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*Original Article*

# Arc of Universal Gravity

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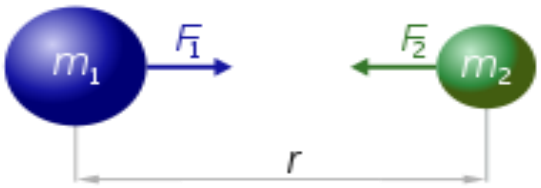
***Abstract*** *— In this paper, the theory of the universal gravitation arc was proposed by analyzing the errors of Newton's universal gravitation equation. The gravitational field does not exist. Gravitation is a kind of communication between particles. Gravitation is an entanglement force between particles. The two particles are connected by an invisible rope. The theory of the arc of universal gravity is proved correct by the fact that the lunar orbit risings and low orbit satellite orbit dropping as well as there is microgravity on satellites and space stations. The new equation of gravity is deduced therefrom. The change in the intensity of universal gravitation is influenced by the time it spends on its transmission. There is a half-life in the process of gravitation propagating. Mass and time are the functions of gravitation. The length of the gravitational arc and the speed of gravitation are the functions of time. The angular velocity and distance are the function of the length of the gravitational arc. Under the condition that the distance between two particles is zero, the strength of the gravitational force can be calculated by the equation. Density is also one of the factors that affect the strength of gravity. Kinetic energy is transmitted by rotation and revolution. Change in the speed of gravitation is the cause of some celestial bodies running abnormally. The rotation of celestial bodies is the driving force for the expansion of the universe. It is no need for dark energy to exist in the universe.*

**Keywords —** *Gravity.*

## I. INTRODUCTION

Newton's law of universal gravitation states that a particle attracts every other particle in the universe using a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. [1]

Every point mass attracts every single other point mass by force pointing along the line intersecting both points. The force is proportional to the product of the two masses and inversely proportional to the square of the distance between them:




$$F_1 = F_2 = G\frac{m_1 \times m_2}{r^2}$$

**Fig.1 Sketch Map of gravitation**

Where:
F is the force between the masses;
G is the gravitational constant (6.674×10−11 N · (m/kg)2);
m1 is the first mass;
m2 is the second mass;
r is the distance between the centers of the masses.

"a particle attracts every other particle in the universe using a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them", It is not calculated by theory, nor obtained through practice, but artificially determined. It needs to be verified by practice whether it is correct.

$$G = \frac{G}{4\pi} \quad (1)$$

$$F = G\frac{m_1 m_2}{4\pi r^2} \quad (2)$$

4πr2 is the surface area of the sphere with radius r. This indicates that gravitation is a field force.

Following Isaac Newton, Pierre-Simon Laplace attempted to model gravity as some kind of radiation field or fluid, and since the 19th-century, explanations for gravity have usually been taught in terms of a field model, rather than a point attraction.

## II. THE PARADOX OF THE EQUATION

The equation of the centrifugal force,

$$F_C = \frac{mV^2}{r} \quad (3)$$

Where:

F g is the gravity between the sun and the earth

F c is the centrifugal force formed by the revolution of the earth around the sun.

M is the mass of the sun.

m is the mass of the earth

V is the average speed of the revolution of the earth around the sun(29.78 km / s) [2]

rs is the distance between the earth and the sun.

The Sun is about halfway through its main-sequence stage, during which nuclear fusion reactions in its core fuse hydrogen into helium. Each second, more than four million tons of matter is converted into energy within the Sun's core, producing neutrinos and solar radiation. At this rate, the Sun has so far converted around 100 times the mass of Earth into energy, about 0.03% of the total mass of the Sun.[3]

$\therefore$ M→ lessened

$\therefore$ F g → reduced

$\because$ F g = F c

$\therefore$ F c → reduced

$\because$ Both of m and V are constant

$$\because F_C = \frac{mV^2}{r_s} \quad (3)$$

$\therefore$ rs→ increased

$$\because G\frac{Mm}{r_s^2} = \frac{mV^2}{r_s} \quad (4)$$

$$\therefore M = \frac{r_s V^2}{G} \quad (5)$$

$\therefore$ M → increased

The paradox that the conclusion "M→ increased" is from the condition "M→lessened" confirms that the equation of the law of universal gravitation is wrong.

Newton's law has since been superseded by Einstein's theory of general relativity. However, it is still widely used. Relativity is required only when there is a need for extreme precision, or when dealing with very strong gravitational fields, such as those found near extremely massive and dense objects, or at very close distances (such as Mercury's orbit around the sun).

The paradox was found, solved the "Newton's law is not suitable for the vast majority of astronomical field" the mystery. It is not known exactly how much error is derived from Newton's law. No matter whose mistakes have to be corrected is a scientific attitude.

## III. ARC OF UNIVERSAL GRAVUTY

### *A. The nature of gravity*

Newton's law of universal gravitation states that a particle attracts every other particle in the universe using a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. The mistake is that the force that a particle attracts every other particle in the universe is inversely proportional to the square of the distance between them. In the correction equation, rβ replaces r2.Of course, the value of the gravitational constant must be re-measured.

The correction gravitation equation：

$$F = G_N\frac{Mm}{r^\beta} \quad (6)$$

Where:

GN is the new universal gravitational constant

$$G_N M = \frac{V^2}{r^{(1-\beta)}} \quad (7)$$

$\because$ GN and β be constants.

$\because$ M→ lessened

$\therefore$ r(1−β)→ increased

$\therefore$ $0 \le \beta < 1$.

This shows that gravitation is not a field force. The gravitational field [4]does not exist. Therefore, the only possibility is that gravitation is a kind of communication between particles. Gravitation is an entanglement force between particles. The two particles are connected by an invisible "rope".

### *B. Delayed gravitational arrival and sending gravitational ahead of time*

Isaac Newton's equation of a gravitational force law requires that each particle with mass respond instantaneously to every other particle with mass irrespective of the distance between them. [5]

The speed of universal gravitation is also the speed of light. Gravity propagation can take time

Take the moon as an example. When the moon is at A, the Earth sends gravitation. When the gravitation reaches point A, the moon has reached point B. A delay has occurred. The gravitation emanating from the earth and the moon is entangled with each other. Gravity in the dissemination of the process, needs to constantly change direction. In fact, the gravitation emanating from the earth and the moon are mutually opposite and continuous. They propagate along each other's path, forming entanglement with each other. The path of transmitting gravitation is a curve. It is an arc of gravity.

In the gravitational delay phenomenon that occurs at the same time, the phenomenon of sending gravitational force ahead of schedule is also happening. Due to the rotation of the Earth, when the Moon is at A, the Earth sends a gravitational force to B. Its propagation path is similar to the gravitational propagation path formed by the delay of gravitation, only in the opposite direction.

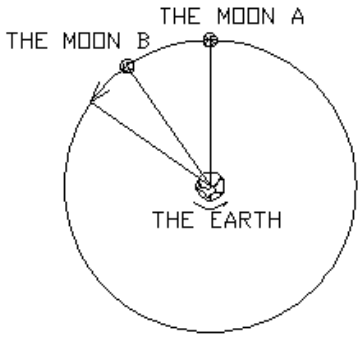



**Fig.2 A schematic map of the moon's revolution**

### *C. Arc of Universal Gravity*

The two effects of gravitational delay and gravitational pull ahead offset each other. The direction of the gravitational arc is determined by the difference between the earth's rotational angular velocity and the moon's rotational angular velocity.

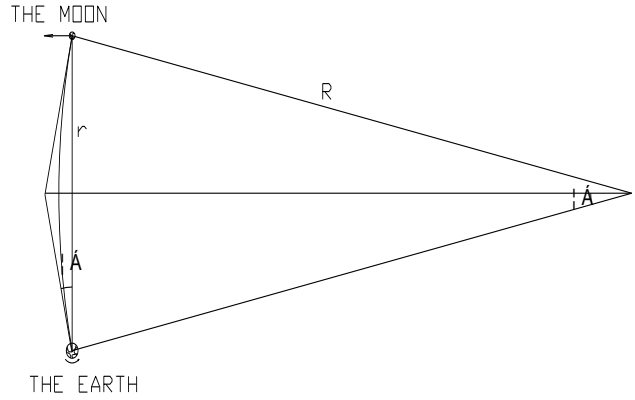



**Fig.3 A schematic map of an arc of gravity**

Where:

V is the average speed of the revolution

r is the distance between the earth and the moon or satellite

u is gravity propagation speed[6] [7]

t is gravity transmission time between the Earth and the moon or satellite

ω1 is the angular velocity of Earth's rotation

ω2 is the angular velocity of lunar or satellite revolutions

λis the correction factor

αis the arc 1/2 of the gravitational arc

R is the radius of the arc of gravity

L is the length of the arc of gravity (The length of the gravitational propagation path)

$$t = \frac{L}{u} \quad (8)$$

$$\alpha = \lambda \cdot t \cdot \left| \frac{\omega_1}{\omega_2} \right| \quad \alpha \leq 90° \quad (9)$$

$$R = \frac{r}{2\sin\alpha} \quad (10)$$

$$L = 2\pi R \cdot \frac{2\alpha}{360^0} \quad (11)$$

$$\frac{\pi \cdot r}{2} \geq L \geq r \quad (12)$$

When$\alpha$=90°, the radial force of the gravitational arc is zero.

## IV. EVIDENCE OF THE EXISTENCE OF GRAVITATION ARC

### *A. The moon orbit rises, and artificial satellite orbit drops*

As we all know, the Earth's rotation cycle time is 1 day, the moon revolution period is 27.3 days. The angular velocity of Earth's rotation is 27.3 times the angular velocity of the lunar revolution. The direction of the arc of universal gravitation between Earth and the Moon coincides with the direction of lunar motion. [8]

Low orbit artificial satellites can circle a few laps to a dozen laps each day. The angular velocity of the Earth's rotation minus the rotation of the earth's low orbit satellite equals the negative angular velocity. The direction of the gravitational arc between Earth and the low orbit satellite is backward. It is the opposite of the movement of low orbit satellites. The attitude and orbit control subsystem consists of sensors to measure vehicle orientation, control laws embedded in the flight software, and actuators (reaction wheels, thrusters). These apply the torques and forces needed to re-orient the vehicle to the desired attitude, keep the satellite in the correct orbital position, and keep antennas pointed in the right directions. [9]

Objects in orbit are not perfectly weightless due to several effects. [10]

The geostationary satellite's angular velocity of revolution is equal to the angular velocity of Earth's rotation. The arc of universal gravitation between them is straight.

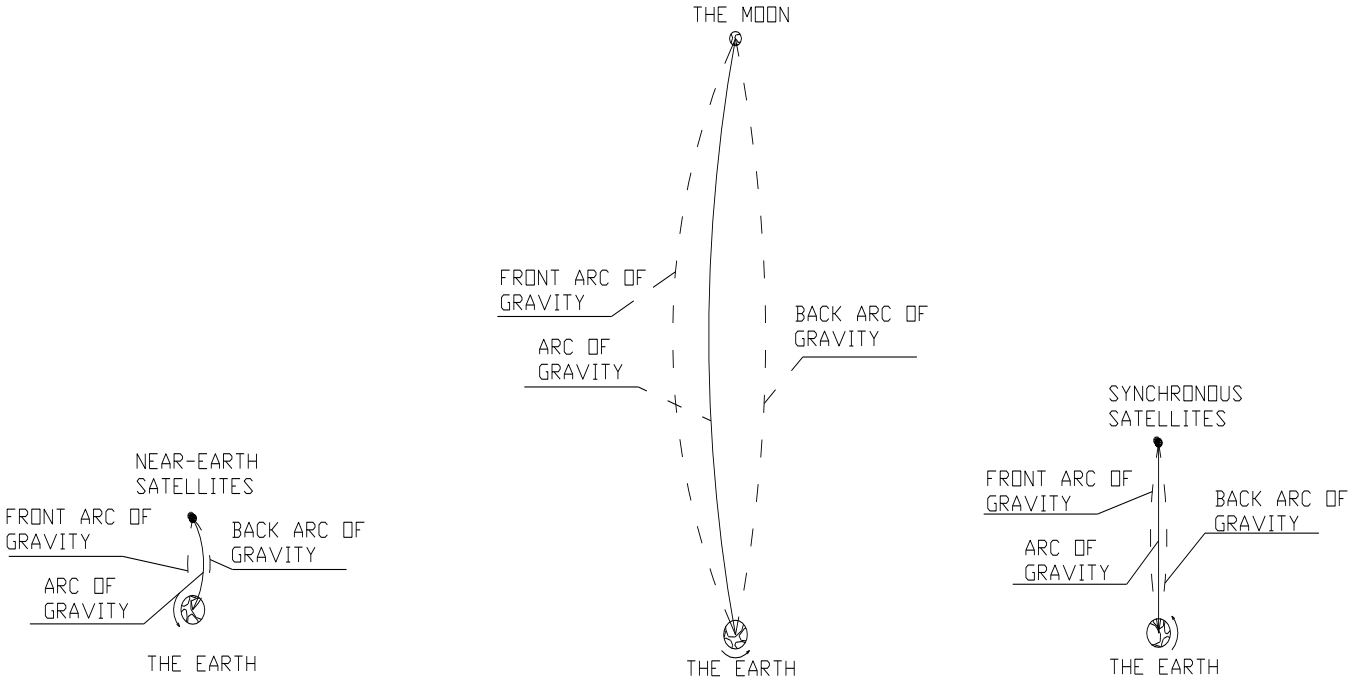



**Fig.4 The type of arcs of gravitational force**

The gravitational pull of the moon breaks down into two forces. The force pointing to Earth and the lunar centrifugal force cancel each other out. The direction of the other force is the same as the direction of the moon's movement. This force accelerates the lunar movement.

Low orbit satellites receive a force that is opposite in direction to their movement. Its acceleration is negative.

The geostationary force satellites receive in their direction of motion is zero.

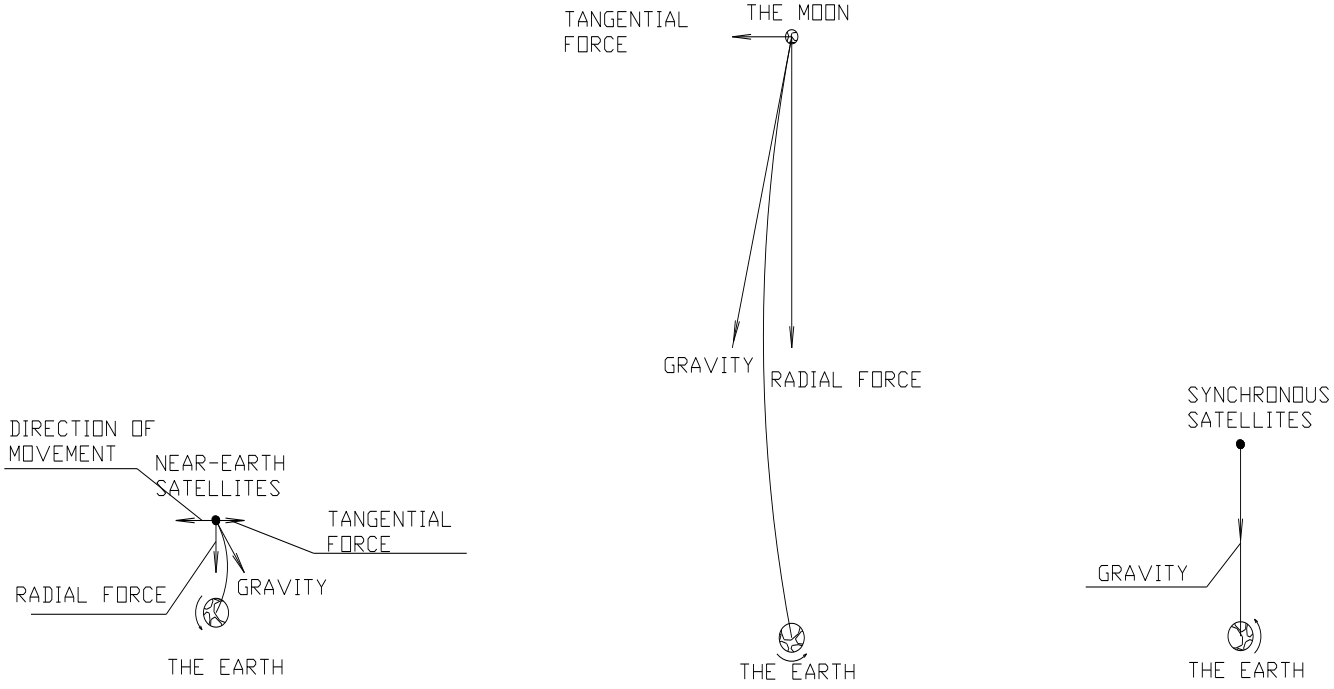



**Fig.5 The result of universal gravitation acting**

As the speed of the moon continues to accelerate, its orbit is constantly rising. The moon is leaving the earth. Of course, the angular velocity of Earth's rotation is also slowing down.

The low orbit artificial satellite fell to earth because of its reduced speed. It gives negligible force to Earth's rotation.

According to the theory of gravitational arcs, the centrifugal force of artificial satellites and space stations cancels out the components of gravitational force in the centripetal direction of the earth. The horizontal component of gravitation becomes the microgravity of artificial satellites and space stations. Other theories cannot explain the microgravity phenomenon of artificial satellites and space stations.

Only geostationary artificial satellites remain unchanged.

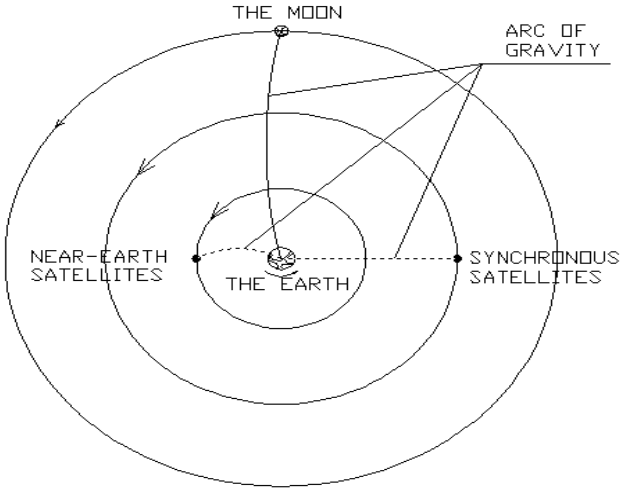



**Fig.6 Positions of Various gravitation arc**

The traditional gravitation is radial force. Centrifugal force equals radial force

With laser ranging, the changes in the Earth-Moon distance have been measured accurately (3.7 cm year− 1), and the slowing down of the Earth's rotation due to energy transfer to the moon can be calculated exactly (Bender et al., 1973). [11]

The slowing down of the Earth's rotation is 5.4 × 10− 22rad s− 1 leading to a 0.024 ms year− 1 increase in the length of the day. [11]

### *B. The Deimos orbit rises, and the Phobos orbit drops*

The rotation time of Mars is about the same as that of Earth; each time is 24 hours and 37 minutes.

Deimos is the smaller of Mars' two moons. Being only 9 by 7 by 6.8 miles in size (15 by 12 by 11 kilometers),Deimos whirls around Mars every 30 hours.

The direction of the arc of universal gravitation between Mars and Deimos coincides with the direction of Deimos motion.

The gravitational pull of Deimos breaks down into two forces. The force pointing to Mars and Deimos centrifugal force cancel each other out. The direction of the other force is the same as the direction of Deimos's movement. This force accelerates Deimos's movement.

The reason for its orbital rise is the same as for the lunar orbital rise. As we all know, there are no tides on the surface of Mars.

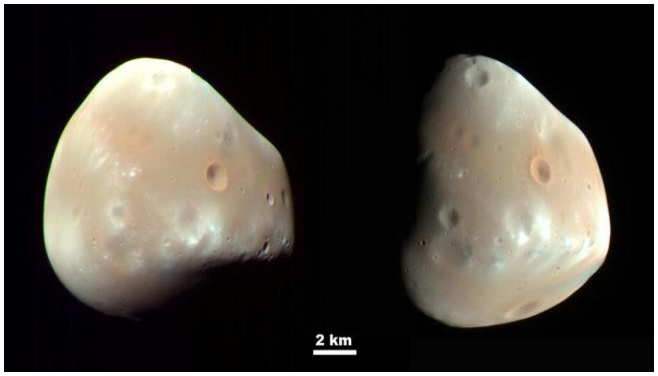



**Fig.7 Images captured by NASA's Mars Reconnaissance Orbiter, reveal that the surface of Deimos is mostly smooth, marred only by recent impact craters. (Image: © NASA/JPL/University of Arizona)**

Deimos will suffer the opposite fate. Its orbit is slowly drawing it away from Mars, and eventually, the moon will be cast off into space [12].

The Martian moon Phobos orbits only a few thousand miles above the Red Planet's surface. Its proximity to its planet is one of the reasons astronomers were unable to see the satellite until the late 19th century. In fact, the moon is getting closer to Mars over the centuries, and eventually will either break up or be pulled into the Martian surface [13].

Time to make one orbit: 7.65 hours. The reason for the Martian moon Phobos is getting closer to Mars over the centuries is the same as for the low orbit artificial satellite fell to earth.

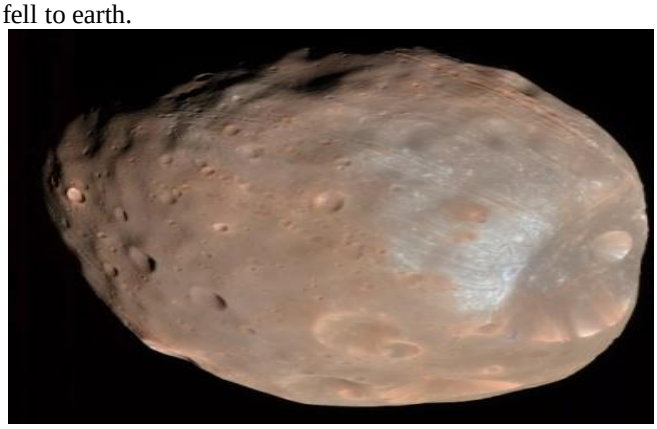


**Fig.8**

NASA's Mars Reconnaissance Orbiter took this image of the larger of Mars' two moons, Phobos, from a distance of

about 6,800 kilometers (about 4,200 miles). (Image: © NASA/JPL/University of Arizona)

Phobos is spiraling inward at a rate of 1.8 centimeters (seven-tenths of an inch) per year, or 1.8 meters (about 6 feet) each century.

In addition, Jupiter's rotation period is 9 h 55 m 29.70 s ± 0.05 s. The revolution period (day) of Adrastea is +7h 9m 30s. The revolution period (day) of Metis is +7h 4m 29s. Eventually, Adrastea and Metis fall to Jupiter's surface.

The spin energy of Jupiter is transferred to the remaining 77 moons, with the exception of Adelesta and Metis, resulting in an extension of Jupiter's rotation period by 0.8 seconds [14].

All of Jupiter's retrograde moons will also fall to Jupiter's surface. The rest of Jupiter's moons will be far away from Jupiter.

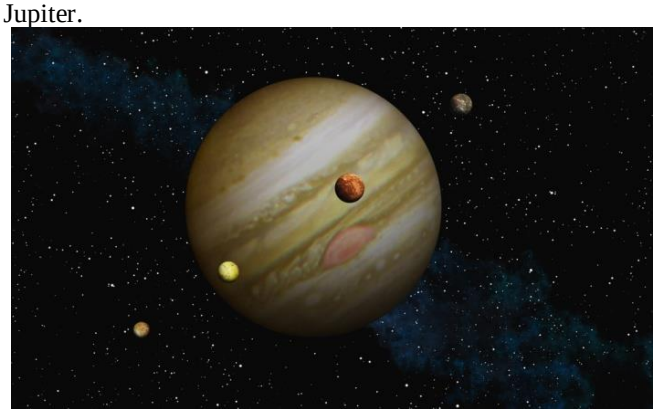


**Fig.9**

***C. The influence of the gravitational arc on the galaxy***

A galaxy is so large that the role of the gravitational arc becomes visible. Both the spiral galaxy and the windmill galaxy have a drag texture due to the tangential force of the gravitational arc. The difference is the structure of two galactic nuclei. There is a single-core in Spiral galaxies. There is or ever had dual-core or multi-core in Pinwheel galaxy. There is a dual-core in the Milky Way.

**Fig. 10 NGC 4414, a typical spiral galaxy in the constellation Coma Berenices, is about 55,000 light-years in diameter and approximately 60 million light-years away from Earth[15]**

**Fig. 11 The Pinwheel Galaxy, NGC 5457[15]**

The mass of any galactic core is greater than the sum of all the stars in the galaxy. Otherwise, the galactic core can't drive the entire galaxy to speed up its run. The tangential force continuously raises the stars in the low orbit to the high orbit. Spiral galaxy and Pinwheel galaxy eventually evolved into ring galaxy

The radial force of the gravitational arc between the vast majority of stars and the galactic nuclei inside the galaxy is zero. These stars rely on each other's gravitation to form a three-dimensional braid. The braid is continuously undermined by the tangential force of the gravitational arc between these stars and the galactic core. Some stars are off the galaxy and thrown away by galaxies.

The rotation of the celestial body minimizes the probability of collision with the celestial collision celestial body. Otherwise, before the birth of mankind, the solar system no longer exists.

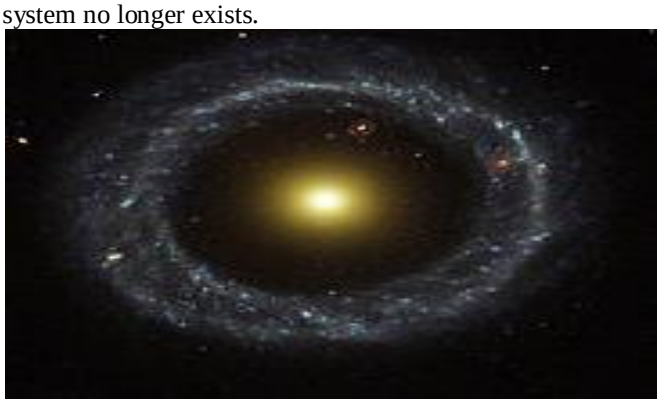


**Fig. 12 Hoag's Object, an example of a ring galaxy[15]**

If the galactic nuclei still maintain a high rotational angular velocity, the stars in the galaxy will all escape, and only one galactic nucleus remains

***D. No Gravity attenuation***

Do not ignore the fact; gravitation is a kind of energy. If gravitation is field force, Gravitation radiates continuously into cosmic space. Energy has been consumed in large quantities; gravitational pull inevitably shows a gradual decline in the process. After more than ten billion years, no

energy can keep the gravitational force from being exhausted. As a result, the galaxy disintegrates, and the universe loses its control. Fortunately, gravitation is not a field force. This terrible result can not appear at all.

Gravitation is an entanglement force. The gravitation that particles send and the gravitation that particles received are equal. Gravity has not been consumed. Gravitation did not weaken.

### *E. No gravitation merger*

The arc of universal gravitation is a curve. When the planets are in a row, the phenomenon of universal gravitation merger will not happen.

### *F. Accelerating expansion of the universe and runaway Star*

The accelerating expansion of the universe is the observation that the universe appears to be expanding at an increasing rate,[16][17] so that the velocity at which a distant galaxy is receding from the observer is continuously increasing with time.[18]

The accelerating expansion of the universe and runaway Star[19] [20], is satisfactorily explained by the theory of the universal gravitational arc.

## V. EQUATION DERIVATION

### *A. β>0*

Two sets of parameters in the parameters of the moon and the geostationary satellite and the low-orbit satellite are input into the following equations

$$G_N M = \frac{V^2}{r} \cdot \frac{L^{\beta}}{\cos\alpha} \quad (13)$$

Three β values and three GNM values can be found. If three β values are the same value, the equation is the correct gravitation equation. Otherwise, it is not.

$$F = G_N \frac{Mm}{L^{\beta}} \quad (14)$$

This equation only considers the rotation of the parent star; the rotation speed of the sub-stars is neglected due to the slow speed or too small mass.

### *B. β=0*

Intuitively, the length of the path of the gravitational propagation affects the change of the strength of the gravitational force. In fact, the change in the intensity of universal gravitation is influenced by the time it spends on its transmission. There is a half-life in the process of gravitation propagating. The length of the propagation path is only one of the parameters of the time change. Time is determined by both the length of the path and the speed of the gravity [10] [11].

Where:

T0 is the half-life of gravitation

Fr is a radial force

Ft is a tangential force

a is the tangential acceleration

$$F = G_N Mm \cdot \left(\frac{1}{2}\right)^{\left(\frac{t}{T_0}\right)} \quad (15)$$

$$a = \frac{F \cdot \sin a}{m} \quad (16)$$

Two sets of parameters in the parameters of the moon and the geostationary satellite and the low-orbit satellite are input into the following equations

$$G_N M = \frac{V^2}{r} \cdot \frac{2^{\left(\frac{t}{T_0}\right)}}{\cos\alpha} \quad (17)$$

Three T0 values can be found. If three T0 values are the same value, the equation (15) is the correct gravitation equation. T0 may not be a constant but a sequence of numbers. It is impossible for a simple mathematical equation to accurately describe such a complex universe.T0 can also be measured with a dedicated satellite

### *C. Results*

Although both equations (14) and (15) can calculate the rise of lunar orbit and the descent of low-orbit satellites, they are essentially different.

When r = 0, equation (14) $F = \infty$, equation (15) $F = G_N Mm$

Under the condition that the distance between two particles is zero, the strength of the gravitational force can't be calculated by the equation (14); the strength of the gravitational force can be calculated by the equation (15).

The speed of gravitation[10] [11] is not a parameter of equation (14) but a parameter of equation (15). In equation (15), the influence of the gravitational velocity u is the same as the influence of the distance r. Changes in the speed of gravitation [10] [11] are the cause of some celestial bodies running abnormally. There are no use restrictions in equation (15).

From this, it can be judged that Equation (15) is correct. The basic condition for a correct equation is to can be applied in any case.

$$t = \frac{L}{u}$$

$$\alpha = \lambda \cdot t \cdot \left|\frac{\omega_1}{\omega_2}\right| \quad \alpha \leq 90°$$

$$R = \frac{r}{2\sin\alpha}$$

$$L = 2\pi R \cdot \frac{2\alpha}{360^0}$$

$$\frac{\pi \cdot r}{2} \geq L \geq r$$

$$F = G_N Mm \cdot \left(\frac{1}{2}\right)^{\left(\frac{t}{T_0}\right)}$$

$$a = \frac{F \cdot \sin a}{m}$$

$$Fr = F \cdot \cos\alpha$$

$$Ft = F \cdot \sin\alpha$$

The above equation is collectively referred to as JinXiankui Equations. Tangential force and radial force are the components of gravity.

By measuring the microgravity of artificial satellites and space stations, all the constants in the Jin Xiankui equation can be obtained through calculations.

When the gravitational arc passes through celestial bodies, the gravitational speed at this section of the road is not only accelerated, but also the path is curved. There are many small curves in the arc of universal gravitation. The so-called spatiotemporal distortion is actually the change of the speed of light and the velocity of gravitation and their path.

In addition, density is also one of the factors that affect the strength of gravity. It is not clear how much its impact is.

## VI. CONCLUSIONS

The theory of the universal gravitational arc is in accordance with the scientific facts. The new gravitational equation can be used in any case. All anomalies phenomena related to the law of universal gravitation in the universe can be explained by the theory of universal gravitational arc. The rotation of celestial bodies is the driving force for the expansion of the universe. It is no need for dark energy to exist in the universe.

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