Is it really true that the Universe experiences accelerating expansion?

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Abstract

According to Standard Model cosmology, the universe experiences accelerating expansion, which creates the need for dark energy models. But I read other possible theories, for example Lemaitre-Tolman-Bondi (LTB) model which suggests that there are large structures (void) which introduce inhomogeneity in the Universe. See for instance: http://arxiv.org/abs/0709.2044.

Introduction

This article is a summary of discussion in researchgate.net. According to Standard Model cosmology, the universe experiences accelerating expansion, which creates the need for dark energy models.
But I read other possible theories, for example Lemaitre-Tolman-Bondi (LTB) model which suggests that there are large structures (void) which introduce inhomogeneity in the Universe. See for instance: http://arxiv.org/abs/0709.2044. Therefore it seems that the homogeneous-isotropic assumption of the Standard Model is questionable.
Another possible explanation is Kashlinsky-Tsagas's dark flow model. Basically it says that the observed accelerating expansion is a mere illusion. See
http://www.nbcnews.com/id/44690771/ns/technology_and_science-science/t/accelerating-universe-could-be-just-illusion/#.U4vYcvFhiK1

Answers

[1] **Adarsh. M. J.**
Yeah,i guess the universe is accelerating and most of the proofs point out in the same direction. I guess finding out what exactly banged at the time of big bang might provide the answer. Besides, the "inflationary model", says that the "inflaton field" was responsible for the accelerated expansion of the early universe and dark matter and dark energy hypothesis with all its WIMPS seem to solve atleast a part of the "accelerated expansion" problem, of course we havent detected any of the dark matter or dark energy..... i guess thats why they are named as WIMPS!

[2] **R. Rakhi**
Yes. According to observations, viz. Supernova observations, CMBR, BAO etc, the Universe is undergoing accelerated expansion.

[3] **Vikram Zaveri**
The attached theory shows that the repulsive gravitational force can exist when total kinetic energy of a system dominates the total potential energy. A gravitational attractive force can exist in a smaller local system in which total potential energy dominates the total kinetic energy. Because the equation is associated with the reversible process, both forces can be described by same equation. The velocity vector in this equation appear in squared form. So if v is positive or negative, the result is the same. The term particle anti-particle has a different definition in this theory than the term matter anti-matter. The former has opposite velocity and the latter has oposite charge as well. The repulsive gravitational force is associated with the accelerated expansion of the universe. This is different than the suspected

repulsive gravitational force between matter and anti-matter in other theories.

[4] **Trevor Bamidele Davies**
I think the universe is indeed in a state of accelerated expansion as evidenced from Type 1a supernova, CMB, integrated Sachs-Wolf effect and several other observations. For me it is rather a question of whether the whole dark energy thing is a viable explanation or alternatively that the gravitational field equations may need to be modified at super large scales. I tend to lean towards the latter as I do not believe that the gravitational constant G in Einstein's field equations remain constant for all times. In other words, if the mass/ energy density is finite but the size of the universe keeps increasing, then why should we expect the gravitational coupling between matter fields to remain the same? This of course is a consequence of Mach's principle which is curiously absent from GR.

[5] **Juan Casado**
A tiny acceleration of the expansion is the best fit to observations. However, these observations could be also compatible with a linear expansion at present, a model supported by an increasing number of papers. See for instance:
https://www.researchgate.net/publication/251572020_steady_flow_cosmological_model

[6] **Michael Peck**
Victor,
I have just submitted an article for peer-review that conclusively rules out cosmological redshift originating from metric expansion. If you want a private copy, feel free to send me a message. For each observation that supports the big bang theory, there are at least two that directly contradict it. These problems have existed for over 40 years and appear to be systematically neglected due to an over-reliance on confirmation rather than rigorous attempts at refutation.

Concluding remarks
This discussion seems to confirm the consensus that there is accelerating expansion in the Universe, although there is also different opinion. However, this consensus may be challenged in the future.

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