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Some Physical Aspects of Artificial and Natural Field Gyroscopes. Relation with Atmospheric Phenomena and Geo-Pathogenic Zones.

The paper considers physical effects, produces by a spinning electromagnetic field. Unlike a traveling wave, all its energy remains in a localized volume, what relates such the system with a mechanical gyroscope. Like the classical gyroscope, the electromagnetic spinning, manifested as a Field Gyroscope, produces a torque in a case of the non-stationary spinning. However, the electromagnetic base of the spinning brings new features, which the mechanical gyroscope does not have. The phenomena of the Filed Gyroscope allow explanation of dangerous atmospheric processes and anomalies of Geo-Pathogenic Zones as well as the possibility of a new type of the propeller.

1. Introduction.

The conception of the Field Gyroscope, further-FG, was developed by the author as a transfer of ideas and results of mechanical gyroscopic experiments of N.A. Kozyrev [1,2] and other researchers [3-5] into the field domain [6-9].

Rotation of electric vector in the elliptically polarized electromagnetic wave is well known.
However, unlike the elliptically polarized wave, FG does not transfer the energy. Its Umov-Pointing vector equals zero. Energy remains accumulated inside the geometric sizes of FG. The localized energy has an equivalent mass, angular momentum and other attributes of a real gyroscope.

The spinning vector $\boldsymbol{E}$ is developed by 2 orthogonal parent vectors $\boldsymbol{E}_1$ and $\boldsymbol{E}_2$, shifted in a phase.

$$\vec{E}_1 = \vec{E}_{01}\sin(\omega_1 t) \text{ and } \vec{E}_2 = \vec{E}_{02}\sin(\omega_2 t + \varphi) \quad (1)$$

The resulting vector $\boldsymbol{E}_s$ is a function of time and has a value

$$E_s(t) = \sqrt{E_1^{\,2} + E_2^{\,2}} \quad (2)$$

The angle α of a radius-vector is a time-varying value according to

$$\alpha = \arctan\frac{E_2}{E_1} \quad (3)$$

In the simplest case, $\omega_1 = \omega_2$, then the end of $\boldsymbol{E}_s$ depicts an ellipse, if $\boldsymbol{E}_{01}$ and $\boldsymbol{E}_{02}$ are not equal, the most common case, or a circle, if they are equal.

Non-stationary spinning of FG is of special interest, because it can produce a real physical torque, yet it develops a unique case of mass-variation spinning.

FG origins as a result of superposition of two orthogonal fields shifted in phase.
This situation is pretty frequently occurs in Nature. Because of developed physical consequences, studying artificial and natural FG is a matter of importance.

FG is a spinning reference frame, producing additional accelerations $\boldsymbol{a_s}$ for the associated objects, having velocity $\boldsymbol{v}$ inside FG of a radius $\boldsymbol{r}$.

$$\vec{a}_s = 2[\vec{\omega}\vec{v}] + [\vec{\omega}[\vec{\omega}\vec{r}]] \quad (4)$$

The mechanic manifestation of the first related force is known as a Coriolis force.
However, the degree of this association is a special question. For instance, it's related to passing a laser beam through FG.
If the beam is associated in some degree $\boldsymbol{k}$ *(0< k<1)* with FG, this can result in deflection of the beam. In this case $\boldsymbol{v=kc}$ and the acceleration can be considerable.

The earlier experiments of [10,11] showed that FG interacts with photons.

In the majority of the cases, the spinning of FG is non-stationary.
Non-stationary spinning FG, having time-varying angular momentum $\boldsymbol{L}$ produces the torque $\boldsymbol{M}$,

$$\frac{d\vec{L}}{dt} = \vec{M} = \left[\vec{r}\vec{F}\right] \quad (5)$$

The non-stationary spinning develops mechanical forces which can rotate even relatively massive objects, placed inside FG.

This force also will result in specific deflection of the light beam

Fig.1 shows the possible experiment of propagating the laser beam inside the non-stationary FG. However, in this planned experiment, the beam is propagating along the long axis, which does not correspond to conditions (4) and (5) in the best way. According to (1) and (2), the beam has to be directed normally to the FG axis to some effect. However, it's not clear yet about special effects along the major axis of FG.

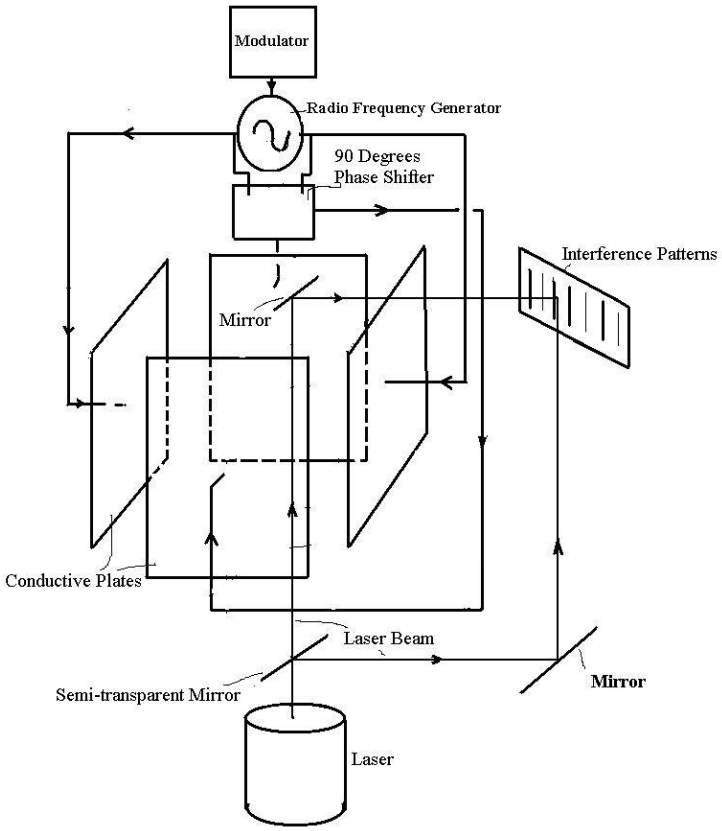

Fig.1. Generating non-stationary FG and one of the possible interference experiments to reveal Space-Time distortions inside FG.

Fig.2 shows the possible outcome of propagation of the beam of light inside the non-stationary FG, normally to its axis. The developed torque *F*r,* according to (5) can deflect the beam.

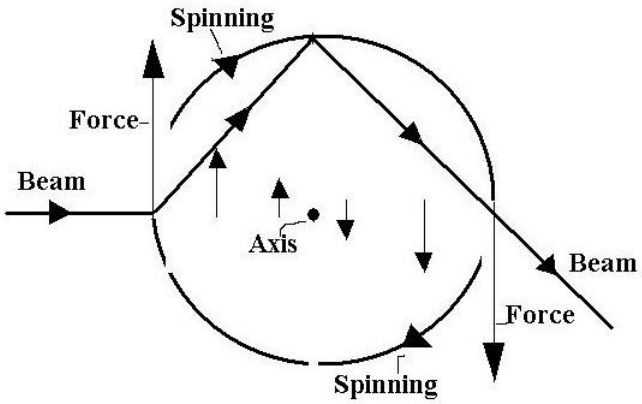

Fig.2. The possible outcome of propagation of the beam of light inside the non-stationary FG, normally to its axis. The developed torque *M= F*r,* according to (5), can deflect the beam.

2. Parameters of FG

For FG, its mass can be calculated from energy of the field inside its geometrical limits.

$$m = \frac{W}{c^2} \quad (6)$$

Total energy W of FG, having diameter *D* at the angular speed ω, is a sum of potential and kinetic energy, associated with the momentum of inertia *I*.

Taking into consideration that the moment of inertia of a cylindrical–like FG, having diameter D is

$$I = \frac{mD^2}{4} = \frac{W}{4c^2} D^2 = W\left(\frac{D}{2c}\right)^2 \quad (7)$$

And the kinetic energy of spinning is

$$W_k = \frac{1}{2} I\omega^2 = \frac{1}{2} W\left(\frac{D\omega}{2c}\right)^2 \quad (8)$$

We can write down

$$W(t) = \frac{1}{2}\varepsilon\varepsilon_0 \int_V E_s{}^2(t)dV + \frac{1}{2} W(t)\left(\frac{D\omega}{2c}\right)^2 \quad (9)$$

From here, the total energy of FG is

$$W(t) = \frac{\varepsilon\varepsilon_0 \int_V E_s{}^2(t)dV}{2 - \left(\frac{D\omega}{2c}\right)^2} \quad (10)$$

From here, the mass of FG is

$$m(t) = \frac{\varepsilon\varepsilon_0 \int_V E_s{}^2(t)dV}{2c^2 - \left(\frac{D\omega}{2}\right)^2} \quad (11)$$

It has some common features with Lorentz's transformation for the relativistic mass for a linear motion:

$$m = \frac{m_0}{\sqrt{1 - \left(\frac{v}{c}\right)^2}} \quad (12)$$

Generally, for FG, the angular momentum is a function of two time-dependable variables,

$$L(t) = I(t)\omega(t) = \frac{m(t)D^2}{4}\omega(t) = \frac{D^2\omega(t)\varepsilon\varepsilon_0 \int_V E_s{}^2(t)dV}{8c^2 - (D\omega)^2} \quad (13)$$

So far we supposed the driving field $\boldsymbol{E}_s$ as a constant. In this case, $d\boldsymbol{L}/dt=0$.

However, the non-stationary is a more natural condition for FG.
If $\boldsymbol{E}_s$ is a time-varying value, so does its mass *m,* then

$$\frac{dL}{dt}=\frac{D^2}{4}\left(\omega\frac{dm}{dt}+m\frac{d\omega}{dt}\right)=\frac{D^2}{8c^2-\left(D\omega^2\right)}\varepsilon\varepsilon_0\left(\omega\frac{d}{dt}\int_V\vec{E}_s{}^2(t)dV+\frac{d\omega}{dt}\int_V\vec{E}_s{}^2(t)dV\right)=\frac{D}{2}F(t) \quad (14)$$

We get a time-varying torque. Its value theoretically tends to infinity at some critical frequencies and changes the sign in vicinity of them.

3. Non-Linear Phenomena of FG: Mass "Resonance". Antigravity? Gravity Waves.

It follows from above that there is a critical point of the frequency of spinning where these functions tend to infinity, experience a rupture and then became negative.
The resonance-like phenomenon exists in vicinity of specific frequencies of spinning.
At this point, FG will consume abnormal amount of energy, the feeding generator will be overload and the effect will not reach its theoretical level.

The "resonance" frequency depends on the diameter of FG. Fig.3 shows this supposed phenomenon for FG having 400V/m at 1m diameter and 1m^3 volume.

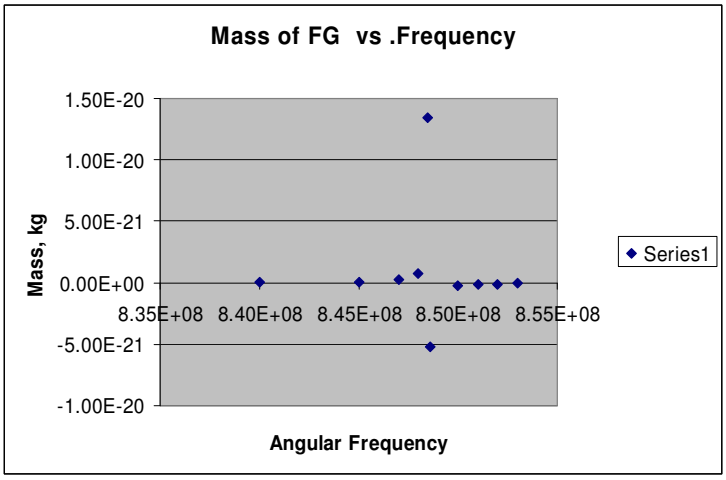

Fig.3. Dependence of mass of FG on its angular frequency for E=400V/m at 1 m diameter and 1m^3 volume.

The resonance-like phenomenon exists in vicinity of specific frequencies of spinning.
The "resonance" frequency depends on diameter of FG. Fig.3 shows this supposed phenomenon of the mass for FG having 400V/m at 1m diameter.
Reality of the negative mass has to be studied in the experiments.

As it follows from (11), the "resonant" frequency is

$$\omega_r=2.83\frac{c}{D}rad/s \quad (15)$$

Fig. 4 shows this dependence.

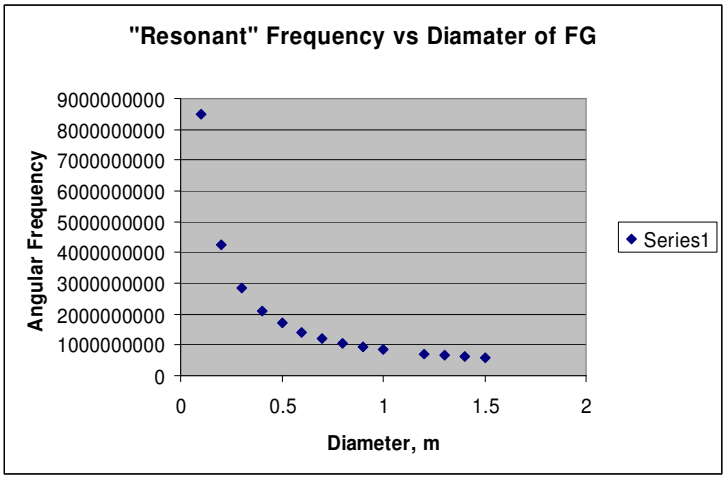

Fig.4. "Mass Resonance" frequency vs. diameter of FG

Fig.5 shows the variation of the FG-developed torque in vicinity of the "resonant" frequency for 400V/m, D=1m and 1m^3 volume.

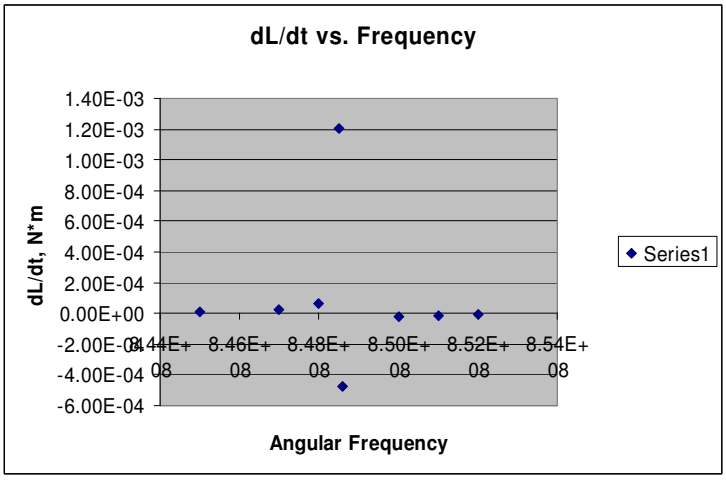

Fig.5. Dependence of the torque of FG on its angular frequency for E=400V/m at 1 m diameter and 1m^3 volume, if $d\omega/dt=0$

According to (11), the mass of the non-stationary FG is a time-varying value yet it can reach considerable values to generate the gravity waves.

4. The Experiment

The experiment had to show that FG really develops the torque.
The experimental installation, that was used earlier to show interaction of FG with gamma-photons [10,11], was employed in that mechanical experiment. The 14 g disks were suspended inside the double quadrupole spinner, Fig.6. The spinner developed opposite directed FG at 400 V/m at 3MHz, specially modulated to increase the torque.

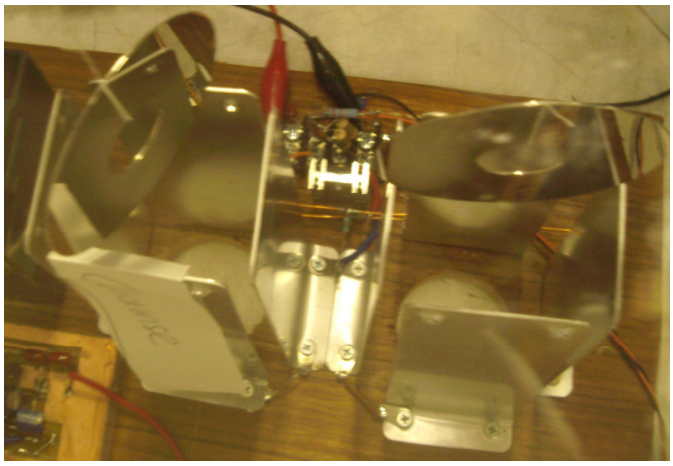

Fig.6. Two quadrupole spinners, generating opposite modulated spinning electric fields 400V/m @3MHz, according to Fig.1, having the disks placed in the originated FG. During the experiment, the disks turned for as much as 10 degrees.

The quadrupole spinners were driven with the modulated voltage shown in Fig.7. This actually is an image of the trajectory, depicted by the end of the spinning vector $\boldsymbol{E}_s$.

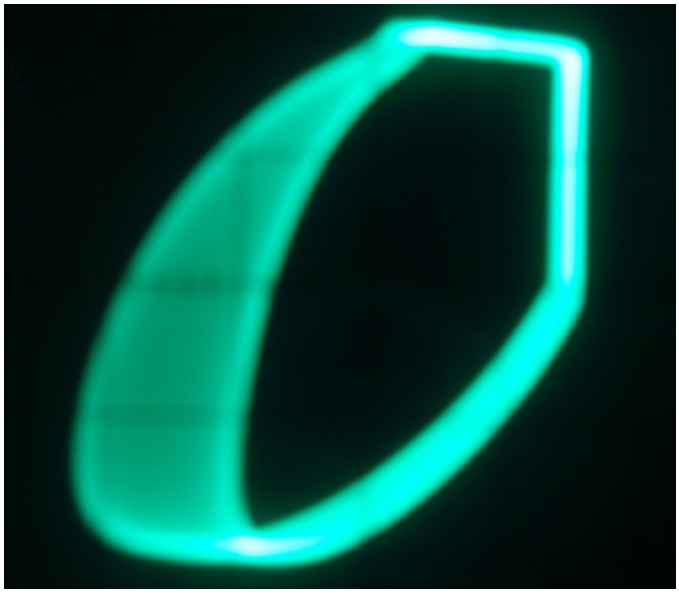

Fig.7. The actual trajectory, depicted by the end of the spinning vector $\boldsymbol{E}s$.

The generated torque is being compensated by an opposite momentum of the twisted filament having a torsion constant k. This results in rotation of the disks for the angle θ. Now we can show that

$$\frac{dL}{dt}=\frac{D^2}{8c^2-\left(D\omega^2\right)}\varepsilon\varepsilon_0\left(\omega\frac{d}{dt}\int_V \vec{E}_s{}^2(t)dV+\frac{d\omega}{dt}\int_V \vec{E}_s{}^2(t)dV\right)=\frac{D}{2}F(t)=-k\theta \qquad (16)$$

During the experiment, the disks rotated for as order of 10 degrees. Such a considerable rotation was possible due to presence of high level derivatives, seen in Fig.6 at the upper portion. More detailed analysis of the experiment will be done in the next publication.

5. Quantum Aspects of FG.

At low mass, like *1.0E-20kg*, FG can be considered as a quantum object.
There is a point of view that FG-related Torsion Fields are bosons, having an integer spin, according to the quantum statistics.

Then

$$L(t) = I(t)\omega(t) = \frac{m(t)D^2}{4}\omega(t) = \frac{D^2\omega(t)\varepsilon\varepsilon_0\int_V E_s{}^2(t)dV}{8c^2 - (D\omega)^2} = n\hbar \quad (17)$$

This allows calculating the number of FG-bosons.

Because the energy of FG increases along with frequency, the higher energies can correspond to higher energy photons. Therefore, we can assume that FG generates virtual particles, in particular – the photons, which are bosons like the quanta of FG.

$$W(t) = \frac{\varepsilon\varepsilon_0\int_V E_s{}^2(t)dV}{2 - \left(\frac{D\omega}{2c}\right)^2} = nh\nu \quad (18)$$

However, at the critical resonant frequencies, the mass and angular momentum experience drastic increase and FG can not be considered anymore as the quantum object.

6. FG and GPZ

The author repeatedly raised the question about originating FG over GPZ. The detailed analysis was done in [6,9,12].

As the set of formulas above shows, there are possible strong non-linear phenomena in FG-generating GPZ.
The negative mass and the time varying mass can develop distortion of Space-Time metrics with the following consequences.
In particular, speculations about anti-gravity phenomena in GPZ now can get a base.

The set of formulas above shows that the beam of light inside FG can experience deflection. This question was raised by the author in 2005. But FG presents in majority of GPZ. At least two group of experimenters reported later that they observed either attenuation of the signal from laser beam-receiving photo-detector or its deflection [13,14]. On the other hand, the observed reduction of the signal could be caused by the deflection of the beam from the active area of the detector.

7. FG and Atmospheric Phenomena

The dangerous atmospheric phenomena like twisters, hurricanes and tornados can be explained on a base of this developed conception.

There are a lot of atmospheric FG, produced by lightings and even permanently existing Earth's electromagnetic fields, generated in Van Allen belt an then supported by the Earth's –ionosphere resonator [6]. Electric field in clouds can reach as much as 3.0E+6 V/m before the electric breakdown at a volume of tens of millions cubical meters. These fields have all the conditions for developing FG. Needles to say, that this FG can produce a heavy torque, which will be able to rotate many-tons mass of the clouds and air.
If so, this gives a hint how to fight these unwanted processes. The opposite spinning artificial FG can be developed to compensate the natural one.

Let's calculate the resonant frequency according to (15) for FG, having D=1.0E+4 m in clouds. It equals 8.5E+3 Hz. The atmosphere is reach with these frequencies, supported by the Earth-ionosphere resonator [6].
Now we can calculate the torque. At the lighting discharge the field can be E=1.0E+6 V/m.
If our FG has a height of 1.0E+3 m, the total volume equals 7.85E+10 m^3. The total energy of this FG is as much as 1.0E+12 J. The mass of this FG is 1.0E-5kg. According to (14), the torque at 8kHz is 0.7 N*m. Even this is enough to start rotation of masses of water vapors and air. As the frequency approaches the resonant one at 8.5E+3 Hz, the torque theoretically tends to infinity. After 8.5E+3 Hz, the frequency domain of negative mass and anomalous phenomena begins.

FG could also explain the phenomenon of year 1970, when a small plane flew through the giant bagel-like rotating cloud and was cast through Space and Time getting the destination in Florida for shorter time and with less consumed fuel.

8. FG –Propellers

Direct employing considerable torque of FG in vicinity of the "resonant" frequency develops the pair of forces rather than a net force,
However, the net force can be developed basing on acceleration of the moving particle inside the spinning reference frame. For this purpose the interaction of the particles with FG has to be partial.

Interaction of FG with quantum objects had been proved experimentally. It means that the quantum objects became <u>partial</u> participants of the spinning reference frame. This interaction has a spin-to-spin nature. For origination of $2[\vec{\omega}\vec{v}]$ acceleration, every particle has to participate in rotation. For interaction between FG and particles this is furnished by spins. In this case, FG Propeller can be offered. The Coriolis force can work here, Fig.7.

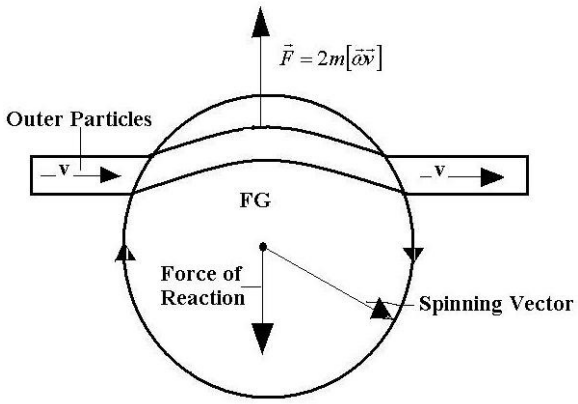

Fig.8. Conception of FG-Propeller. The outer quantum particles moves through FG, participating in the spinning reference frame due to spin-to-spin interaction. The particles experience action of the Coriolis force. The force of reaction moves FG source.

Conclusion.

1. Field Gyroscope, FG, is a real object, having a physical mass.
2. Its interaction with quantum particles, crossing it, can result in origination of a force of reaction, if the particles are associated with FG only partially.
3. Non-stationary spinning FG develops a mechanical torque.
4. The existence of the torque was proved experimentally.
5. There are quasi-resonant frequencies of spinning, at which its mass rapidly tends to infinity and then becomes negative as the frequency increases.
6. Non-stationary FG develops the varying mass, which can be considerable at critical frequencies to develop gravitational waves.
7. There is a logic base to assume that FG can produce virtual particles, including photons.
8. FG can cause anomaly phenomena in the atmosphere where it generates the torque enough to rotate considerable masses of vapors and air.
9. One of the anomaly FG-phenomena in the atmosphere is generation of the negative mass which can distort Space-Time metrics.

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