Bright Spot / Dark Whole theory

"The universe is not a dark hole, but an observer-centred bright spot in an ocean of darkness"

The Big Bang theory emerged in the 20th century after a long scientific debate about the question if the universe would be static, shrinking or even expanding. Several decades on, the big bang theory is still the most accepted theory of our universe with a powerful lobby. Many scientists are making their living investigating and proving this theory. In fact, questioning the theory could even jeopardise ones career. However, the theory raises more and more questions than it provides answers[1]. Unexplainable observations are being made fit and suitable by introducing extensions and additions to the theory like hyperinflation and dark energy. Even last week observations revealed an impossible heavy black hole in the infant universe. Should we continue travelling this (pathless) way? Or is it time to go back to the drawing board, re-assessing all observations and testing all explanations? I think we should.

The main cause of red shift could be gravitational.

Hubble discovered that light is redder shifted, the further away the source is. The explanation is that these stars move away from earth. The observed red shifts from distant objects that were interpreted as "velocities" were huge. The universe was "expanding" and the expansion was even accelerating. In reverse mode, the universe would be shrinking to an infinite small point from which everything has evolved. Voila: The Big Bang theory was born.

But if we assume an infinite homogenous and isotropic universe and both Einstein's general relativity theory and Isaac Newton's shell theorem to be true then it could turn out that the red shift is predominantly caused by gravitation. Isaac Newton proved the shell theorem and stated that: (1) A spherically symmetric body affects external objects gravitationally as though all of its mass were concentrated at a point at its centre; and (2) If the body is a spherically symmetric shell (i.e., a hollow ball), no net gravitational force is exerted by the shell on any object inside, regardless of the object's location within the shell. The "body" could be a solid sphere, but could also be sphere with low-density material like gas or even an almost empty space like our universe. If an observer looks randomly in a direction and sees a distant object we could construct a sphere with the object in its centre and the observer on its surface (but outside the sphere). Shell theorem part 1 states that all the mass in the sphere affect external bodies as though all of its mass were concentrated in its centre. For low densities like our universe and very distant objects (billions of light years away) this mass is huge and will affect the red shift of light emitted at its centre trying to escape the spherical body. Shell theorem part 2 means that we can construct a shell round the sphere that includes the observer in which no net gravitational force will be exerted on the observer. In an infinite large universe this shell could also be infinite large. This argument will hold for every observer anywhere observing any object anywhere in the universe. High red shifts correspond with distant objects because the involved spherical mass (and gravitational potential) is large. If the distance approaches the Schwarzschild radius the red shift will increase to infinity. Objects beyond the Schwarzschild radius are not visible for the observer. In the figure below an observer on the surface of sphere A is looking to its left at a heavily red-shifted light source A, almost a Schwarzschild radius away. The observer could look in every direction seeing the observable universe, which is sphere C.

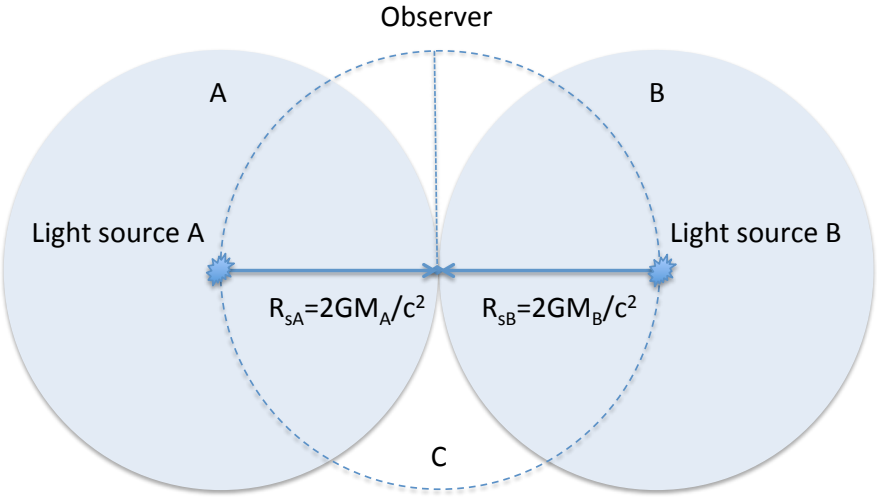

Figure 2: Observable universe (C)

[1] See Journal of Cosmology, 2010, Vol 6, 1533-1547. Cosmology, January 30, 2010: Big Bang? A Critical Review.

The red shift can be calculated with the formula:

[1] $$z = -1 + \sqrt{\frac{1 - \frac{2GM}{c^2 r_{reciever}}}{1 - \frac{2GM}{c^2 r_{source}}}}$$

If the receiver is not located near a massive body like a neutron star or black hole, the gravitational potential at this location is (almost) zero (0). Formula [1] could be rewritten as [2], replacing the mass M by "density * $4\pi r^3/3$".

[2] $$z = -1 + \sqrt{(1/(1 - (8 * G * \Pi * r_{source}^2 * density)/(3 * c^2))}$$

Density = critical density = $9{,}47*10^{-27}$ kg/m^{-3}
G (Gravitational Constant) = $6{,}67408 \times 10^{-11}$ m^3 kg^{-1} s^{-2}
c = (Light velocity) = 299792458 m s^{-1}
π = 3,141 592 653

If we choose for the density the critical density and replace all the constants we can obtain formula [3].

[3] $$z = -1 + \sqrt{\frac{1}{1 - r_{source}^2 * 5{,}8914 * 10^{-53}}}$$

If the denominator of [3] becomes zero, the redshift z becomes infinite. That is the case if r = $1{,}30*10^{26}$ meter (approximately 13,8 billion light-years). The red shift formula [2] is assuming that the gravitational potential of the receiver/observer is zero and the gravitational potential of the light-source is the accumulation of all the mass in the sphere with radius r, which is the distance between the source and observer.

Gravitational redshift would explain most observations and would not require dark energy to solve the puzzle. It would also explain the "coincidence" of the universe having the critical mass. The -so called- Hubble constant is estimated at approximately 71 km per second per mega parsec. The edge of the observable universe is an estimated 13,8 billion light-years away (4231 mega-parsec). This means that the "velocity" of light sources at the edge of the observable universe will be approximately the speed of light! What a coincidence! The current explanation of the source of these red shifts is that space itself is expanding: the "cosmological" red shift[2], giving birth to the BIG BANG theory. Other sources of red shift have been disregarded, like the Doppler red shift and gravitational red shift. The Schwarzschild geometry states that for every mass M there is a radius, the Schwarzschild radius ($R_s = 2GM/c^2$) within which all particles must fall. The radius is proportionally with the mass. If the mass is evenly distributed in space, the mass is proportional with the volume of the sphere ($4\pi r^3/3$), which is proportional with the third power of "r". This means that for all densities, however small, there will be a Schwarzschild radius. What is the Schwarzschild radius of the observable universe? What is the mass of the observable universe? If the universe is "flat" the critical density is calculated at approximately $9{,}47\times10^{-27}$ kg/m^{-3}. The total mass of the universe[3] would therefore be $0{,}9*10^{53}$ kg and the corresponding Schwarzschild radius would be 13,8 billion light years. What a coincidence, again! How big are the odds that the mass of the observable universe (with red shifts caused by speed) is exactly the critical mass? That seems to be not probable, highly unlikely even. However, if redshifts are predominantly caused by gravitation the only important parameter in the equations is the density itself. The observable universe can be calculated by solving the Schwarzschild equation. Higher densities will result in smaller observable universes (in fact every density is "critical" per definition). The Hubble constant is the speed of light divided by the Schwarzschild radius of the universe.

[2] See https://en.wikipedia.org/wiki/Redshift
[3] See https://people.cs.umass.edu/~immerman/stanford/universe.html

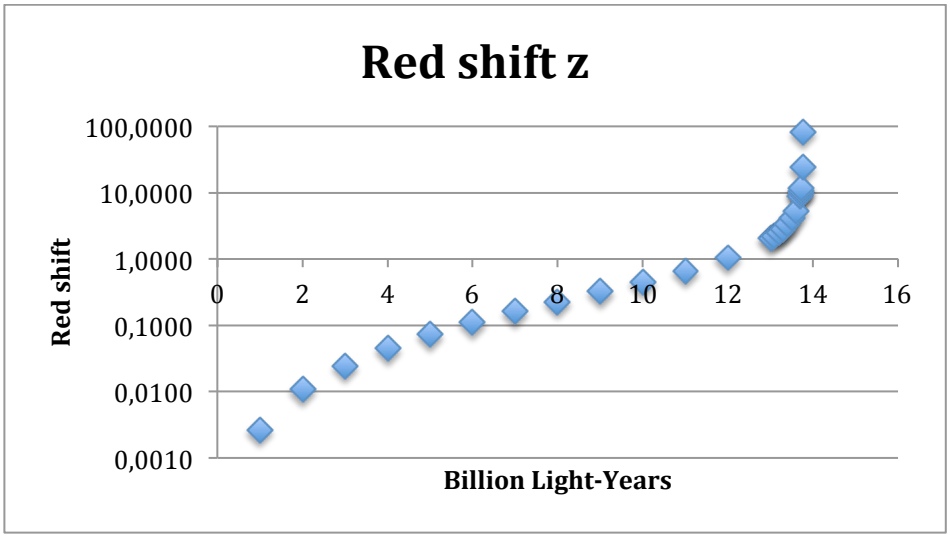

Figure 1: the relation between red shifts and the distance of light sources

Velocities larger than the speed of light are not necessary to explain the observations. The Big Bang theory states that the cosmological expansion leads to velocities larger than the speed of light. Gravitational red shift also provides an answer for Olbers paradox[4]. In an infinite universe the sky at night would be dark because light cannot travel from places beyond the Schwarzschild radius so only a small portion of the infinite number of stars and galaxies can be seen on earth. Moreover, from every point in the infinite universe it will appear that this point is the centre of the universe and the edge of the universe is 13,8 billion light-years away.

Does this mean that the BIG Bang theory is wrong? Probably it is. But does it also mean that the Steady State theory is true? It could be, but not for sure. If the total mass of the (observable) universe is constant then the Schwarzschild radius will be constant. If somehow particles could pop into existence from no-where or the contrary process could be true that particles somehow annihilate and cease to exist. The Mass of the universe is a variable, as is its density, its Schwarzschild radius and Hubble constant. An infinite (old and wide) universe without rejuvenating processes would have faded away a long time ago. The universe we live in has not faded away so probably somewhere and somehow new particles are being created continuously. I suggest we start looking for these particles instead of searching for dark energy.

Assumptions and conclusions & further work to be done

Assumptions

1. The density of the universe is estimated at 9,47*10-27 kg/m−3, which is the critical density. The other variables, like the Hubble constant and the size and age of the observable universe are outcomes of this estimated density;
2. Assumption: the universe is infinite, homogenous and isotropic on large scales;
3. Assumption: Einstein and Newton were right on GR and shell theorem.

Conclusion

4. Gravity accumulates causing GR effects on large distances. That's why large red shifts are mainly gravitational red shifts instead of cosmological red shifts. As a consequence the big bang theory must be flawed. The universe is more likely much older than originally estimated, which explains why just recently mature structures have been observed just after the "big bang". Red shifts should be calculated considering both local effects (which are dominant on short distances) as global GR effects (which are dominant on large distances).

Consequences

5. Dark energy is a hoax, fake news. The search for it will fail.
6. Big-Bang-To old to exist structures can be explained, the universe could be much older than we thought, perhaps even infinitely old.
7. Observed Red Shifts can be explained without big bang and expansion of the universe;
8. Hubble's constant is simply derived from the average density of the universe;
9. The observable universe is determined by the Schwarzschild radius.

[4] See https://en.wikipedia.org/wiki/Olbers%27_paradox

10. Olbers paradox is solved: the bright spot is surrounded by an ocean of darkness;

Work to be done

11. Cosmic background radiation has yet to be explained in the Bright Spot theory. Small variations in cosmic background radiation could perhaps be explained by small variations in density for different directions. Could cosmic background radiation be some sort of (black hole) photon sphere?
12. Research on Supernova type 1a Standard Candles has yet to be integrated in the Bright Spot theory. Note: one would expect standard candles supporting the gravitational red shift trajectory because the distance to the object can be computed using the inverse square law as is the calculation of the redshift.

Colophon

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