10.000 Universes or Two Observers? - Spiriting Away the Universe's Missing Mass. *

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Abstract

The problem of the universe's missing mass is approached from a new perspective in which two observers, one located on the planet Earth and the other at a remote location calculate the mass by reference to the age of the universe, which is postulated to be everywhere measured to be the same. This yields a formulation analogous to distance in special relativity theory, only with the age of the universe substituting for the velocity of light and a position on the universe's absolute time scale substituting for the relativistic velocity v but with mass and time considered non-local and perpendicular to the axis of observation. Such a theoretical construct is capable of eliminating entirely the unseemly missing mass from consideration and to simplify cosmology considerably.

1 Introduction

The fact that the so called "Big Bang" (BB) theory for the creation of the universe rests on many *ad hoc* assumptions tends to be forgotten because of numerical agreements achieved in highly sophisticated calculations. The Big Bang theory is hailed in the mass media as the one and only explanation for the universe's existence while many scientists increasingly regard it as merely a numerical tool to be used in the search for a deeper theory.

In its infancy, the BB theory purported that all matter and energy initially were concentrated in a point-like volume that exploded and expanded to create the universe. Current versions of the theory instead emphasize early quantum fluctuations that were made permanent because of expansion at superluminal velocities of the initial point-like volume. Both the early and the late versions rely on the unquestioned assumption that space and time may exist in the absence of physical contents. The theory places the initial conditions in such a pre-existing space-time. The current versions even endow space-time with the supernatural (not seen in the real world) powers to override the causality principle because they suppress what would otherwise be superluminal velocities in favor of superluminal expansion of space. [1]

Besides presumptions about the initial conditions, the BB theory must also perform at the cosmological horizon, which, in classical cosmology, is located at the universe's remote. The cosmological horizon is usually defined as where the most ancient light signals originate but may be extended to include the origins of any not yet arrived neutrinos and the location of the initial singularity in BB theory (this is herein denoted the 'absolute' cosmological horizon). The BB theory is unable to answer the question what is beyond the remotest conceivable cosmological horizon where processes extending to our universe once took place. The autonomy of space-time in the absence of physical contents in principle allows there to exist 10000 universes beyond that horizon.

Anything which is beyond about 0.3×10^6 years after the Big Bang is concealed from observation and need not be accounted for because classical cosmology indicates opacity at earlier times. The cosmic background radiation (CBR) is postulated to be the most ancient perceivable signal from earlier times coming directly from that horizon ('signatures', relics, and residues excluded). The CBR is postulated to derive from thermal motion shortly after the universe became transparent. It is different from signals coming from other remote matter in not being red-shifted.

An inconsistency of the BB theory with observations that is often talked about is the universe's missing mass. Less mass is observed in the real world than there ought to be according to the theory. This has sparked a search for dark mass, dark energy, black holes, neutrino mass etc: Just like particle physicists dream that the Higgs particle had been found in a super-collider, astrophysicists dream of a universe where the nature of all missing mass was known. This article will focus on the universe's missing mass from another perspective - it being a void mass arising because of an error of observation.

2 Theory

In special relativity theory (SRT), signals coming from any process taking place at the object are distorted such as to indicate that the moving object's time axis shifts scales depending on its velocity. Since all movements take place relative to anything else, this fact causes SRT to refute an absolute time axis. In SRT, the simultaneity of events only makes sense when the events can be observed. Undoubtedly, however, events may also be truly simultaneous even if not observed. SRT leaves it an open question how to relate such truly simultaneous events that do not require signal transmission along the axis of observation in order to be defined.

[1] There is, however, an alternative to a pre-existing space-time; a new cosmology can be constructed by adhering to the geometry of plain physical observation as implemented in the hydrogen atom in place of a non-physical Cartesian coordinate system with relativistic corrections (1). This yields a one-dimensional universe along the signal axis whith all matter is located in the laboratory frame at the (non-classical) cosmological horizon and all uncertainty at the universes remote pole (2-4).

In SRT one deals with 3 observables along the axis of observation; distance x, velocity v, and signal velocity c, to which comes a time axis with coordinate t adding to these observables according to

$$x' = \frac{x - vt}{\sqrt{1 - \frac{v^2}{c^2}}} \tag{1}$$

where the primed symbols indicate measurements performed by an observer moving relative to the object (equivalent of the object moving relative to the observer) and unmarked symbols indicate measurements performed by an observer who sees the object at rest. The same transformation law applies to an object's rest mass including its kinetic energy (plain symbol M) moving relative to the primed observer:

$$M' = \frac{M - vt}{\sqrt{1 - \frac{v^2}{c^2}}} \tag{2}$$

Now, consider two observers, one located on the planet Earth and the other very far away and postulate that the age of the universe is everywhere measured to be the same. The first observer is located at present time on the universe's (absolute) time axis, $A_0 = A_U - A_U$, (A_U is taken here to be 13.7×10^9 years, cf. ref. 2-3 and references quoted therein) and the second one at the remote position $A_X = A_U - A_t$ as measured by the first one. The two observers are simple enough to lack a time axis of their own (they may be thought of as an atom, a material energy transition or something else capable of experiencing present time only) so their own time coordinates in Eq. 2 may be set to zero. They may deduce the age of the universe from radioactive decay, stellar evolution, globular clusters, extrapolated redshift, etc. but not from direct observation Only signals and physics having impact on the axis of observation can be measured by direct observation (5). This does not apply to the universe's time and mass (5), which are non-local and therefore perpendicular to the axis of observation. The two observers adhere to the idea of the constancy of the velocity of light such that distance along the axis of observation becomes proportional to age and through the nearly constant apparent rate of expansion of the universe (at least up to the CBR epoch), proportional to the velocity taken as v in Eq. 2. Eq. 1-2 only apply to signals along the axis of observation and a counterpart for perpendicular entities is now sought. By analogy with Eq. (2),

$$M_U{}' = \frac{M_U}{\sqrt{1 - \frac{A_X{}^2}{A_U{}^2}}} \tag{3}$$

where M_U is the mass of the universe (primed as seen by the observer at A_X and unprimed as seen by the one at A_0). The observer at A_0 only sees a fraction of the mass that his colleague computes who takes a remote position. For example, a baryon density in local (non-distorted) volume measured at A_U of 0.02 yields $\frac{A_X}{A_U} = 0.9998$ and $A_t = 2.74 \times 10^6$ years after the Big Bang, which is quite close to CBR-horizon (This is when matter becomes visible in the BB theory, usually considered to be at 0.3×10^6 years but probably quite adjustable up or down depending on one's choice of details within the BB framework).

3 Discussion

Besides resolving the problem of the universe's missing mass, postulating that its age is everywhere measured to be the same like expressed by Eq. (3) invalidates questions about what may exist beyond the absolute cosmological horizon. Namely; nothing, the extent of which belongs to the non-local axis perpendicular to signal observation, may be older than (or, for the moment, add weight to) *the* (= our) universe.

Classical cosmology pursues another relation between mass and age. The universe's mass is determined through gravitational forces between celestial bodies being overridden by the thrust of the Big Bang. Since the expansion follows a time course, the age of the universe is strictly correlated to its volume. BB theory makes no distinction between mass measured from the outside of the purported fireball and the mass seen from here. Some observer is (erroneously) assumed to be able to escape from the epoch of quantum observations where observations of the remote are subject to considerable uncertainties, through a cosmological horizon, and to arrive at such an external position. The assignment of non-local mass and time to a perpendicular axis like in Eq. (3) in contrast allows greater freedom regarding the time coordinate. The position on the real (perpendicular) time axis may not be the same as that calculated from direct observations parallel to the observation axis. Such considerations may ultimately turn out to be relevant to the measured distance scale of the universe when recalculating the distances to the observed celestial bodies.

What may exist between the absolute cosmological horizon and the CBR creation is still an open question. The opacity of the universe at that interval may hint at an epoch in which classical quantum observations do not apply, followed by the known epoch of quantum observations and later by an epoch of intelligent observations and interpretations (like that of thermal radiation, including CBR, cf. ref. 6).

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