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BINDING THEORY

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ABSTRACT

This article describes the structure of universe according to binding theory in which a super massive object is present at the center of physical natural system. Binding theory is formed after comparing various stable systems that are bounded. Masses and sizes of the unknown objects like black hole or complete system can be approximated with the help of binding theory. This article has also revised the calculated mass of black hole present in our Milky Way galaxy, which is in contradiction to previous results. The binding theory has compared various data and after comparing the various masses and sizes, result is drawn.

Keywords: Universe, Black holes, Galactic center, Interstellar masses, Atomic masses, Planetary masses.

I. INTRODUCTION

The Universe consists of matter and energy which includes planets, stars, galaxies, the contents of intergalactic space, the smallest subatomic particles, and all matter and energy, The part of the Universe that we can see, referred to as the observable universe, is about 28 billion parsecs (91 billion light-years) in diameter at the present time [1]. The Big Bang theory is the prevailing scientific cosmological model that describes the development of the Universe. Assuming that the prevailing model is correct, the age of the observable universe is measured to be 13.798 ± 0.037 billion years [2][3].

Many theories have been proposed about the structure of our universe. Some very heavy objects like black holes are also a part of this universe. A black hole is a mathematically defined region of space-time exhibiting such a strong gravitational pull that no particle or electromagnetic radiation can escape from it. The theory of general relativity predicts that a sufficiently compact mass can deform space time to form a black hole [4]. A super massive black hole (SMBH) is the largest type of black hole, on the order of hundreds of thousands to billions of solar masses, and is found in the center of almost all massive galaxies. In short, the general structure can be learned as a massive object in a system is present at the center and objects of negligible mass as compared to the nucleus revolve around heavier nucleus. In this article, masses of various systems and their sizes are compared and their nucleus mass and nuclear size to total system mass and size ratio are found and finally binding theory is proposed from this data. From this data, pre supposed masses have been revised.

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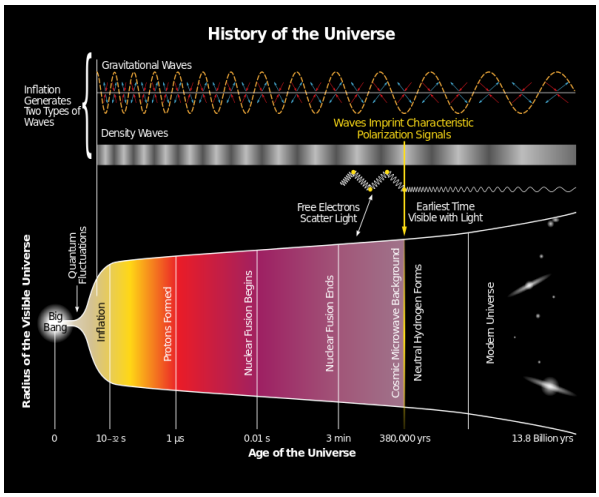

Fig 1. History of the Universe - gravitational waves are hypothesized to arise from cosmic inflation, an expansion just after the Big Bang [5]

II. EXPERIMENTAL DETAILS

The masses and sizes of various natural systems have been listed in table. Then the masses of various physical systems that are bounded (stable) are compared between their total mass and nucleus mass and calculated the ratio of nucleus mass and total mass. The same thing is done with their sizes and again found their ratio. From the statistical inference, binding theory is proposed as shown below:

1.1. BINDING THEORY

TABLE 1: Comparing various physical masses and nucleus to total mass ratio.

Sr. No.	System	Nucleus mass	Total mass	Nucleus Mass/ Total mass
1	Hydrogen atom	1.6726×10^{-27} Kg	1.673534×10^{-27} Kg	0.998
2	Earth moon structure	5.97219×10^{24} Kg [6]	6.045667×10^{24} Kg	0.9878
3	Solar system	2×10^{30} Kg [7]	2.0028×10^{30} Kg	0.998
4	Milky way	8.2×10^{36} Kg[8] ??	$2*10^{42}$ kg-$3*10^{42}$ kg[9][10]	Should be 0.99
5	Universe	??	10^{53} Kg [11]	Should be 0.99 for non expanding universe

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Table 1 compares nucleus mass and total mass of various objects found in our universe. The shape and movement of particles is more or less same for all these systems. Some particles are rotating around a comparative very heavy nucleus. From the comparison of data, it was found that nucleus mass to total mass ratio is approximately equal to 0.99. In the above table Earth Moon system is odd one out since moon produces a significant effect on Earth. That means system mass (SM) is approximately equal to Nucleus Mass (NM) for a system to be bound and stable. That is:

$$SM \approx NM$$

TABLE 2: Comparing various physical sizes and nucleus to total diameter ratio.

Sr. No.	System	Diameter	Nucleus diameter	Nucleus diameter/ diameter
1	Hydrogen atom	1.06×10^{-10} m	2.4×10^{-15} m	2.26×10^{-5}
2	Earth moon structure	788490 Km	12742 Km [12]	0.01616
3	Solar system	1.7×10^{16} m	1.4×10^{9} m	8.235×10^{-7}
4	Milky way	100000 LY [13]	0.002 LY [8]	2×10^{-8}
5	Universe	93 billion LY [1]	Should be around 9.3 LY for stable and non expanding universe	Should be around 10^{-10} for stable and non expanding universe

Table 2 compares the sizes of various objects or systems. It can be deduced that if particles rotating around the nucleus have negligible effect on the nucleus then the nucleus to total system diameter ratio lies in the range of 10^{-5} to 10^{-8}. The ratio decreases with the increasing size of the system. In the above table Earth Moon system is odd one out since moon produces a significant effect on Earth.

After Comparing Table I and Table II Binding Theory can be summarized for a planetary system to be stable are as follows:

1. **System mass is approximately equal to nucleus mass.**
2. **In a system, mass of bodies that are bonded by nucleus can never be greater than nucleus itself.** It means that in terms of mass, only a stronger one can hold a weaker one. Weaker cannot control stronger. Though weaker one may have slight effect on stronger one.

The nucleus to total diameter of the physical natural system lies in the range of 10^{-5} to 10^{-8}. The ratio decreases with the increasing size of the system.

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III. RESULTS AND DISCUSSION

From the binding theory it is found that for a particular natural system in which a comparative heavy nucleus is present as compared to the revolving objects, the nucleus mass constitutes more than 99% of total mass of the system while size of nucleus is negligible as compared to total size of the system. Based on binding theory, masses of various physical systems are revised. Also for a particular condition, mass and size can be predicted. Based on binding theory, mass of black hole at the center of Milky Way galaxy (Galactic Center) is revised. Also for particular condition, mass of center of universe is approximated using binding theory.

3.1 MASS OF BLACK HOLE AT GALACTIC CENTER

The Milky Way is the galaxy that contains our Solar System. The center of the Milky Way is termed as Galactic center. Milky Way Galaxy or system is stable and 100,000 Light Years in diameter [13]. The nucleus diameter is around 0.002 Light Years [8]. The thickness of Milky Way galaxy is around 1,000 Light Years [13].

Fig 2. Milky Way Galaxy seen from Earth (courtesy: Wikipedia)

The mass of milky galaxy is approximated to be $2x10^{42}$ kg- $3x10^{42}$ kg[9][10]. While the mass of Black Hole at the center of the galaxy is approximated to be around $8.2x10^{36}$ Kg[8] (given in red color in table 1). The ratio of nucleus to total mass is:

$$8.2x10^{36} / 3x10^{42} = 0.00000273.$$

Hence the mass of black hole (galactic center) is just 0.000273% of the total mass of Milky Way Galaxy. It means that a particle of 1 unit mass is controlling 366,300 units of mass according to previous data. That seems too much unrealistic and far from reality. Also according to binding theory, a controlling mass or centric mass cannot have a lesser mass than the masses it is controlling.

If the mass of Milky Way galaxy is $2\text{-}3x10^{42}$ Kg, then mass of nucleus of galaxy should be around $1.97\text{-}2.97x10^{42}$ Kg. That means black hole mass at galactic center is equivalent to 10^{12} solar masses. Or mass of black hole at galactic center is quite high than predicted before. It is around 350,000 times than predicted before that is $8.2x10^{36}$ Kg. This mass is required to control whole galaxy in which billions of stars revolve around it including our solar system. Also ratio of nucleus diameter to total galaxy diameter is around $2x10^{-8}$. That means the pull of nucleus mass is too much having a massive mass within little volume.

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3.1.1 Number of stars in Milky Way Galaxy

The Milky Way contains between 200 and 400 billion stars [14]. Also the numbers of dwarf stars are assumed to be at higher end than sun like stars or bigger than sun stars (small black holes). These stars may be independent, bounded with planets like our solar systems or within dwarf galaxies present in our Milky Way galaxy. Let us compare the number of stars by comparing previous value and predicted value by applying law of conservation of mass.

a) The previous mass of black hole at galactic center that is $8.2x10^{36}$ Kg [8]. Also the total mass of Milky Way is $2*10^{42}$ kg - $3*10^{42}$ kg [9][10]. Now mass of our sun in solar system $2x10^{30}$ Kg [7]. Removing mass of black hole at galactic center, we still are left with approximate $2*10^{42}$ kg - $3*10^{42}$ kg mass. That means we can still have 10^{12} or 1 trillion sun like stars in Milky Way. Assuming dwarf stars to be in higher number (with less number of sun like stars and even less small black holes), the number of stars are going to shoot at very high number. That means the previous mass prediction is contradicting with the predicted number of stars in Milky Way galaxy.

b) Let us consider mass of black hole according to binding theory at galactic center that is $1.97\text{-}2.97x10^{42}$ Kg. Again the total mass of Milky Way is $2*10^{42}$ kg - $3*10^{42}$ kg [9][10]. Now mass of our sun in solar system $2x10^{30}$ Kg [7]. Removing mass of black hole at galactic center, we are left with approximate $3*10^{40}$ kg mass according to law of conservation of mass. That means we have 10^{10} or 10 billion sun like stars in Milky Way. Assuming dwarf stars to be in higher number (with less number of sun like stars and even less small black holes), the number of stars are going to be very high number and can easily approach the predicted value of number of stars. That means predicted mass is compatible with the predicted number of stars in Milky Way galaxy.

3.2 MAHA BLACK HOLE AT CENTER OF THE UNIVERSE

According to the Big Bang theory, our universe sprang into existence as "singularity" around 13.7 billion years ago [15]. Singularities are zones which defy our current understanding of physics. After its initial appearance, it apparently inflated called as the "Big Bang", expanded and cooled, going from very small and hot to the size and temperature of our current universe. According to Big Bang, universe is not stable or bonded and is expanding since its inception as shown in figure 3. If big bang theory is correct then there must be the center of the universe until or unless it is completely destroyed during big bang.

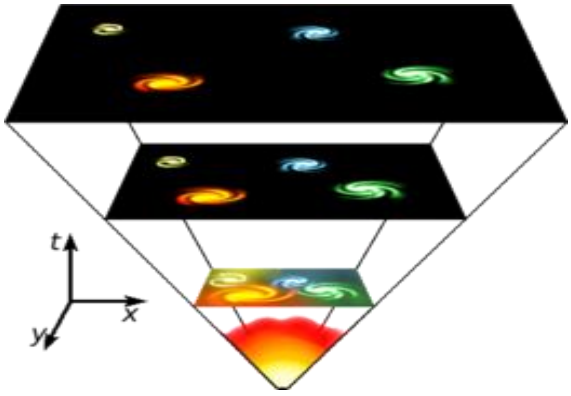

Fig 3. According to the Big Bang model, the universe expanded from an extremely dense and hot state and continues to expand today. (Courtesy: Wikipedia)

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Universe consists of billions of stars, galaxies, planets, subatomic particles etc. Its diameter is around 93 Billion Light Years [1]. It has mass of 10^{53} Kg [11]. **According to binding theory, if universe would have been non expanding and stable, then the nucleus to total universe ratio would have been around 0.99.** That means the mass of nucleus or center of the universe would have been around $9.9x10^{52}$ Kg. After comparing the radius of various physical objects, **the diameter of the nucleus would have been less than or equal to 9.3 light years** (in green color in table 2) for non expanding universe. Of course our universe had a nucleus and it started from a very heavy mass goliath (or Maha Black Hole). If it is present, then it must be at the center of the universe until or unless it is completely destroyed during big bang.

Since the universe is not stable and is expanding, the central mass (if it is present) is considerably less than that the expected mass according to binding theory. Also size of the Maha black hole (if it is present) is also less as compared to the expected before (9.3 light years in diameter).

IV. CONCLUSIONS

Structure of universe has been explained according to binding theory. Various masses and sizes have been compared for the postulation of binding theory. Binding theory has been proposed for a system in which a massive object is present at the center and objects of negligible mass as compared to the nucleus revolve around heavier nucleus. According to binding theory, the mass of black hole at the center of the Milky Way galaxy or galactic center is around 350,000 times the predicted mass before. Also it presents the possibility of the presence of Maha Black Hole at the center of our universe. The presence of Maha Black hole at center of the universe can be predicted by using both binding theory and big bang theory combined as future work. Also the masses of various bodies can be revised with the help of Binding Theory.

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