies already existing at the edge of the universe that must have already been billions of years old over 13 billion years ago; which would make them older than the Big Bang. Then, there is the problem of the oldest globular clusters so far discovered, whose ages are reported to be in excess of 16 billion years (Van Flandern 2002). The Milky Way and other galaxies are also so old that they must have formed before the so called "Dark Ages" and thus almost immediately after the Big Bang, which is not consistent with the theory.

Also, images taken with the Hubble Space Telescope and other larger telescopes show that no two galaxies are alike, and the endless varieties of galactic forms pose grave challenges to the theory governing evolution of the diverse galactic shapes.

Using the Infrared Array Camera (IRAC) aboard NASA's Spitzer Space Telescope, astronomers have detected about a dozen very red galaxies at a distance of 10 to12 billion light years from Earth (cfa Harvard 2005). According to the Big Bang model, these galaxies existed when the universe was only about 1/5 of its present age of 13.75 billion years. The unpredicted existence of "red and dead" galaxies so early in the universe questions soundness of the

theories regarding galaxy formation (cfa Harvard 2005). Analysis showed that galaxies exhibit a large range of properties. Young galaxies with and without lots of dust, and old galaxies with and without dust. There is as much variety in the so called "early universe" as we see around "today" in galaxies closer to Earth. Moreover, the Spitzer Space Telescope, which is sensitive to the light from older and redder stars, has also revealed evidence for mature stars in less massive galaxies at similar distances (Spitzer 2005), when the Universe was supposedly less than one billion years old.

7. Gravitational - wave Background

One of the acid tests relating to the validity of the Big Bang model is detection of remnant of gravity waves from the earliest epoch of the universe. Existence of gravitational - wave background, predicted by Einstein in 1916 in his general theory of relativity, is expected from the violent early moments of the Big Bang much like the cosmic microwave background that fills the sky with radio waves from the early universe. While the microwave background originated 380,000 years after the Big Bang, gravitational – wave background purportedly come directly from events in the first minute after the Big Bang. As per Einstein's prediction, the cataclysmic Big Bang is believed to have created a flood of gravitational waves – ripples in the fabric of space-time that still fill the universe, albeit at a very feeble strength to be discernible by the conventional astronomical tools, and carry information about the universe as it was in the immediate aftermath of the Big Bang.

These waves should be observed as the "stochastic (random) background" – analogous to a superposition of many waves of different size and directions on the surface of a pond. The amplitude of the background is directly related to the parameters that govern the behaviour of the universe during the first minute after the Big Bang. The primordial stochastic gravitational waves are the warps, twists, and bends in space-time that were laid down as universe expanded from its earliest moments to the present.

The LIGO (Laser Interferometer and Gravitational Wave Observatory - jointly managed by MIT and Caltech, USA) and GEO 600 (the German-UK interferometer detector) have been actively searching for the gravity waves since 2002. The Italian Virgo interferometer joined the search in 2007. As per a recent report published in *Nature*, stochastic background of the gravitational waves, expected as unique signature from the earliest moment of evolution of the universe, has not been discovered despite 2 years of sustained search for gravity waves (LIGO et al. 2009), putting a serious question mark on the validity of the inflationary Big Bang model of universe as viable explanation for the origin of the universe. The above finding is based on analysis of data collected by the LIGO and Virgo interferometers during 2005-07. The LIGO interferometer comprises two detectors-2 km and 4 km in length, installed at Hanford (Washington), and a 4 km instrument set-up at Livingston (Louisiana),USA. Each of the L – shaped interferometers uses a laser split into two beams that travel back and forth down the long interferometer arms. The two beams are used to monitor the difference between the two interferometer arm lengths. According to the general theory of relativity, one interferometer arm is slightly stretched while the other is slightly compressed when a gravitational wave passes by. Lasers are sensitive enough to measure changes in each arm's length as small as a thousandth the diameter of an atomic nucleus.

8. Rivers of Galaxies Flowing in the Wrong Direction

The Big Bang predicts general uniformity in the trajectory of galaxies, and yet, contrary to this theory (Joseph 2010a), there are galaxies crashing into each other from every conceivable direction. There are in fact rivers of galaxies flowing in the wrong direction, including local galaxies who streaming motions are too high for a finite universe that is supposed to be everywhere uniform (Van Flandern 2002).

As summarized by Van Flandern (2002): "The average redshift for galaxies of a given brightness differs on opposite sides of the sky. The Big Bang interprets this as the existence of a puzzling group flow of galaxies relative to the microwave

radiation on scales of at least 130 Mpc. Earlier, the existence of this flow led to the hypothesis of a "Great Attractor" pulling all these galaxies in its direction. But in newer studies, no backside infall was found on the other side of the hypothetical feature. Instead, there is streaming on both sides of us out to 60-70 Mpc in a consistent direction relative to the microwave "background". The only Big Bang alternative to the apparent result of large-scale streaming of galaxies is that the microwave radiation is in motion relative to us", a result which is contrary to the theory of the Big Bang.

Moreover, at the center of the local supercluster, 250 mly away in the direction of the Hydra and Centaurus constellations, rivers of galaxies over a region of hundreds of million light years across, are all flowing in the same direction; an "anomaly," which defies Big Bang predictions, and is thus attributed to a "Great Attractor" the identify of which is unknown.

9. Constancy of Speed of Light

One of the basic assumptions of Einstein's general theory of relativity, is the constancy of the speed of light. A varying speed of light contradicts Einstein's theory of relativity, and conflicts with the Big Bang model for the universe. In recent years, the speed of light has been observed to have exceeded the speed of 300,000 km/sec, albeit over short range, in quantum tunneling experiments (Landauer 1993, Brown 1995). This has led some to claim that light moved faster during the early stages of the universe. For example, the evidence for variations in the fine-structure constant, α (= $e^2/ \hbar c$) - a measurement of the strength of electromagnetic interaction between photons and electrons based on measurement of light travelling billions of years from quasars (Davies et al. 2002) has been used to claim that the speed of light was faster than its current speed some 6 to 10 billion years ago. The fine-structure is believed to be slowly increasing over cosmic timescales.

The laws governing the physical world cannot afford to be selective in their attributes, simply for the sake of saving a theory. Constancy of speed of light has

to be uniform in all epochs of time whether it is nascent universe or the mature universe we are currently in, if general relativity, whose backward extrapolation leads to the state of Big Bang. The laws governing the physical world cannot afford to be selective in their attributes, simply for the sake of saving a theory. Constancy of speed of light has to be uniform in all epochs of time whether it is nascent universe or the mature universe we are currently in, if general relativity, whose backward extrapolation leads to the state of Big Bang.

Though it is true that during the purported cosmic inflation during the early epoch (~10^{-35} to 10^{-32} sec after the Big Bang) of the universe, speed of light may have crossed the threshold level (300,000 km/sec in vacuum), as a result of the theorized extremely rapid exponential expansion of the infant universe by a factor of at least 10^{78} in volume, reasonable 'particle physics' explanation for the supposed inflation, however, remains elusive. The inflationary concept, supporting a vacuum-dominated universe (arising out of quantum fluctuations) during phase transition in the early history of the universe was evolved by some cosmologists (Guth 1981; Linde 1982) to circumvent problems of 'flatness', 'horizon' and the 'primordial magnetic monopole' associated with the Big Bang model. The hypothetical inflation field giving rise to inflation still remains speculative. Moreover, there is no general consensus among cosmologists regarding the timing of the beginning and end of the inflationary epoch. In Linde's 'chaotic inflation', inflation starts at the Planck time ,10^{-43} sec when the temperature was 10^{32} K, whereas in other models, inflation starts when the temperature falls to the point (10^{-35} sec after Big Bang when the temperature was ~10^{28} K) at which the symmetry of the Grand Unified Theory (GUT) is spontaneously broken.

10. Oldest Planet

In July 2003, the oldest planet yet was discovered, a huge gaseous object equivalent to 2.5 times the size of Jupiter whose origin dates back to about 13 billion years (at z ~7). This ancient planet was located by the Hubble Space

Telescope near the core of the ancient globular cluster M - 4 located some 7,200 light years away in the northern - summer constellation of Scorpius (Hansen et al. 2003). This discovery challenges a widely-held view among astrophysicists that planets could not have originated so early because the Universe had yet to generate heavy elements needed to make them. Planet-making ingredients include iron, silicon and other elements heavier than helium and hydrogen. These so-called metallic elements are cooked in the nuclear furnaces of stars, and accumulate from the ashes of dying stars (supernovae), which are recycled in new stars and their families of planets (Joseph and Schild 2010).

Planets 13 billion years in age, nearby galaxies ~13.6 billion years in age, distant galaxies billions of years older than the supposed Big Bang, and the existence of Great Galactic Walls that took from 80 billion to 250 billion years to form, do not at all support the Big Bang theory.

11. Future Probes

We are presently in a "golden age" of cosmological discoveries. Astronomers working on the WMAP mission stunned the scientific community with their announcement that the first generation stars in the universe were surprisingly born just after 200 million years of the Big Bang birth of the cosmos. Of course, the fact is, the true age of the universe is unknown, and since its inception, the age of the universe has been steadily pushed backwards in time, from 2 billion year to 8 billion after it was determined the Earth was 4.6 billion years in age, and now the estimates are 13.75 billion years.

With ten times the light-gathering power of Hubble, the James Webb Space Telescope (JWST), successor to the HST due to be launched in 2014, may well detect ever more distant galaxies. Likewise, the ultra-high resolution radio telescopes such as Atacama Large Millimeter Array (ALMA) in Chile, which is to become operational in 2012, will be peering still deeper into the universe, and probably pushing the hypothetical Big Bang further backward in time as ever more distant galaxies are detected.

12. Conclusion

There is a growing body of evidence which demonstrates the universe could not have begun with a Big Bang 13.75 billion years ago. Indeed, the day may come when it is determined there never was a "Big Bang" and cosmologists of the future will only gaze back in wonder at how anyone could have believed in a creation event which was refuted by so much contradictory evidence.

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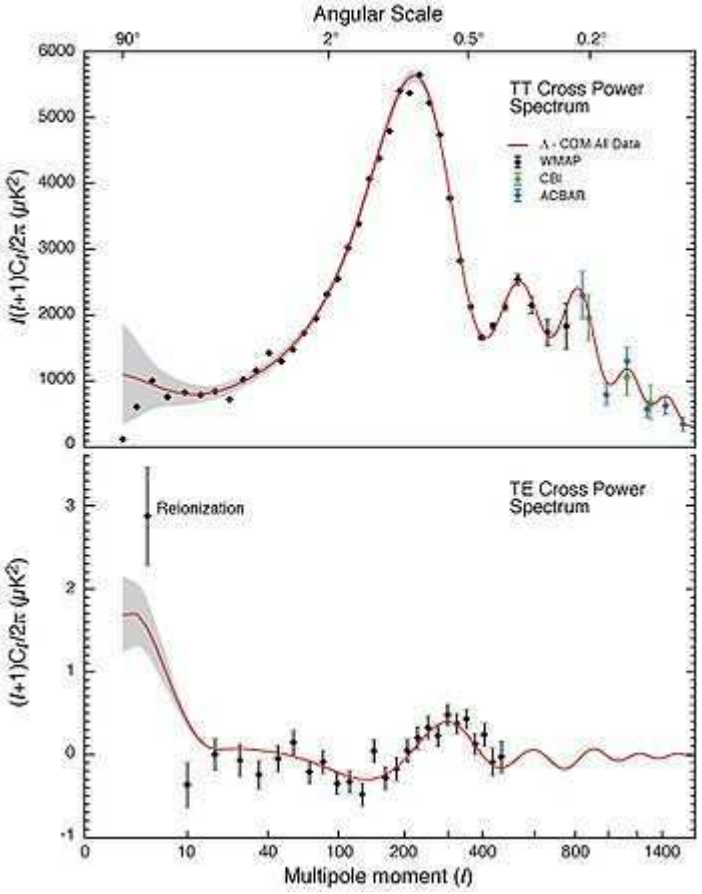

Fig. 1&2 : Comparison of the predictions of the standard Big Bang model with experimental measurements. The power spectrum of the cosmic microwave background radiation anisotropy is plotted in terms of the angular scale (or multipole moment) (top)

Credit : NASA/WMAP Science Team

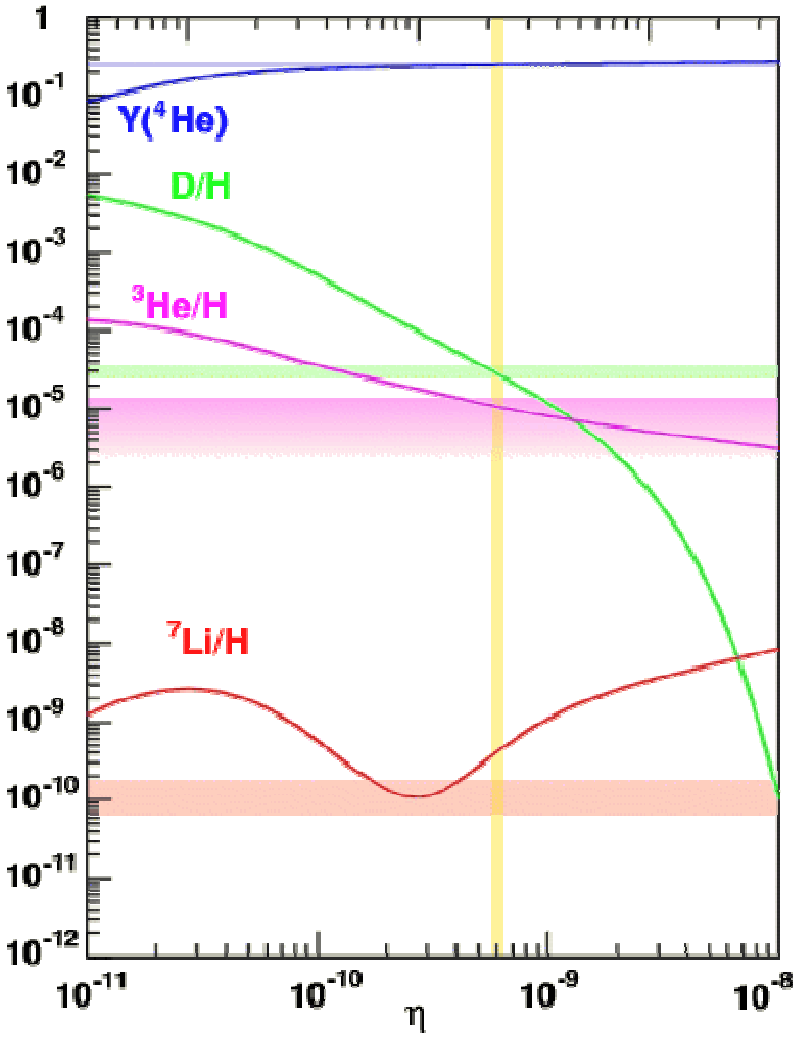

Fig. 3 : Relative abundances of lighter elements (curves indicate the theoretical predictions from Big Bang nucleosynthesis, the horizontal stripes the values that follow from observations)

Adapted from an image by E. Vangioni, Institut d'Astrophysique de Paris

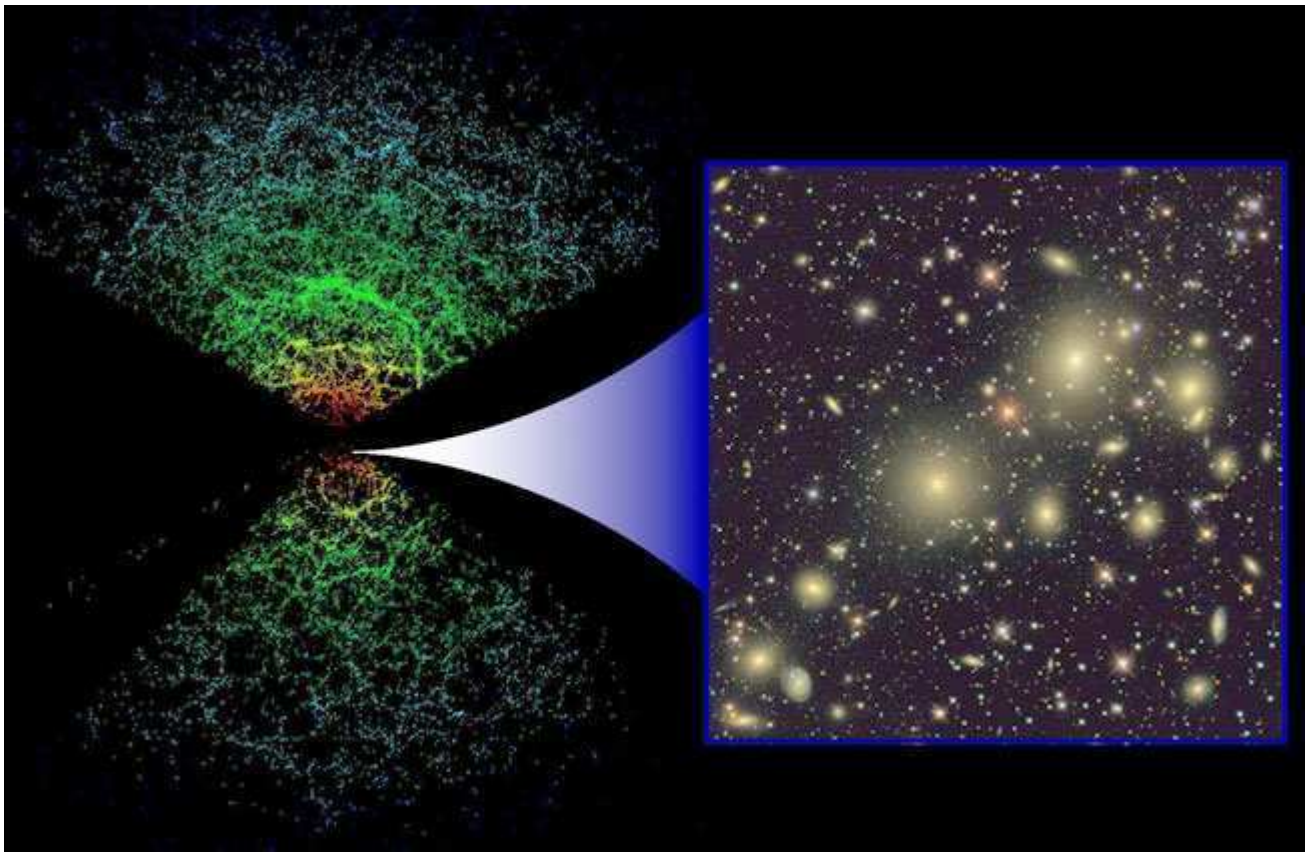

Fig. 4 : SDSS 3D Universe Map

Credit: Sloan Digital Sky Survey Team, NASA, NSF, DOE

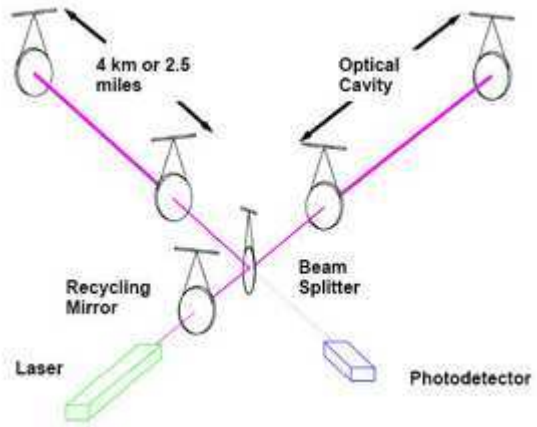

Fig. 5 Schematic diagram of Laser Interferometer Gravitational-wave Observatory

Credit : http://space.mit.edu/LIGO/more.html