Essay

On Quantization of Galactic Redshift & the Source-Sink Model of Galaxies

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Abstract

This paper briefly discusses a Source-Sink model of galaxies and its implication on the observed quantization of galactic redshift. As shown elsewhere, the Newton law and Maxwell electromagnetic equations can be described by the Source-Sink model too. The Source-Sink model of galaxies can be interpreted further in the context of superfluid dynamics as described by Gross-Pitaevskii equation. Because radial Gross-Pitaevskii equation can yield ring soliton-like solutions, I submit a hypothesis that the universe may likely have a center in the ring soliton-like form.

Key Words: quantization, galactic redshift, Source-Sink model, ring, soliton-like.

Introduction

In recent years there are some reports suggesting explanations for quantization of galactic redshift as observed by Tifft et al. One of those proposals is suggested by Firmin J. Oliveira, who submits a wave equation model based on Carmeli's Cosmological General Relativity in order to describe such a quantization of galactic redshift [1-2]. Despite its useful approach to describe this phenomenon of quantized redshift, Oliveira's approach apparently lacks a physical model to describe why there exists quantization of galactic redshift. Therefore, we seek a better approach which provides physical model of the phenomenon.

A Source-Sink model of Galaxies

Physical model of quantization of galactic redshift does exist. Hodge's Source-Sink model of Galaxies is an example. Hodge argues that on the galactic scale the universe is inhomogeneous and redshift z is occasionally less than zero. He also argues that several differences among galaxy types suggest that spiral galaxies are Sources and that early type, lenticular, and irregular galaxies are Sinks of a scalar potential field [3].

Hodge postulates the existence of a scalar potential ρ (erg) field with the characteristics to cause the observed differences in spiral and elliptical galaxies. The gradient of ρ is proportional to a

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force F_s (dyne) that acts on matter [3]. F_s exerts a force to repel matter from spiral galaxies and to attract matter to early type galaxies.

The derivation of Planck's black body radiation equation includes the proposition that the energy of a photon is discrete and composed of a number N of basic energy/particle packets [3]. From this conjecture, some formulas for redshift of sink and source galaxies can be derived.

While of course the arguments of Hodge can be discussed further, it seems interesting that he can come up with a physical model in order to explain such a quantization of galactic redshift.

Furthermore, it may be interesting to note here that both Newton law and Schrodinger equations can be derived from similar assumption of source-sink model [4-5]. In this regard, Rahman has given a proof that classical electrodynamics can be derived from similar source-sink fluid model [6].

While surely the aforementioned papers by Wang, Hodge and Rahman use different methods, all of them have the same assumption of the existence of source-sink particles. Therefore this approach seems quite promising to explore further.

Gross-Pitaevskiian interpretation

Now I would like to extend further Hodge's source-sink model of galaxies into the context of Gross-Pitaevskii model. We know that Gross-Pitaevskii equation is often used to describe superfluid dynamics. In one of his papers, Moffat has shown that quantum phion condensate model with Gross-Pitaevskii equation yields an approximate fit to data corresponding to CMB spectrum, and it also yields a modified Newtonian acceleration law which is in good agreement with galaxy rotation curve data [7].

Furthermore, this author also has argued that Gross-Pitaevskii equations yields quantized vortice which can be used to explain the galactic intrinsic redshift phenomenon [8]. Therefore here I also argue that Hodge's Source-Sink model of galaxies can be related to Gross-Pitaevskiian description of superfluidity.

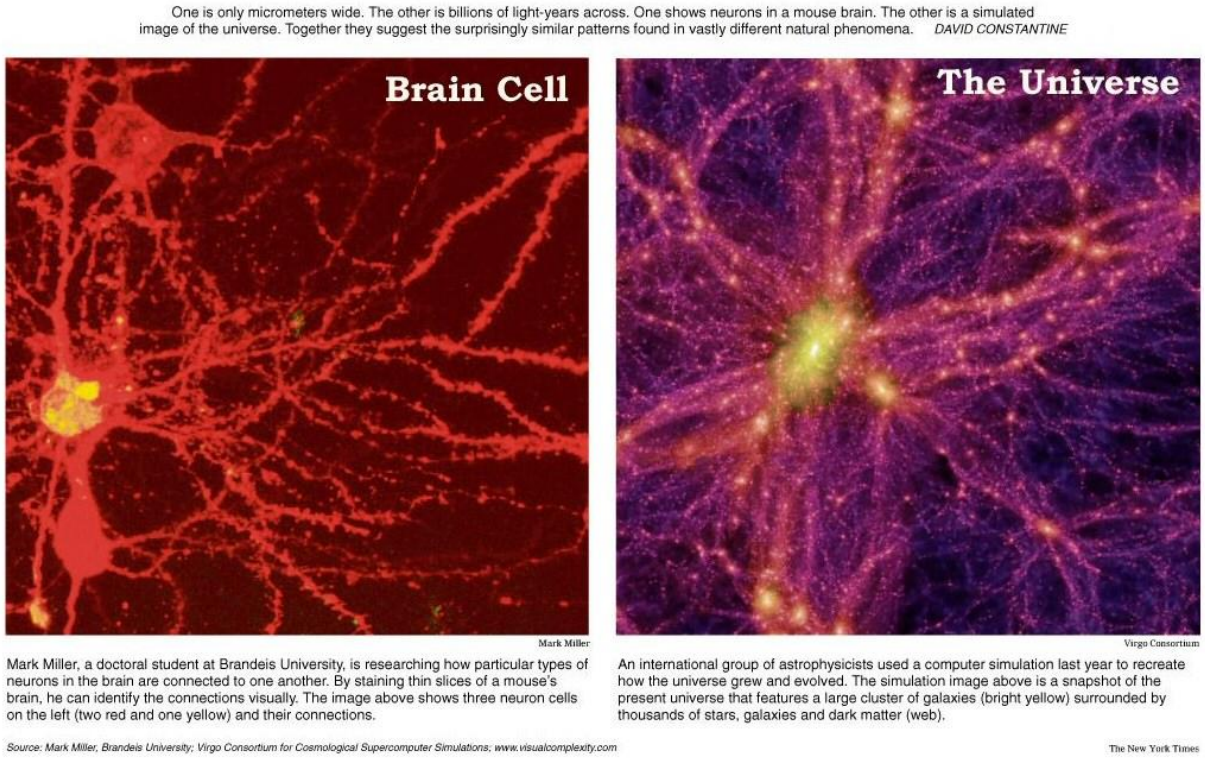
In this regard, I would like to mention a recent paper by Toikka, Hietarinta, and Suominen [9], which suggests that there can be ring soliton-like solutions of the cylindrically symmetric (i.e. radial) Gross-Pitaevskii equation with a potential. Extrapolating this result to the universe scale, I submit a hypothesis that the universe may likely have a centre in the form of ring soliton-like. This hypothesis requires further observation in order to verify or refute.

Interestingly, one can also note that Michael Peck has also suggested that the Universe may have a centre, using a revised model of General Relativity[10]. But of course it does not mean that I agree with all Peck's arguments.

Does the Universe have a centre?

In this section I would like to mention a picture suggesting similarity between brain's neuron and the structure of the universe. See Picture 1 [11-13].

(Note: One is only micrometers wide. The other is billions of light years across. One shows neurons in a mouse brain. The other is simulated image of the universe. Together they suggest the surprisingly similar patterns found in vastly different natural phenomena.- David Constantine)



Picture 1. Similarity between brain's neuron and the Universe

If the above picture holds true, then it seems to have a profound implication, suggesting that there can be a deep connection between brain's neuron and the structure of Universe.

While of course there is a question about the great differences between the structure of supercluster of galaxies and the structure of brain's neuron, one may recall that there are possible hints suggesting explanations about possible connection between brain's neuron and the structure of the Universe, for instance:

- Fractal theory suggests possible self-similarity between microscales and macroscales, see for instance the scale relativity theory of Nottale, 1997 [17]. See also Celerier & Nottale, 2005 [18].
- Spiral waves can be found in different scales from the microscales to the macroscales. These spiral waves may be a governing pattern in galaxy formation too, and these spiral waves are resulted from complex Ginzburg-Landau equations.
- A recent discovery of network cosmology by Dmitri Krioukov et al. suggests a deep similarity between brain, internet, and the Universe [14]. He finds theoretical link between hyperbolic metric and complex network. They write as follows: "Here we show that the causal network representing the large scale structure of spacetime in our accelerating universe is a power-law graph with strong clustering, similar to many complex networks such as the Internet, social, or biological networks. We prove that this structural similarity is a consequence of the asymptotic equivalence between the large-scale growth dynamics of complex networks and causal networks. This equivalence suggests that *unexpectedly similar laws govern the dynamics of complex networks and spacetime in the universe*, with implications to network science and cosmology"[14]. (emphasis is added)
- Krioukov et al.'s finding may be related to the work of Serrano et al [15], suggesting possible connection between self-similarity of complex networks and hidden metric space.

Regardless the differences of theoretical approaches as mentioned above, apparently we can agree about one thing from looking at Picture 1 above, that is both brain's neuron and the Universe have a centre. This can be generalized further as follows: Any complex network tends to have centre. Therefore apparently our hypothesis above that the universe can have a centre, which is based on Gross-Pitaevskiian description, now seems to be supported by recent finding based on complex network studies.

There is other study based on network analysis which also supports the idea that complex networks tend to have centre, that is a recent study about global corporate control which results in a conclusion that there are "core" corporate which hold control on majority of other corporate in the world.[16] This finding about core corporate seems also to suggest that there is a centre in the network of global corporate control.

We summarize therefore that based on recent findings based on complex network studies we can find clues to support our hypothesis that the Universe may likely have a centre. However, this hypothesis requires further observation in order to verify or refute.

Moreover, it seems that there remains a long way to prove that there exists deep connection between brain's neuron and the structure of Universe.

Concluding Remarks

This paper briefly discusses a Source-Sink model of galaxies and its implication on the observed quantization of galactic redshift. As shown elsewhere, the Newton law and Maxwell electromagnetic equations can be described by the Source-Sink model too. The Source-Sink model of galaxies can be interpreted further in the context of superfluid dynamics as described by Gross-Pitaevskii equation. Because radial Gross-Pitaevskii equation can yield ring soliton-like solutions, I submit a hypothesis that the universe may likely have a center in the ring soliton-like form.

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