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The Motion and Structure of Matter under Universal Magnetism

Guoyou HUANG gorgeoushuang@sina.com

Cambridge Science Center, 107 South Wenming St. Beihai, Guangxi 536000 CHINA

Abstract: The gravitation equation presented here is the same as the Lorentz force formula in electromagnetics. It shows that gravitation fields can be described with the same dynamics rules as the ones we use to describe electromagnetic fields. The source of the magnetic field in planets, galaxies, cosmos, and their affections to motions and structures of galaxies are discussed. A new kind of magnetic field called universal magnetic field plays an important role in the origin of charges and galaxies. As a part of its conclusions, the data of magnetic fields in solar system were given and dark matter has been defined in this paper.

Key words: unified field, galaxy, magnetic field, dark matter.

1. Introductions

In another paper, I suggest a no-quantum coulomb force between two spinning systems and a universal magnetic force between moving substances. They come from the co-motions of spinning quanta and moving substances. Because the motions of substances cause a kind of complex movement between the substance and the absorbed or emitted quanta, brings in a kind of Coriolis force. The Coriolis force causes by spinning quanta and moving substances is always perpendicular to the movement direction of substances. This is the characteristic of a magnetic force. I call this force universal magnetic force or Universal Magnetism so as to differentiate it from the gravitomagnetic force under general relativity, which was thought to be a Faraday effect of the gravitation.

2. The Universal Magnetism

Magnetic force always co-exists with gravitations. Comparatively to the electromagnetic interaction, the universal gravitation and its co-existed magnetic interaction can be called as mass-magnetic interaction. It's the most fundamental interaction in universe. The movement of any neutral substance can cause a certain magnetic field. All neutral substances encounter a Lorentz force as they are moving in a magnetic field. This force is called as universal magnetism, or mass-magnetism so

as to differentiate to electromagnetic force. But for unified reason, we regard that a certain quantity of mass ***m*** equals to a certain quantity of charge ***q***.

$$q = Dm \qquad (2.1)$$

D is a constant called universal magnetism constant.

In order to describe the dynamics in a system, we can introduce matter element ρdV and matter current JdV from the average density ρ of the system. The matter element ρdV will encounter a gravitation force $g\rho dV$, in spite of whether it is resting or not, and whether the field g changes or not, or wherever the decaying field comes from. The matter current JdV will encounter a magnetic force $J \times BdV$ from the magnetic field B, in spite of how the matter current is distributed in space, or where the magnetic field comes from, or whether it changes or not. So, we have the following equation for mass-magnetic interactions.

$$F = \rho dV + JB \qquad (2.2)$$

If all the substances in that area move in the same speed ***v***, they form a matter current.

$$J = \rho Dv \qquad (2.3)$$

Equation (2.2) can be changed to

$$F = \rho(g + Dv \times B) \qquad (2.4)$$

Formula (2.4) is the gravitation equation of a unit mass substance. It can be used to the movement and structure of galaxies. It is the same as the Lorentz formula in electromagnetics. It shows that gravitation fields (I prefer to call mass-magnetic field) can be described with the same dynamics rules as the ones we use to describe electromagnetic fields.

3. The Magnetic Field in Galaxies and Cosmos

The equivalence current of a substance *m*, which moves with a period *T* around a center point, is given as the following

$$I = \frac{Dm}{T} \qquad (3.1)$$

The magnetic field induction intensity *B* in the center point will be

$$B = \frac{\mu_0}{2} \cdot \frac{Dm}{RT} \qquad (3.2)$$

The magnetic field induction intensity B in poles of a celestial body can be integrated into

$$B \approx \frac{0.07\mu_0 DM}{RT} \qquad (3.3)$$

where M is the central mass, R is the radius and T is the rotation period.

The magnetic formula (3.3) can be simplified to

$$B = \frac{HM}{RT} \qquad (3.4)$$

All the magnetic field in heaven bodies include the earth are mostly the mass-magnetic field which are caused by movements of neutral matter in them. The magnetic field in the earth is about $5\times10^{-5}T$, use earth's data to formula (3.3), we can confirm the universal magnetic constant D as

$$D = 5.38\times10^{-11}\,sAkg^{-1} \qquad (3.5)$$

And with formula (3.4), we can confirm the constant $\boldsymbol{H}$ as

$$H = 4.60\times10^{-18}\,ms^{-1}A^{-1} \qquad (3.6)$$

The magnetic field in all the planets in solar system calculated by formula (3.4) is given in table 3-1. They are consistent to observation data.

Table 3-1. The magnetic fields in the Solar System

	Sun	**Mercury**	**Venus**	**Earth**	**Mars**	**Jupiter**	**Saturn**	**Uranus**	**Neptune**	**Pluto**
M(kg)	1.99e30	3.30e23	4.87e24	5.98e24	6.42e23	1.90e27	5.68e26	8.68e25	1.02e26	1.27e22
R(m)	6.95e8	2.44e6	6.05e6	6.38e6	3.34e6	7.15e7	6.03e7	2.56e7	2.48e7	1.15e6
T(S)	2.13e6	5.06e6	2.10e7	8.56e4	8.90e4	3.54e4	3.90e4	6.22e4	5.80e4	5.52e5
B(T)	**6.18e-3**	**1.23e-7**	**1.76e-7**	**5.0e-5**	**1.26e-4**	**3.45e-3**	**1.11e-3**	**2.51e-4**	**3.26e-4**	**9.20e-8**

As a special condition, the magnetic field in cosmos system is given by the following formula

$$B = \frac{HM}{8\pi C}t^{-2} \qquad (3.7)$$

The mass magnetic field of toady's cosmos is about $1.1\times10^{-9}T$.

4. Ring Galaxies

Inside the cosmos, if we ignore the gravitation from the local systems, the gravitations from the cosmos neutralize each other. The substances only controlled by the Lorentz force from the cosmos magnetic field $\boldsymbol{B}$.

$$F = \rho D v \times B \qquad (4.1)$$

In early cosmos, the Lorentz force causes vortex movements of cosmos matter to form galaxies. This is also the force maintaining the ring galaxies in the nowadays universe.

The deflection acceleration of a neutral substance in a magnetic field is

$$a = Dv \times B \qquad (4.2)$$

The magnetic deflection radius of a neutral substance is.

$$r = \frac{v}{D \times B} \qquad (4.3)$$

The period of circle movement for neutral substances is

$$T = \frac{2\pi}{D \times B} \qquad (4.4)$$

The acceleration and deflection radius of a neutral substance are independent to its mass. They only depend on its speed and magnetic field in which the substance is. The circle periods of neutral substances are all the same in a definite magnetic field. This characteristic is the same as that for a rigid rotation. It is the most important characteristic of universal magnetic force. This will appear in some movement of galaxies in which the universal magnetic force surpasses the gravitation. This often happens in ring galaxies and in some areas inside the spiral galaxies where the rotating movements are mostly controlled by universal magnetisms. The speed of the stars in these areas is in direct ratio to their distances to center while it is in an inverse ratio in other areas.

So, the universal magnetism takes an important role in galaxies. Ring structure, which maintained by universal magnetism, is a typical structure in galaxies. Rings can be formed in any galaxy. Outside our Milky Way, there is such a ring at about 120000 light years (See Fig 4-1). The Hoag's Object is a typical ring galaxy (see Fig. 4-2).

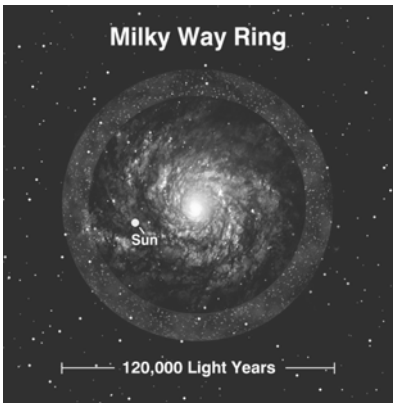


Fig 4-1. A ring in the Milky Way.

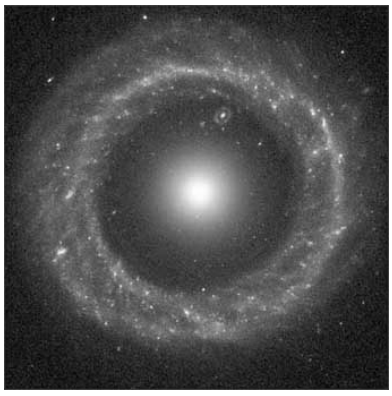


Fig 4-2. The Hoag's Object

5. The Origin of Charges and the Asymmetry of Matter

The super mass-magnetic field in the early cosmos is the base of the movement

and structure of all matter in universe. For example, in the great-unified period of about 10^{-40}s in the very early cosmos, the mass-magnetic field was about 10^{-105}T. Controlled by this super magnetic field, all the movement and structure are restrained strictly to ensure the magnetic balance between elements and universe. So all the cosmos' matter have to circle in directions which are perpendicular to the magnetic lines to form spinning particles within a very small radius (see formula (4.3)) before they can (only can) move along the magnetic lines. Any other movements in any directions cannot be possible. The magnetic field caused by the spinning particles has to be reverse to the super magnetic field. So, there are only two possible statuses for the particles: (1) Dextro magnetic particles, in which their angular speed is in the same direction to the super magnetic field. They cause a magnetic field that is reverse to their angular speed. These are negative charges. (2) Levo magnetic particles, in which their angular speed is reverse to the super magnetic field. They cause a magnetic field that is in the same direction to their angular speed. These are positive charges.

The above analysis shows that there are no neutral particles in the very early period of cosmos. All the neutral particles are combined by charges (independent spinning particles in fact) with strong interactions, weak interactions and electromagnetic interactions in a later period. From the magnetic field in Earth, we can see that the neutral particles have the same magnetic characteristics as the negative charges. It is to say that neutrons combined by a positron and an antiproton are much more stable than the neutrons combined by an electron and a proton. The later can be changed into protons and electrons by weak interactions. So the protons and the antiprotons were asymmetrical in the early cosmos. This is the source of an asymmetry of the cosmos matter.

6. The Structure and Motion of Galaxies

The universal magnetic force acts a key role in the structure and movement of galaxies. The background magnetic field of cosmos and the magnetic field of galaxy nuclei are decisive factors to the structure and movement of galaxies. As a whole, the magnetic fields have to be reversed to the background magnetic field. All the galaxies in universe can be divided into three types according to the relationship between the magnetic fields of cosmos and galaxies.

(1) **Proton Galaxy**. These are galaxies where their magnetic fields are stronger than the background magnetic field in the whole galaxy. Mostly controlled by the galaxy field, all stars in these galaxies move reversely to the rotating direction of the galaxy nuclei. They are levo to the cosmos field just like the proton. So they were called Proton Galaxy. Because of mass magnetism, the force center in all stars is not always the galaxy center. They are in an area around the axes of the galaxy (Fig 6-2). So the stars are distributed in a rather thick area like a lens. (Fig.6-1A) The orbit of these stars is a spiral line.

(2) **Electron Galaxy**. These are galaxies that their magnetic fields are weaker than the background magnetic field in the whole galaxy. Mostly controlled by the

background magnetic field of the cosmos, all stars in these galaxies move in the rotating direction of the galaxy nuclei. They are dextro to the cosmos field just like the electron. So they were called Electron Galaxies. See Fig.6-1B. Among electron galaxies, there is a special kind of galaxies called ring galaxies where their centripetal acceleration is mostly supplied by the Lorentz force from the background magnetic field because they do not have a nuclei big enough to supply the gravitation they need. (Fig.6-1B).

（3）**Neutron Galaxy**. These are galaxies, whose magnetic fields are stronger than the background magnetic field in the center part of the galaxy but weaker in the outer parts. Mostly controlled by the galaxy field, all stars in the center part move in a direction reverse to the rotating direction of the galaxy nuclei. Also controlled by the background field, all stars in the out parts move in the rotating direction of the nuclei. In the intermediate parts where the galaxy field is balanced with the background field, the stars can move in all directions and distributed in a rather spherical area. Such a galaxy seems to be combined by a Proton Galaxy and an Electron Galaxy (Fig. 6-1C).

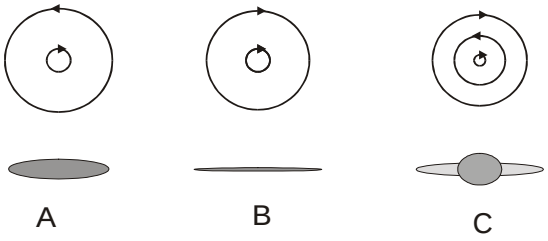
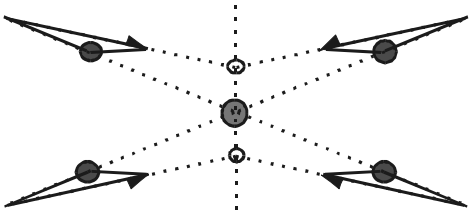


Fig.6-1. The structure and motion of galaxy



$$F = m(g + Dv \times B)$$

Fig.6-2.Force center of stars in a galaxy

7. Dark Matter

Dark matter is the results of Newton’s universal gravitation theory and general relativity in astrophysics and cosmology. From above analysis to the motion of galaxies we can see that dark matter does not really exist. The universal magnetism offers almost all of the centripetal force in ring galaxies and part of centripetal force in

other galaxies like our Milky Way. This force comes from the background magnetic field, which we can observe by Faraday effect and other effects of the stars. This force also happens in the gas shell of ellipse galaxies and the motion of galaxies in galaxy clusters. So they is no necessity for dark matter in the galaxies or the whole universe.

8. Conclusions

With universal magnetism, we can explain the formation of the magnetic of galaxies and cosmos. It can also explain the origin of particles and charges, the formation of galaxies, the structure and motion of the galaxies and so on. It offers a completely new method to study astrophysics and cosmology.

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