Micro Bang Model of the Universe

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Big bang and Lambda-CDM (Cold Dark Matter with dark energy) models of the universe have gained almost unanimous approval of the physics society. But I feel those models are too artificial. In addition, there are a lot of questions left unanswered including following questions. How galaxies were formed? Why rotation speed of galaxies is constant regardless of its radial position? Why our universe is so homogeneous in large scale? Why our universe is so flat? How whole mass of our universe was created? Why our universe contains far more particles than antiparticles? For these questions, I propose "Micro Bang Model" of the universe. In this hypothesis, I assumed that our universe was made from a single particle which I named "Origin Particle".

First Questions

Artificial satellites are flying high above the surface of earth where the air is very thin but not zero. So, meeting resistance of the air, it loses its kinetic energy in the long run and finally falls down to earth. On the other hand, our earth is flying around the sun for 4.5 billion years and has not fallen to the sun yet despite the resistance of gas on its way. It is because gas on the way of the earth is much thinner and kinetic energy of the earth is much larger than that of tiny artificial satellites. Gas in the interstellar space must be still much thinner than that of our solar system, and kinetic energy of stars must be far larger than that of the earth. We are apt to think that if attraction force exists,

things must be attracted to the source of the attraction force. But this is only because we live in so dissipative world where friction is common. To the contrary, in the world of stars, effect of friction serves very limited role. Therefore, as shown in Fig. 1A, if there are two stars attracting each other, velocity of these stars become faster when they come closer, and after closest point, using the kinetic energy they gathered, these stars go apart to the original distance. The trajectory would not shrink much within the age of our Universe.

Lambda-CDM model introduced an idea of dark matter to explain the force that can keep stars within a galaxy together against the centrifugal force. But in the first place, dark matter model does not explain how stars have been brought together to such a small area. As argued above, trajectory of stars will never shrink unless

some energy dissipation mechanism works like the air for artificial satellites. (Fig. 1B)

Y.Sofue and V.Rubin made it clear that rotation speed of galaxies is constant regardless of its radial position while simple dynamics predicts it must be faster near the center of each galaxy. (1) This is also attributed to the dark matter in most accepted models. But no one knows what dark matter is.

Micro Bang Model

To explain these questions and others, I propose a new scenario of the birth of our universe as follows. Suppose there was an original space whose physical laws are quite similar to that of our space. (Fig. 2A) In the original space, a pair of virtual particles; a particle and an antiparticle were created everywhere for a very short time due to the uncertainty principle as our world. So far, no one will raise any objection. But here, I framed one simple but new hypothesis that the laws of physics which
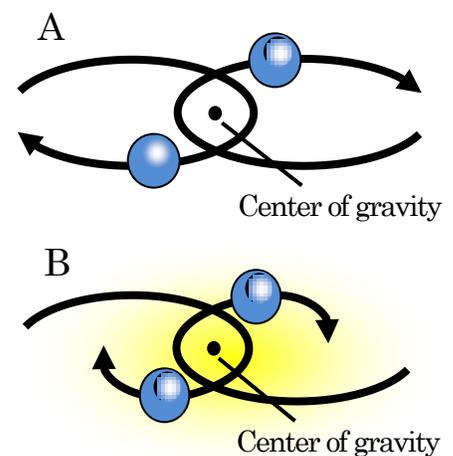
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Fig. 1 Trajectory of objects
(A) Trajectory without friction
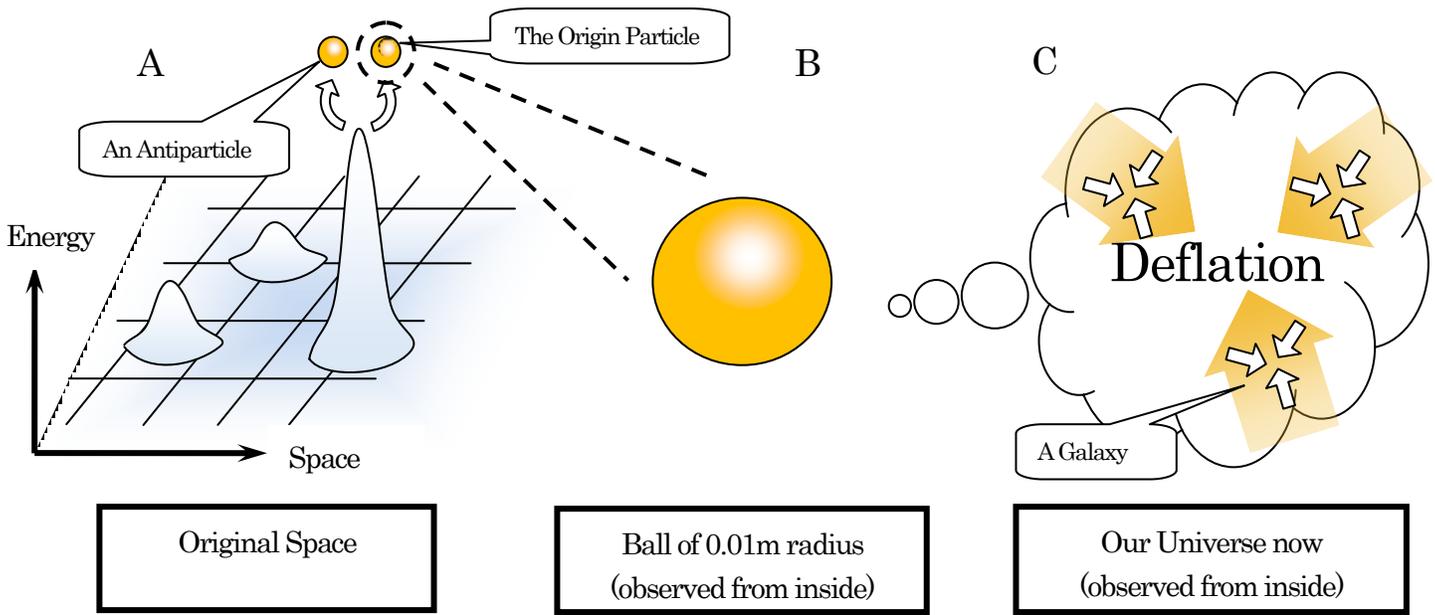(B) Trajectory with friction

Fig. 2 The Origin Particle: The Seed of Our Universe

rules the relationship between time and space (i.e. speed of light) changed inside one of the particles. I named the particle the "Origin particle" because it is the seed of our Universe. I defined this time as time t0 and named the phenomena which follow "Micro Bang". If inflation theory which adopts faster expansion than speed of light were accepted, this hypothesis might not be so bizarre. From this time t0, all physical variables should be defined in two ways; a variable observed from original space and a variable observed from inside the new space. I use suffix "_o" for former one and suffix "_n" for the other one.

To make it simple for the first work, I assume the radius of the Origin Particle $Rp_{\_o}$ was as large as the Planck length which is 1.62E-35 m and the distribution of the density $\rho_{\_o}$ was homogeneous

inside the particle. Thus, in this model, our Universe has clearly defined center and outer edge unlike other models.

The mass $Mp_{\_o}$ of it is calculated as,

$$Mp_{\_o} = \frac{4}{3} \cdot \pi \cdot Rp_{\_o}{}^3 \cdot \rho_{\_o} \qquad (1)$$

In this model, at time t0, $Mp_{\_n}$ and $Rp_{\_n}$ are the same as $Mp_{\_o}$ and $Rp_{\_o}$ respectively. But after t0, I assumed the speed of light in the new space reduced dramatically and all variables became different inside the Origin Particle. Assuming that a mass point $m_{\_n}$ ($m_{\_n} \ll M_{\_n}$) exists at the distance $rd_{\_n}$ from the center of the Origin Particle, gravitational force $Fg_{\_n}$ is caused by the mass $Mi_{\_n}$ which is in the region where position $r_{\_n}$ is smaller than $rd_{\_n}$.

$Mi_{\_n}$ is calculated as follows.

$$Mi_{\_n} = \frac{4}{3} \cdot \pi \cdot rd_{\_n}{}^3 \cdot \rho_{\_n} \qquad (2)$$

Gravitational force $Fg_{\_n}$ between

$M_{\_n}$ and $m_{\_n}$ is,

$$Fg_{\_n} = \frac{G_{\_n} \cdot Mi_{\_n} \cdot m_{\_n}}{rd_{\_n}{}^2} \qquad (3)$$

where, $G_{\_n}$ denotes gravitational constant of new space. Thus, Potential energy $Ep_{\_n}$ of $m_{\_n}$ is,

$$
\begin{aligned}
Ep_{\_n} &= \int_0^{rd_{\_n}} Fg_{\_n} \cdot dr_{\_n} \\
&= \frac{2}{3} \cdot \pi \cdot rd_{\_n}{}^2 \\
&\quad \cdot G_{\_n} \cdot \rho_{\_n} \cdot m_{\_n} \qquad (4)
\end{aligned}
$$

Assume that initial position of the mass point $m_{\_n}$ was at the center of the particle with the speed of light $cn_{\_n}$, and after flying outward, it stopped at the position $Rp_{\_n}$. Equation of energy is,

$$
\frac{1}{2} m_{\_n} \cdot v_{\_n}{}^2 + Ep_{\_n} \\
= \frac{2}{3} \cdot \pi \cdot Rp_{\_n}{}^2 \cdot G_{\_n} \cdot \rho_{\_n} \cdot m_{\_n}
$$

$$(5)$$

Solving equation (2) to (5) gives,

$$Rp_{\_n}{}^2 = \frac{cn_{\_n}{}^2}{\frac{4}{3} \pi \cdot G_{\_n} \cdot \rho_{\_n}} \qquad (6)$$

Table 1. History of Our Universe   - A Trial Calculation -

	Coordinates	t0 Time of the Micro Bang	At the time when Rp_n is 0.01m	t_n=13.7 billion years (today)
Time after Micro Bang [Sec]	original	0	0	0
	new	0	3.34E−09	4.32E+17
Radius of Our Universe [m]	original	1.62E−35	1.62E−35	1.62E−35
	new	1.62E−35	0.01	1.30E+26
Speed of Light of our Universe [m/S]	original	3.00E+08	4.85E−27	3.74E-53
	new	3.00E+08	3.00E+08	3.00E+08
Mass of Our Universe M [kg]	original	4.66E−70	4.66E−70	4.66E−70
	new	4.66E−70	1.79E+00	3.00E+52
Density of Our Universe ρ [kg/m³]	original	2.64E+34	2.64E+34	2.64E+34
	new	2.64E+34	4.26E+05	3.29E−27

Eq. (6) shows that any object with speed of light cannot go beyond the radius Rp_n. Then the radius Rp_n can be defined as the radius of the new space.

In common sense, the value of Rp_n should be astronomical size, but here, I introduced a hypothesis that G_n became big enough to make Rp_n as small as the size of elemental particle in the new space. Like most quantum related theories, the question "Why it happens?" is out of scope of this paper.

Outside the Origin Particle

As shown above, at the edge of the Origin Particle, the light stops going outward any more. Observing from the center of the Origin Particle, time progress at the edge of the Origin Particle stops because speed of light there observed from original space becomes 0. And outside the Origin Particle, time progress must be shared in common with the edge of the particle. Therefore, in less than a moment before the annihilation of the created pair of particles in the original space, eternal time could pass inside the new space.

Deflation

As described above, the Origin Particle was created due to the uncertainty principle with the size of Planck length 1.62E-35 m. After the birth, gravitational constant became larger and speed of light observed from original space became slower in the Origin Particle. Because speed of light is the scale which defines the size of objects, if it slows down, all objects including from elementary particle to stars became smaller observed from original space. Observing around us, we cannot know what is going on because everything around us including ourselves and measuring equipments is shrinking simultaneously with the speed of light. But in star light which was emitted long ago, we can observe red shift. It can be interpreted as a longer wave length emitted when everything was larger.

Homogeneity

In Big Bang model, anything can happen during inflation period because laws of physics which we know cannot be applied. But after inflation, things must be under laws of ordinary physics.

Then, when something homogeneous explodes, explosion must begin from the surface because when the matter on the surface is being blasted, matter under a skin stays still because of the pressure made by the explosion of the skin. Explosion front propagates layer by layer to the center. This front is called shockwave. After such an explosion, matter near the center of the explosion cannot get enough kinetic energy to be blasted away. For example, after the explosion of a supernova, there always exists a massive core left in the center.

In our Universe, such a great core is not found yet. This is the biggest reason I doubt Big Bang Model. To the contrary, Micro Bang Model can easily explain homogeneity by only assuming the initial homogeneity inside the Origin Particle.

Dark Energy

I feel the idea of dark energy is quite artificial. Therefore I omitted it from this new model. Instead, to explain seemingly expanding universe, I propose deflation model of the Universe.

Omitting the idea of dark energy, objects must continue falling to

the center of gravity of the Universe under the law of gravity. But if shrinking rate of the light and objects is faster than falling rate, the Universe must be recognized to be expanding. And if those rates are the same, our Universe must be recognized to be a flat space.

A Trial Calculation

For this model, mass and age of our Universe should be recalculated because the premises for estimating them are totally different. But for a trial, I calculated the history of our Universe using widely accepted total mass of 3.00E+52 kg (2) and age of 13.7 billion years old. (3) At present, radius of our Universe can be calculated by age and light speed, which make 13.7 billion light years observed from new space.

But observed from original space, because time has been stopped from the beginning, the radius must remain the same value as the radius at the time of Micro Bang.

Speed of Light

Because light emitted from the center of new space at t0 reaches to the edge of the new space today, Minkowski's Proper Time between ((time of the Micro Bang) , (center of the space)) and ((today) , (edge of the space)) must be 0.

Then, light speed inside the new space observed from original space cn_o is calculated as follows.

cn_o (today)

$= Rp_o$ (today) $/ t_n$ (today)   (7)

Thus, speed of light of our Universe today has become very slow observed from original space.

Mass Creation of our Universe

I feel mass creation theory during the inflation period very unnatural. Instead, I propose a model in which the mass conservation law is valid throughout the time being. In this model, total mass of the universe M_o does not change at all, but only the rule for evaluating the mass inside new space was changed. Reduction of the cn_o makes everything in the new space very small. Then, the same trifle mass M_o of the Origin Particle is now evaluated as an astronomically huge mass M_n by the ultramicroscopic people living in it.

Result of trial calculation is shown in Table 1.

Conclusion
Proposed Answers for Questions

I deduce what will happen if Micro Bang Model were valid.

Formation of Galaxies

This was the first question. I think I could explain it without using effect of friction. But, I want to do that in later work.

Homogeneous Universe

This is because the Origin Particle was homogeneous. In a microscopic particle, it is easier to expect better homogeneity than in a larger area.

Expansion of the Universe

Everything in our Universe is falling into the center of the Universe. Thus, distance between stars is shrinking. But because everything including ourselves and measuring instruments are shrinking together, the Universe is observed as if it is expanding.

Red shift

Light from a distant star exhibits red shift not because they are recessing but because everything including wavelength of light was larger at the time it was emitted.

Flat Universe

This is because we are shrinking in the same rate we are falling to the center of the Universe.

Origin of the Mass of the Universe

At first, it was created as a tiny virtual particle. And later, the rule for evaluating the mass was changed to look it huge.

Antiparticles

Our Universe contains few antiparticles because our Universe was made from a single (not anti-) particle.

References

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