Galaxy formation, merging and expansion of dark energy fields, new gravitational fields, and the reason for the flatness of the rotation speed of spiral galaxies

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1. Abstract

There are hundreds of billions of galaxies in the universe. These galaxies can be broadly divided into dwarf galaxies with less than a billion stars and giant galaxies with more than a billion stars. The most widely used classification of giant galaxies is the "Hubble sequence" proposed by American astronomer Edwin Hubble in 1926, which lists four types: elliptical galaxies, spiral galaxies, barred spiral galaxies, lenticular galaxies, and irregular galaxies. As can be seen from the diverse shapes of galaxies, it is thought that various factors are involved in the formation of galaxies. However, there must be a basic principle by which a group of more than a billion stars forms. In this study, we considered the formation of galaxies by extending the formation of stars, gravitational fields, and dark energy fields according to the Energy Body Theory. As a result, we found that the reason why spiral galaxies, which account for 60% of galaxies, have a spiral shape is fundamentally due to the rotation of the galaxy and the expansion of the dark energy field. The spiral arms were formed when a small group of stars rotating in the counter-rotating direction near the bulge approached the bulge, causing them to unravel and extend along the arms. It is also thought that energy flows into the spiral of the dark energy field from the outside, forming a high-energy space. However, it remains to be seen whether this theory is superior to the "high density wave theory," the mainstream explanation for spiral arms. The flatness of the rotation speed of spiral galaxies, an important issue in astrophysics, is thought to be caused by the neutralization due to synthesis of the spiral of the galaxy when the gravitational field is formed, and the rotation according to Kepler's laws.

2. Galaxy formation

A. Chain of energy outflow and inflow

Let us suppose that energy rises in a certain area of space due to the universe circulation system or the like. Stars are born there at regular intervals. Around the star, high-energy space layers (spheres formed by the contraction of the energy cell bodies) are formed as a gravitational field. Furthermore, on its outer periphery, low-energy space layers (spheres formed by the expansion of the energy cell bodies) are formed as a dark energy field. Energy further flows into the low-energy space layers from outer space. The inflow and outflow of energy into this space layer is repeated infinitely, and the gravitational field and dark energy field expand outward. The angle at which energy flows from outer space into the inner dark

energy field is inclined at a certain angle from the vector toward the center of the star. This is because the gravitational field and dark energy field of the star rotate.

*The energy cell bodies are considered to be space made up of Planck-scale particles, and these particles are called energy cell bodies. The restoring force of contracted or expanded energy cell bodies is the source of energy.

B. Formation of stellar clusters

Various conditions cause differences in the growth of stars. When the dark energy field of a star that grows quickly and large reaches the dark energy field of a neighboring star, it combines with the dark energy field of the neighboring star to become a single dark energy field that surrounds the gravitational fields of the two stars. At this time, the smaller star is attracted by the dark energy field and approaches the larger star.

C. Dark energy field of a cluster of stars

This movement of stars is repeated, forming a huge cluster of stars. A dark energy field is then created to surround the gravitational fields of the cluster of stars.

The question here is whether the growth of the gravitational field will stop when the dark energy fields of the two stars combine to become a single dark energy field. As for this, it is currently thought that the growth of the individual gravitational fields of the two stars will stop, and the gravitational field of the two stars will be created in addition to the gravitational fields of the individual stars.

The angle at which energy flows from the outer space into the inner dark energy field is tilted at a certain angle from the vector toward the center of the star. This is because the stars, their gravitational fields, and their dark energy fields rotate.

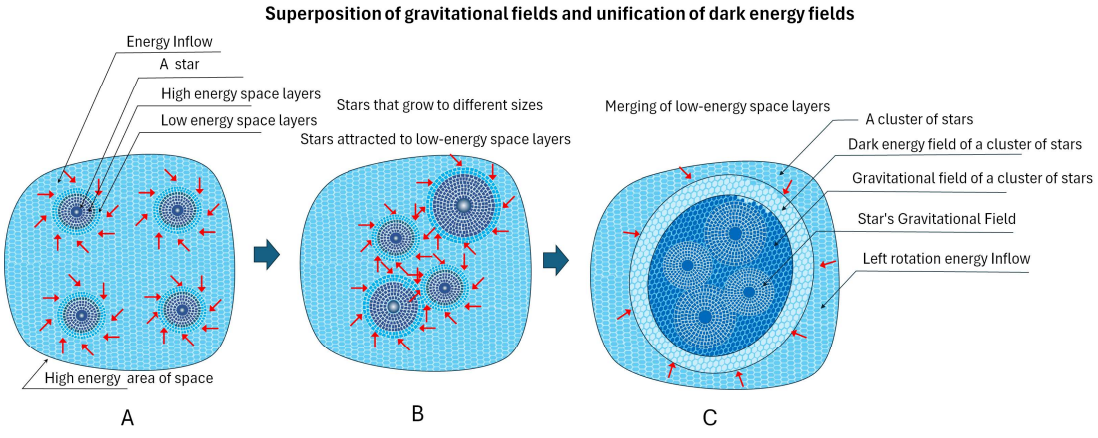

Fig1.

3. Formation of a bulge

The dark energy fields of each star are integrated to become the dark energy field of a small cluster of stars. At this time, the gravitational field of the small cluster of stars is also generated in addition to the gravitational fields of the individual stars. Energy flows into the dark energy field around the small cluster of stars from outer space. This inflow and outflow of energy from the spherical state is repeated, expanding outward. The cluster of stars will rotate as a whole in accordance with the rotation of the individual stars and the gravitational field that they belong to.

As the dark energy field expands, the small cluster of stars approaches other clusters of stars and becomes a larger cluster (bulge). At this time, even if the small cluster of stars rotates in the opposite direction, it is absorbed into the rotation of the large cluster of stars, and they become one and the same rotation as the bulge.

From one perspective, we can distinguish between right and left rotation, but this has no spatial meaning. Therefore, in the process of the formation of a large galaxy, the probability of right-rotating and left-rotating small clusters of stars forming should be the same. However, in the process of galaxy formation, the rotation of the small clusters of stars is absorbed and selected into the direction of rotation of the larger clusters of stars, and as a whole the galaxy rotates in a single direction. Incidentally, whether the spiral of the galaxy starts from the center or moves toward the center is more important than whether it rotates right or left. In the energy body theory model, the spiral is considered to move outward from the center.

4. Counter-rotating star clusters

Counter-rotating star clusters that grow away from the bulge at the center of the galaxy may remain without being absorbed into the bulge. The reason they can exist in the vicinity of the bulge without being absorbed is precisely because of their counter-rotating nature. Also, due to the relationship of angular momentum, it is highly likely that counter-rotating star clusters will remain on both sides of the bulge. However, counter-rotating star clusters that remain on both sides of the bulge will eventually come into contact with the bulge. This is because the direction of rotation between the two clusters becomes the same, and their energy decreases. When they encounter the bulge, the counter-rotating star cluster is loosened by the rotation of the bulge and flutters away, becoming a spiral arm. It is also thought that barred spiral galaxies were formed by counter-rotating star clusters that were farther away.

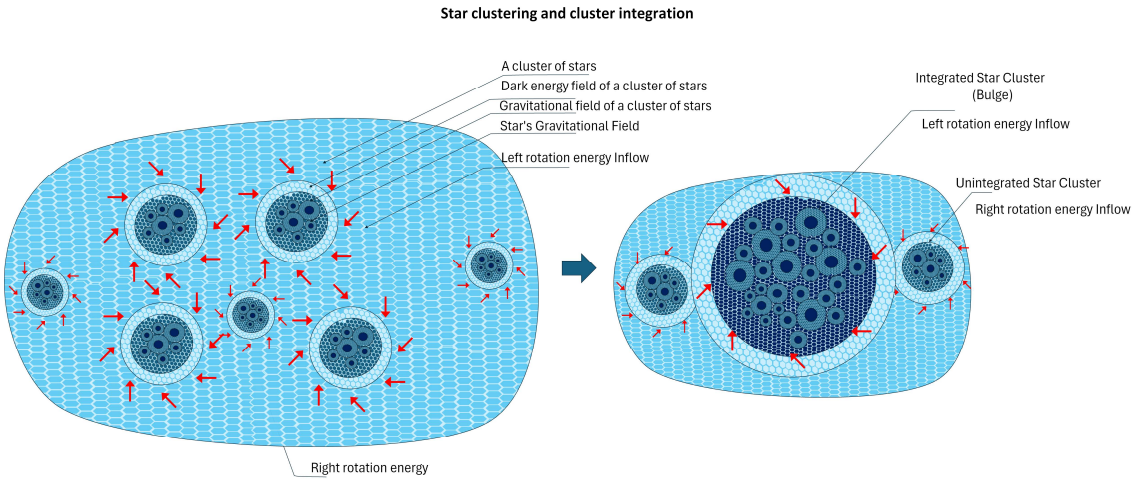

Fig2.

5. Fundamental principle of spiral shape

When the bulge is formed, the gravitational field of the bulge is formed, and a dark energy field is formed around it. The gravitational field is a space layer in which the energy cell bodies contract spherically and becomes a high-energy state. The dark energy field is space layers in which the energy cell bodies expand spherically and becomes a low-energy state. Therefore, as energy flows into the dark energy field from the outside, it forms a gravitational field inside. It expands outward and outward. Since the bulge is rotating, the gravitational field and dark energy field are also rotating. Therefore, if a position on the outer periphery of the dark energy field is P, the position of P rotates while expanding over time. And P draws a spiral. This is the fundamental principle of galaxies becoming spiral.

When energy flows into the dark energy field from outer space, excess energy is generated due to the volume difference between the outer and inner space layers. This excess energy generates a large amount of child clouds, leading to the birth of stars. The place where these molecular clouds are generated becomes a spiral for the reasons mentioned above.

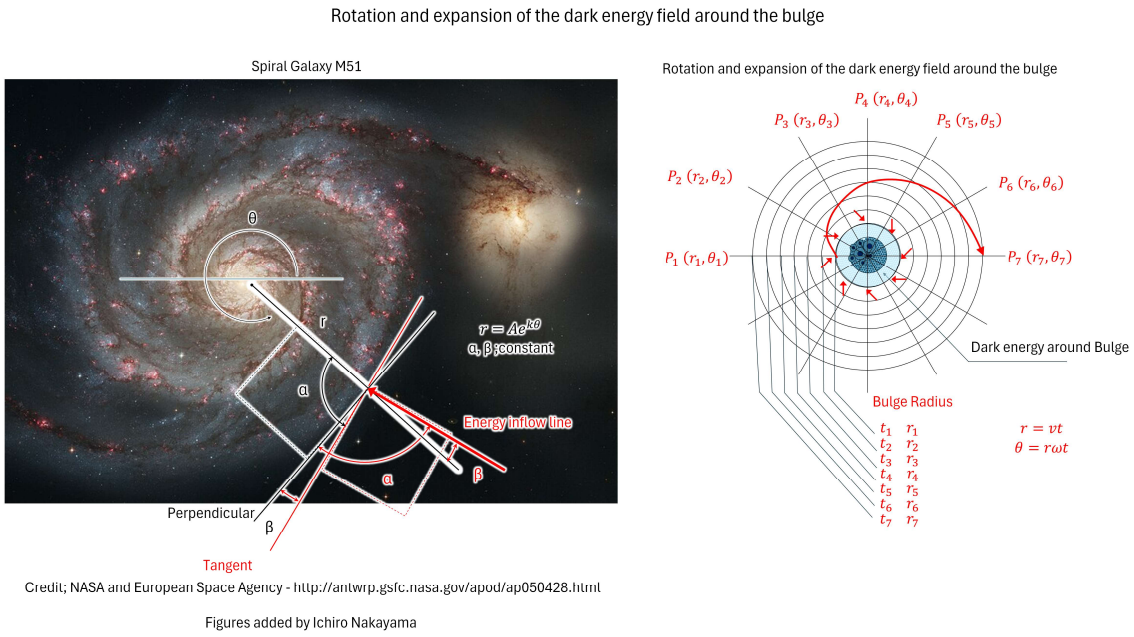

Fig3.

6. Formation of spiral arms

The fundamental reason why the shape of the galaxy is spiral is the rotation and the expansion of the dark energy field. However, another factor is thought to be involved in the formation of spiral arms. This is a small group of stars that rotate in the opposite direction to the rotation of the bulge. In the bulge, the small group of stars that rotated in the opposite direction are all absorbed by the rotation of the bulge. However, since it was far from the bulge, the relatively large group of stars is not absorbed by the bulge and is thought to have remained until the end. When the dark energy of the bulge expands and reaches this group of stars, the group of stars flows along with the rotation of the bulge like a thread being unraveled. This is because the rotation direction of the bulge and the group of stars is the same between them. Fig4. shows this situation. The inflow of energy from the outside to the dark energy field is deviated by an angle β from the center of the bulge due to the rotation.

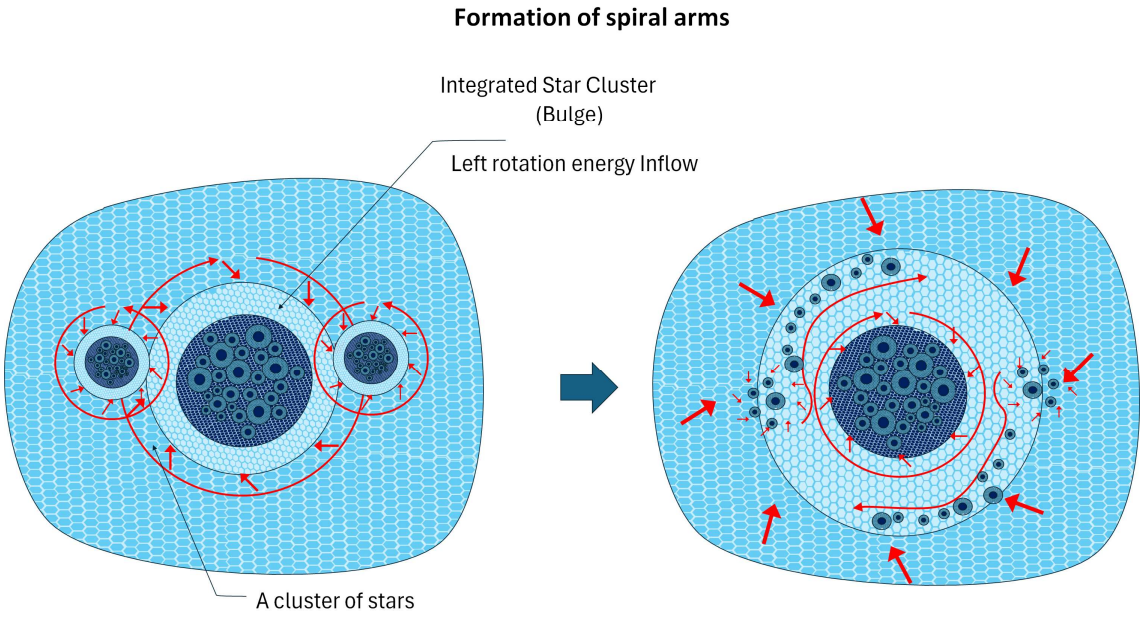

Fig4.

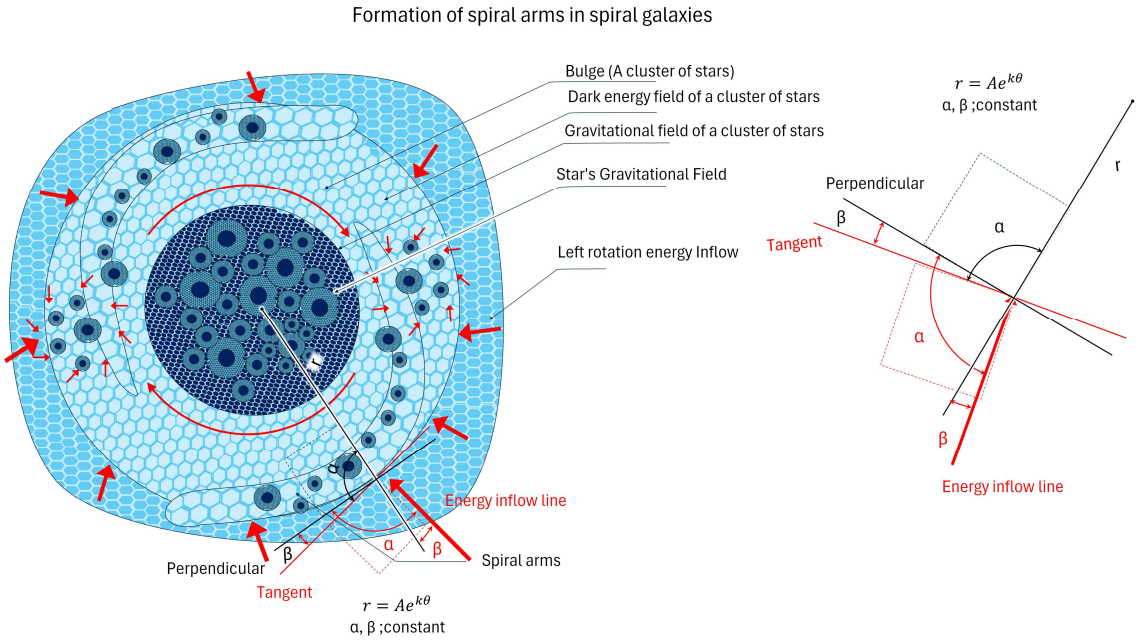

Fig5.

7. The reason for flat rotation speed of a galaxy

Observations have shown that the rotation direction of the M51 spiral galaxy is right-handed (clockwise). This means that the spiral formed from the center of the galaxy outward.

However, the high-density wave theory of astrophysics explains this in terms of the relationship between the rotational energy of the disk, gravity, and high-density waves.

The energy body theory considers that the spiral shape is created by the reason that dark energy expands outward while rotating. This relationship is expressed by the following polar coordinate equation.

$$r=vt$$
$$\theta = r\omega t$$

r is the distance from the center, v is the expansion speed of r, ω is the angular velocity, and θ is the rotation speed at r.

However, this equation is the same as the rotation of a rigid body, and the rotation speed becomes faster the further away from the center.

On the other hand, when the rotation speed of a star is calculated using the equation of motion and Kepler's laws, the rotation speed becomes slower the further away from the center.

Observations have shown that the rotation speed is almost the same once you move away from the center of the galaxy to a certain extent. This has led to the speculation that dark matter exists.

The reason why the rotation speed becomes flat is thought to be as follows:

Due to the rotation and expansion of the dark energy field, the rotation speed increases as one moves away from the center, forming a spiral trajectory. After the dark energy field moves outward, the gravitational field of the entire galaxy is formed. Even after the dark energy field moves outward and the galaxy's gravitational field is formed, the spiral rotation speed at the time the dark energy field was formed is preserved. However, because the equation of motion for the galactic gravitational field also applies, it is speculated that the two are multiplied together to result in a flat rotation speed.

7.1. Rotation speed due to expansion and rotation of the dark energy field (the further away from the center, the greater the rotation speed)

$$r = vt$$
$$\theta = r\omega t$$

v: The expansion and movement speed of the dark energy field

θ: Rotational speed

ω: Angular velocity

$$\theta = \mathrm{CD} \approx BD \approx \Delta r$$
$$AB \approx 2\pi\Delta r$$

$$\therefore AD \cong \sqrt{\Delta r^2 + (2\pi\Delta r)^2} = \Delta rk$$

$$AD \cong r\omega\Delta t$$

$$\therefore r\omega\Delta t \cong \Delta rk$$

$$\int r\omega\, dt = \int kdr$$

$$r\omega t = kr$$

$$\theta = kr \qquad (1)$$

7.2. Rotational speed according to the equation of motion and Kepler's law (the further away from the center, the smaller the rotational speed)

$$f = \alpha M$$

$$f = G\frac{M}{r^2}$$

$$\beta = \frac{\theta^2}{r}$$

$$\therefore \frac{\theta^2}{r} = G\frac{M}{r^2}$$

$$\theta = \sqrt{\frac{GM}{r^2}} = \frac{1}{r}K \qquad (2)$$

f: $force$

α: $acceleration$

M: $matter$

β: $Rotational\ Acceleration$

7.3. Combination of (1) and (2) (flattening the rotation speed)

$$\theta = kr \cdot \frac{1}{r}K = kK \qquad Constant$$

Rotation and expansion of the dark energy field around the bulge

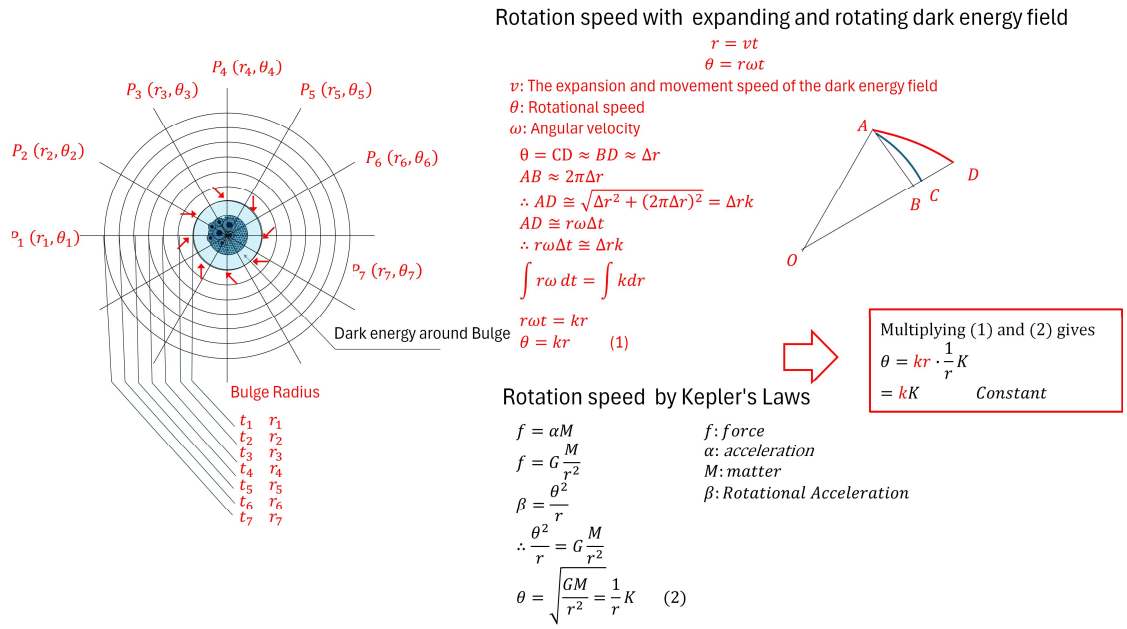

Fig6.

Fig7. shows how the dark energy surrounding a spiral galaxy expands and moves outward, and how the gravitational field that is created after the dark energy is formed. If you fix a point in the dark energy field and observe it, it will expand and rotate, forming a spiral.

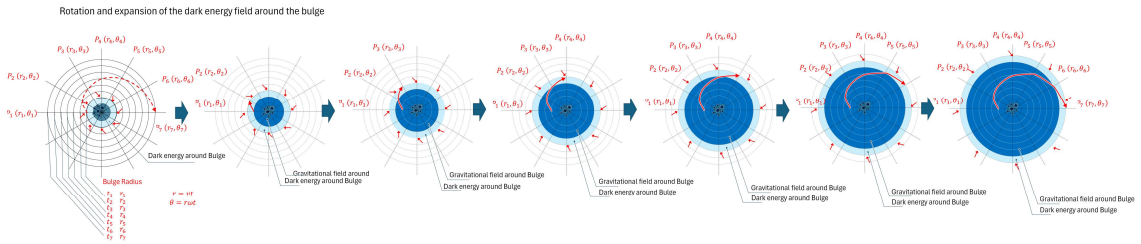

Fig7.

8. Conclusion

In a space where energy has risen due to the cosmic circulation system, countless stars are born, and over time, they make small groups and eventually become the bulge of a galaxy. The stars and small groups of stars do not necessarily all rotate in the same direction, but they are aligned in the same direction by the time the bulge is formed. In the process, the dark energy fields of the small groups of stars integrated into the bulge merge and become

one outside the bulge. Then, they spread out further. Inside the dark energy field, the gravitational field of the bulge is formed separately from the gravitational fields of the individual stars. When energy flows from the outside into the dark energy field inside, surplus energy generate. This becomes the material for new star formation. In this way, a galaxy is formed. And the dark energy field that expands while rotating is the root cause of the spiral shape of a galaxy. The flatness of the rotation speed of a spiral galaxy is because the rotation speed at the time of spiral formation is preserved, and after the dark energy field becomes a gravitational field, neutralizes it with the rotation speed according to the newly applied Kepler's law. Spiral galaxies have spiral arms, which are thought to be caused by a group of stars that developed a little distance away from the bulge and counter-rotated with the bulge approaching the dark energy field of the bulge, becoming loose and scattering in a spiral shape as the dark energy of the bulge expands. Barred galaxies are thought to have developed a barred shape because the group of stars that counter-rotated was far away from the bulge.

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