

Two interesting findings related to dark energy and galactic dark matter

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Abstract

Cosmology and also other fields of physics with one exception are producing fascinating results on a daily basis. In this article the recent empirical finding challenging the notion of standard candle defined by supernova of type Ia crucial for the discovery of dark energy is discussed in zero energy ontology. Second finding is lens effect producing 4 images of distant quasar. The interpretation is that the dark matter of foreground galaxy is responsible for this. My naive expectation would be ring rather than four separate images. TGD framework two cosmic strings with large enough angle between them would produce 4 images.

1 An objection against the notion of dark energy

Nikolina Benedikovic gave a link to a popular article (<http://tinyurl.com/ydo2sna9>) describing a finding [E2] (<http://tinyurl.com/szlm73b>) challenging the notion of dark energy. This finding made by a team of astronomers working at Yonsei University (Seoul, South Korea) is very interesting since twistor lift of TGD predicts length scale dependent cosmological constant.

Let us collect the basic facts first.

1. Standard candle property (<http://tinyurl.com/pn9goe2>) is essential assumption leading to dark energy hypothesis. It states that the distance corrected luminosity of SN Ia supernovae does not evolve with redshift that it depends only on distance.
2. Observation: The luminosity of SN Ia supernova correlates significantly with the population age of the host galaxy. The luminosity thus depends on the environment provided by the host galaxy.

According to the article:

The team has performed very high quality spectroscopic observations to cover most of the reported nearby early-type host galaxies of SN Ia, from which they obtained the most direct and reliable measurements of population ages for these host galaxies. They find a significant correlation between SN luminosity and stellar population age at a 99.5 percent confidence level. As such, this is the most direct and stringent test ever made for the luminosity evolution of SN Ia. Since SN progenitors in host galaxies are getting younger with redshift (look-back time), this result inevitably indicates a serious systematic bias with redshift in SN cosmology. Taken at face value, the luminosity evolution of SN is significant enough to question the very existence of dark energy. When the luminosity evolution of SN is properly taken into account, the team found that the evidence for the existence of dark energy simply goes away (see Figure 1).

3. This is in conflict with the standard candle property if the population age of the host galaxy decreases with distance. This is obvious in standard cosmology. But is this true in TGD Universe obeying zero energy ontology (ZEO)?

In ZEO [L4] (<http://tinyurl.com/yfjtmq6>) the situation might be different. ZEO provides a quantum measurement theory solving the basic paradox of standard quantum measurement theory and leads to a theory of consciousness.

1. The first prediction is that geometric time and experienced time identified as sequence of “small” state function reductions (SSFs as counterparts of weak measurements) are not same. This is of course an empirical fact - thermodynamical time is irreversible unlike geometric time, etc... but in standard ontology these times are identified.
2. In small state function reductions (SSFs as counterparts of weak measurements) arrow of time does not change and their sequence defines self as conscious entity. In big (ordinary) state function reductions (BSFs) the system “dies” and reincarnates with opposite arrow of time. The experiments of Mineev et al [L2] provide direct support for ZEO in atomic systems [L2] (<http://tinyurl.com/yjbpoy3q>). Libet’s findings support this in neuroscience [J1].
3. Assume that the size of the causal diamond (CD) decreases in “reincarnation” that is self experiences “childhood”. If so the size of CD can remain bounded. Irrespective of this assumption the temporal center of mass position of CD in imbedding space $H = M^4 \times CP_2$ remains the same during the sequence of reincarnations.

Most importantly: the steady motion towards future assumed in standard ontology with single arrow of time is replaced with forth-and-back motion in time with constant cm position of CD in H.

4. ZEO explains several time anomalies such stars older than the universe and the observation that the nuclear abundances of very distance stars seem to have nearly their modern values supporting the view that the population age of galaxy does not depend significantly on distance [L3] (<http://tinyurl.com/ydlogkb4>).

In particular, the age distribution for the populations of galaxies would not depend significantly on distance - standard candle hypothesis would be saved!

2 Support for TGD view about galactic dark matter

Cosmology and also other fields of physics with one exception - particle physics - produces fascinating results on daily basis. It is really a pity that particle physicists living in the jail of their reductionistic world view cannot pay any attention to these discoveries and continue moaning that there is no data so that it is impossible to go beyond standard model. Bad philosophy can kill entire field of science. Having replaced Planck length scale reductionism by fractality I can enjoy swimming in the flood of anomalies.

One of the surprises was a popular article about a detection of dark matter lumps [E1] (<http://tinyurl.com/vjvhyud>) by Hubble telescope. The discovery is based on gravitational lensing effect. The popular article tells about light coming from distant quasars - distance is about 10 million light years. At the path of light coming to Earth there is foreground galaxy - distance is about 2 million light years. They are reported to give rise to four separate images of the galaxy by lensing effect.

I am however wondering why one observes four images of each quasar by foreground galaxy. My naive expectation would be a ring if dark matter halo gives rise to the lensing. If so the finding would represent an anomaly. It is also stated that the number of images depends on how many different dark matter particles there exist. I must admit that I do not understand.

What says TGD?

1. If galaxies are associated with long cosmic strings as tangles as in TGD Universe, flat velocity spectrum is automatically predicted without any other assumptions and velocity spectrum determines string tension [L1, L3]. (http://tgdtheory.fi/public_html/articles/meco.pdf and http://tgdtheory.fi/public_html/articles/galaxystars.pdf).
2. Long cosmic string would give rise to two separate images in lensing effect rather than ring as halo would do. Two long foreground cosmic strings with different directions - say being nearly orthogonal - would give rise to four images.

3. The two cosmic strings could be assigned with fusion of two galaxies associated with separate cosmic strings. One can consider the possibility that visible galaxies are formed as two cosmic strings collide: this would give rise to instability initiating the thickening of the 2-D M^4 projection of cosmic string and formation of tangles associated with both cosmic strings. Magnetic energy would be liberated and transform to ordinary matter giving rise to the visible matter of galaxy. For instance, could the 4 spiral arms of Milky way could relate to the second cosmic string in the plane of Milky way tangled around the second cosmic string orthogonal to the plane of Milky Way?

One can consider also a situation in which there is no foreground galaxy but just two cosmic strings and this might provide a test for TGD view.

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