Spinning Electric Field As a Virtual Gyroscope: On Possibility of Existence of Kozyrev's Effect in Rotating Electrical Fields

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Rotational motion got a special status in physics during last decades. Among those angular momentum-related effects, experiments with gyroscopes were historically first. They revealed anomalies, which could not be explained in the framework of Newton's mechanics. Modern physics consider those unusual phenomena as spin-spin interaction via torsion fields.

The great merit of that belongs to prominent Russian astrophysicist N.A. Kozyrev (1908-1983).
He proposed the theory stating that time and rotation are closely interconnected. To verify it, in the 50s, he conducted a large series of experiments with gyroscopes and found that the weight of the gyroscope depends on the angular velocity and the direction of rotation [1,2]. Although the observed phenomenon was pretty small (insignificant fraction of percent), it was completely confirmed by other scientists. Professor A.I Veinik, member of the Belarus Academy, conducted profound research of this effect in 60-80s and offered his own explanation on a base of so called chronal field, [3]. In 1989, H.Hayasaka and S. Takeuchi published results of their experiments in which they showed that the fall-time of freely falling spinning gyroscope depends on the angular velocity. [4]. The unusual behavior of spinning gyroscopes was observed by many other researchers, who claim this as a manifestation of antigravitation. In 1991, Russian theoretical physicist G.I.Shipov showed that the anomaly behavior of gyroscopic systems was caused by the appearance of torsion fields generated by spinning masses [5].

There is one major condition of reproduction of this experiment:
the gyroscope must be in a state of non-stationary rotation. Both N.A.Kozyrev and A.I.Veinik employed special vibrations of the gyroscope, while H.Hayasaka and S. Takeuchi used free-falling gyroscope.
Looks like those researchers who declared absence of any weight variation in their experiments, violated this condition.

The author supposes that the spinning electric field, considered by him in [6,7], behaves itself like a virtual gyroscope, which, when non-stationary conditions are superimposed, can demonstrate all the related effects according to N.A.Kozyrev. Beside its own angular momentum, the spinning electric field can induce it in polar molecules media like water vapors and others, converting them in micro gyroscopes.

Chaotic thermal motion of molecules furnishes the non-stationary condition, needed for observing Kozyrev's effect.

Speaking of the weight of the rotating field, one the related question arises: is the term of the weight legitimate here? Weight is a force on normally directed reaction of a support. The gyroscopes in the experiments of N.A. Kozyrev had the support. This is why applying this term is justified in his works. But we can't talk about weight of the field because the concept of support makes no sense here. Instead, we have to consider changes in gravity. Experiments of H.Hayasaka and S. Takeuchi with free falling gyroscope confirm this.
This is why we will discuss behavior of the virtual gyroscope in terms of the gravity rather than the weight.

1. Spinning Electric Field in Vacuum

First, about the spinning electric field considered in [6,7]. The spinning electric vector origins when superimposing two mutually orthogonal, shifted in phase ac fields of equal frequency (parent vectors). In the nature, the appropriate conditions for forming the spinning vectors are pretty frequently encountered. Artificially, it can be obtained with the system comprising two orthogonal pairs of conductive plates (a quadrupole capacitor) fed by shifted for $\pm 90^0$ voltages.

On the other hand, the rotation of electric vector of an elliptically polarized traveling electromagnetic wave is known. Unlike this process, the spinning electric field, considered here:

1. does not transfer energy, its rotation is always in phase for all the planes of given heterogeneous volume ;
2. is formed by the conservative rather than the curl field.

1.1. Rotation-Related Effects

Kozyrev found that the fractional weight variations is proportional to linear rotational velocity u of the body:

$$\frac{\Delta Q}{Q} = \frac{u}{c_2} \qquad (1)$$

The constant c_2 was considered by Kozyrev as a "cause to effect conversion rate".
It was found from his experiments that $c_2 = 700 km/s$.

Speaking of the weight variation ΔQ, we have to note that it can be shown either as

$$\Delta Q = \Delta m \times g \quad (2)$$

or

$$\Delta Q = m \times \Delta g \qquad (3),$$

where m and g are a mass and an acceleration of gravity, respectively. Both the approaches formally lead to the same result. Fran DeAquino has shown that gravitational mass can be controlled by electromagnetic field [8]. The mass, which is considered here, is actually an inertial rather than a gravitational mass. So, the expression (3) looks more prospective for consideration than (2).

Formally, considering (2), we can talk about changing weight due to originating defect of mass Δm in his experiments. If so, $\Delta m \sim 4-8mg$, obtained in Kozyrev's experiments, implies huge latent energy. This can be the energy of vacuum. Taking into consideration the contemporary paradigm, considering so called "elemental" particles as manifestation of transformation of energy, we can suppose that Kozyrev's experiments with rotating bodies can be accompanied with generating such the particles.

As far as the expression (3) is concerned, we have to note that Kozyrev considered variation $\Delta g / g$ and related it to rotation of Earth [1].

For the rotating cylinder (gyroscope), the expression (1) can be shown as

$$\frac{\Delta g}{g} = \frac{u}{c_2} = \frac{\omega R}{c_2} = \frac{2I\omega}{c_2 m} \times \frac{1}{R} = 2\frac{L}{p_{c_2}} \times R^{-1} \quad (4)$$

The upper portion is a doubled angular momentum L, while the product $c_2 m$ is a linear momentum p at the speed of $7\times10^5 m/s$, (c_2). Quantity of R^{-1} is a magnitude of a curvature.
This shape of Kozyrev's equation clearly includes rotation, linear motion and curvature, which correspond to the paradigm, developed by N.A. Kozyrev.

1.2. Likening a Rotating Electric Field To a Gyroscope

Any rotating field can be characterized by means of the set of major characteristics, intrinsic to its mechanical analogs. For the field of the energy W, its equivalent mass m can be found as

$$m = \frac{W}{c^2} \quad (5)$$

At the speeds of v<<c of the end of the vector, full energy of the spinning field **E** in heterogeneous media of volume V,

$$W = \varepsilon\varepsilon_0 \int_V E^2 dV + \frac{1}{2} I\omega^2 = \varepsilon\varepsilon_0 \int_V E^2 dV \left(1 + \left(\frac{d\times\omega}{4c}\right)^2\right) \quad (6)$$

Here, $\varepsilon, \varepsilon_0, I$ and ω are dielectric permittivity of the media and vacuum, moment of inertia and angular velocity, respectively. First term is potential energy, while the second is kinetic energy. For $d = 1m, V = 1m^3, E = 10^4 V/m, f = 10MHz,$ the potential energy is $\sim 10^{-3} J$. The corresponding mass $m_p \approx 10^{-20} kg$. Considering the spinning field as a rotating cylinder of radius $R = d/2$, we find its moment of inertia $I = \frac{md^2}{4} = 0.25\times10^{-20} kg \times m^2$. The term of the kinetic energy is $\sim 0.25\times10^{-5} J$. The relativistic effects are not considered here because v<<c. The ratio of potential and kinetic energies shows that the contribution of rotation can be considerable. As seen from expression (6), the contribution of the kinetic energy becomes very considerable as the frequency grows over $10^8 Hz$. At these frequencies, expression (6) becomes more complex, because the growing kinetic energy makes its contribution in the total mass according to the Special Theory of Relativity.

N.A.Kozyrev observed the phenomenon of changing weight of spinning gyroscope under the superimposed non-stationary conditions.

Technically, the requirement of non-stationary rotation, needed for likening rotated field to the Kozyrev's gyroscope, can be fulfilled by means of superimposing amplitude- or frequency modulation on the rotation.

If this phenomenon of a virtual gyroscope really exists, this means inevitable changing space-time metrics. This can be studied with a laser interferometer as shown in Fig.1. Here, the rotating electric field is being formed inside the quadrupole capacitor.

Changing space-time metrics, if any, would result in variation of $\varepsilon,\ \varepsilon_0$ and $\mu,\ \mu_0$ (relative magnetic permeability and the permeability of vacuum, respectively). Taking into consideration that

$$c = \sqrt{\frac{1}{\varepsilon_0 \mu_0}} \qquad (7)$$

, one can say that, if the discussed experiment brings positive result, rotation affects the fundamental characteristics of space-time. On the other hand, local speed of the light between the plates of the quadrupole capacitor can be shown as

$$c^* = \frac{c}{\sqrt{\varepsilon\ \mu}} \qquad (8)$$

This can be interpreted as a presence of some virtual media, having index of refraction $n = \sqrt{\varepsilon\mu}$, formed by the rotating field inside the quadrupole capacitor. The variation of the speed of the light will result in changing interference patterns, produced by the laser interferometer of the Fig.1.

The installment, shown in Fig.1, comprises a modulator, which controls a radio-frequency generator. The generator forms a sinus voltage wave, which is being split for two branches, then one of them experiences $\pm 90^0$ phase shift. The sign of the phase shift can be controlled. Presence of two pairs of mutually shifted in phase and spatially fields is a major condition to make the field rotating clockwise or counterclockwise. Such the field is being formed here between the plates of the quadrupole capacitor.

1.3. Two Critical Frequencies

When considering the spinning electric vector, we have to note that, unlike real mechanical objects, it can reach both c_2 and the light speed c . This can result in interesting consequences.

When rotating, the end of the electric vector of radius R can reach and exceed c_2. Formally, according to expression (1), it means that the field can experience a gravity reduction (or increase it- depending on the direction of the rotation). These changes have to be equivalent to space-time variations. It happens at some critical frequency f_{cr1}. Considering the spinning electric vector, produced between plates of a quadrupole capacitor with the distance d, and taking into consideration that $u = \omega R = 2\pi f d / 2 = \pi f d$, we have

$$f_{cr1} = \frac{c_2}{\pi d} = \frac{7 \times 10^5 m/s}{\pi d} \quad (9)$$

It's interesting to note that for the natural landscape ($d \sim 10^2 - 10^5 m$), considered by the authors of [6,7] in relation to originating the spinning vector, f_{cr1} can be of the order of $1 - 10^3 Hz$. The lower limit coincides with a range claimed by Fran DeAquino for diminishing gravitational mass to zero in electromagnetic fields [8]. The upper limit represents the range used in electronic dowsing and bio-location.

As seen from (9), at $d = 1m$, $f_{cr1} = 2.2 \times 10^5 Hz$. Formally, according to the accepted above terms, it means that at the higher frequencies, the system will experience the condition of antigravity.

Another critical process may be related to the speed of light c. At certain f and d, the end of the vector can spin with light speed c compatible rate. So does the equivalent mass of the field. This means that the mass m of the field with energy W can increase as the linear speed v of the end of the vector approaches light speed. It follows from the Special Theory of Relativity that,

$$m = \frac{W \times c^{-2}}{\sqrt{1 - \frac{v^2}{c^2}}} \quad (10)$$

To achieve light speed compatible rate for the vector, rotating between plates with a distance d, the driving field with the frequency f_{cr2} has to be applied.
As follows from (8),

$$f_{cr2} = c \times (d\pi)^{-1} \quad (11)$$

For instance, if the distance between the mentioned plates is about1m, then, at the frequency of ~ 100 MHz, speed of the end of the spinning vector will be approaching light rate.

There is a principal difference between the processes related to these critical frequencies.
While f_{cr1} makes a sense only when non-stationary conditions, like the modulation, are superimposed, f_{cr2}-related processes don't require external non-stationary conditions.

1.4. Relativistic Effects

Approaching the light speed will be accompanied by energetic limitations, related to the increasing mass. This is why in reality the effect is not expected to be such a considerable.

At the light speed compatible rate, the rotating field will look like a spinning hoop, because its major mass will be concentrated in the periphery. In a simplified form, the total energy can be shown as

$$W \approx \varepsilon\varepsilon_0 \int_V E^2 dV \left(1 + \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \left(\frac{\omega d}{2c} \right)^2 \right) \quad (12)$$

It's interesting to note that this experiment can be performed with an oscilloscope in a vector mode. There is the rotating field between deflecting plates of a cathode ray tube, when operating in this mode with two sinus wave voltages, shifted in a phase. The rotation causes a displacement current $J = \varepsilon\varepsilon_0 \frac{\partial E}{\partial t}$, which makes its contribution in general current consumption of the oscilloscope. As the linear speed v of the end of the vector approaches c, the current consumption will increase in ultra linear way because of the growing both relativistic mass of electrons and the rotating field.
As the calculation shows, the expected ultra linear effect can be of the order of 0.1% over classic displacement current at the $f = 100MHz$.

1.5. Experiment With Clock

If the virtual gyroscope really affects space-time metrics, this can result in operation of insulated clock, placed inside the rotating field of the Fig.1.
Of course, the effect of time dilation is true for the moving clock rather than immobile one. On the other hand, the effect of changing weight of the rotating gyroscopes in Kozyrev's experiments was registered by the immobile scale.
This justifies such an approach. At least, two identical clocks with identical setup are needed for this experiment. One of them stays outside the field, while another is placed between the plates of the quadrupole capacitor of the Fig.1. More the advanced experiment envisages placing two clocks in the field: one of them in the center, while another next to the plates, where the speed is maximal. Moreover, the experiment has to be done both for clockwise and counterclockwise rotation. These two experiments can be done simultaneously by means of two quadrupole capacitors, fed by the opposite phase voltages.

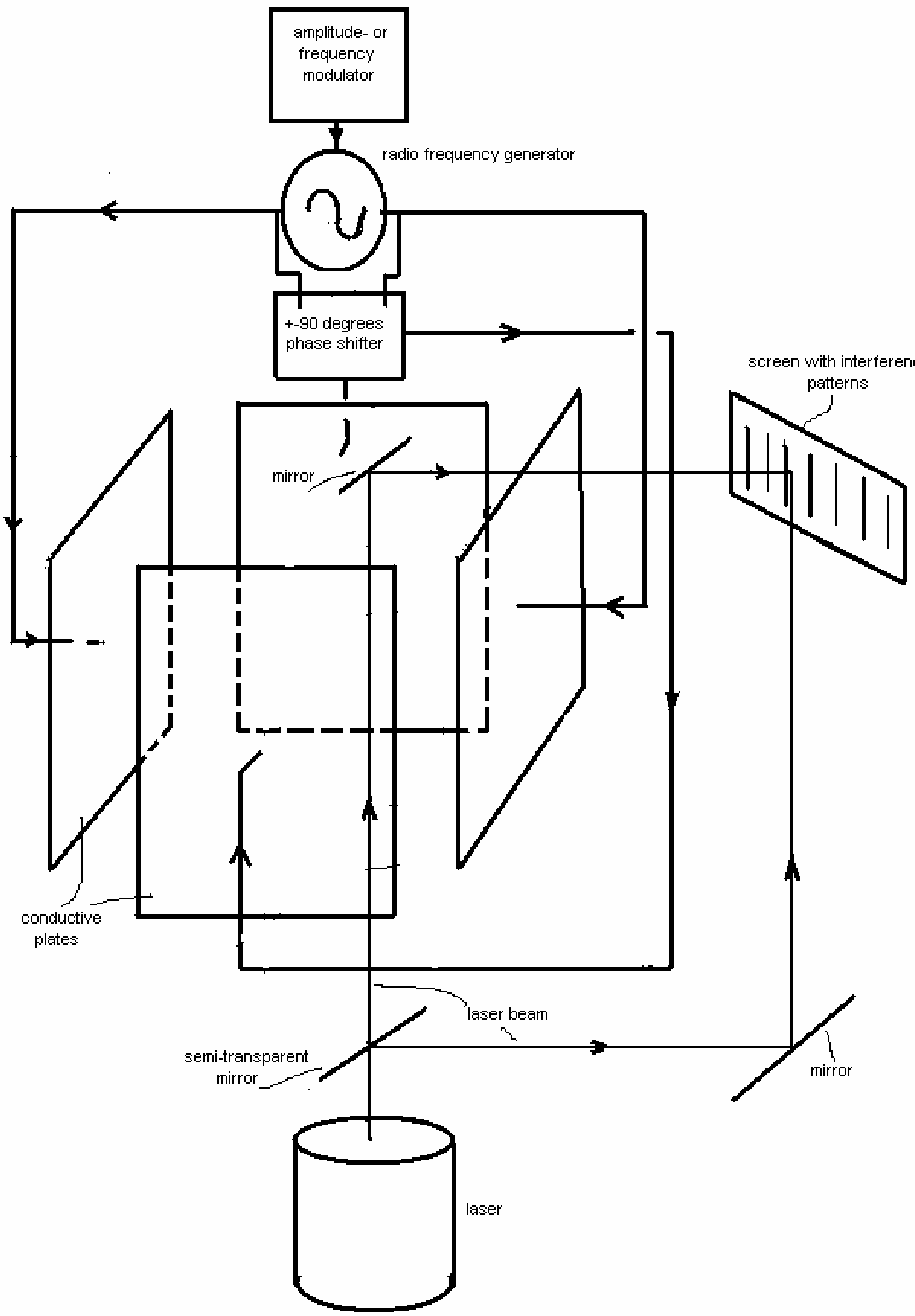

Fig.1
Basic experiment with a laser interferometer.
Spinning vector is being formed between conductive plates, fed by radio frequency voltages shifted in phase. Condition of non-stationary rotation is furnished by means of superimposing modulation.

2. Spinning Electric Field in Polar Molecules Media

When applied to polar molecules media, spinning electric field experiences competition of chaotic heat motion of the molecular dipoles. With regard to Boltzmann's distribution, the number n of dipoles with moment p, which are oriented along the field **E**, can be shown as

$$n = n_0\left(1 - e^{-pE/kT}\right) \quad (13)$$

where $n_{0,} k$, and T are concentration of the molecules , Boltzmann's constant and the temperature, respectively. For $H_2O, p = 6.2\times10^{-30} C\times m.$ Taking this into consideration, for $T = 300K$ and $E = 10^6 V/m$, we have n/n_0 ~0.2%. The small percentage doesn't mean absence of the spinning when the field is applied. Even those dipoles, which can't be aligned by the field, will be following it with the chaotic heat motion superimposed. Fig. 2a shows rotation of dipole under influence of the spinning field with no chaotic motion superimposed, while Fig. 2b shows that in a presence of the chaotic motions of molecular environment.
Moreover, the reasoning behind this suggestion is based on generally accepted statistic approach to behavior of molecular dipoles in electric field.

In a case of the dynamic process of the spinning, we have to take into consideration that if the period of the spinning doesn't exceed time between molecular collisions, molecule can turn for 360 degrees not experiencing chaotic influence of other molecules. Average time between collisions at room temperature is $\sim10^{-9} - 10^{-10} s$. **This means that at the frequencies of the driving field $\sim10^{9} - 10^{10} Hz$, molecular dipoles will behave like classic gyroscopes in external spinning electric field.** On the other hand, **superimposed chaotic heat motion furnishes the condition of the non-stationary rotation,** mentioned above.

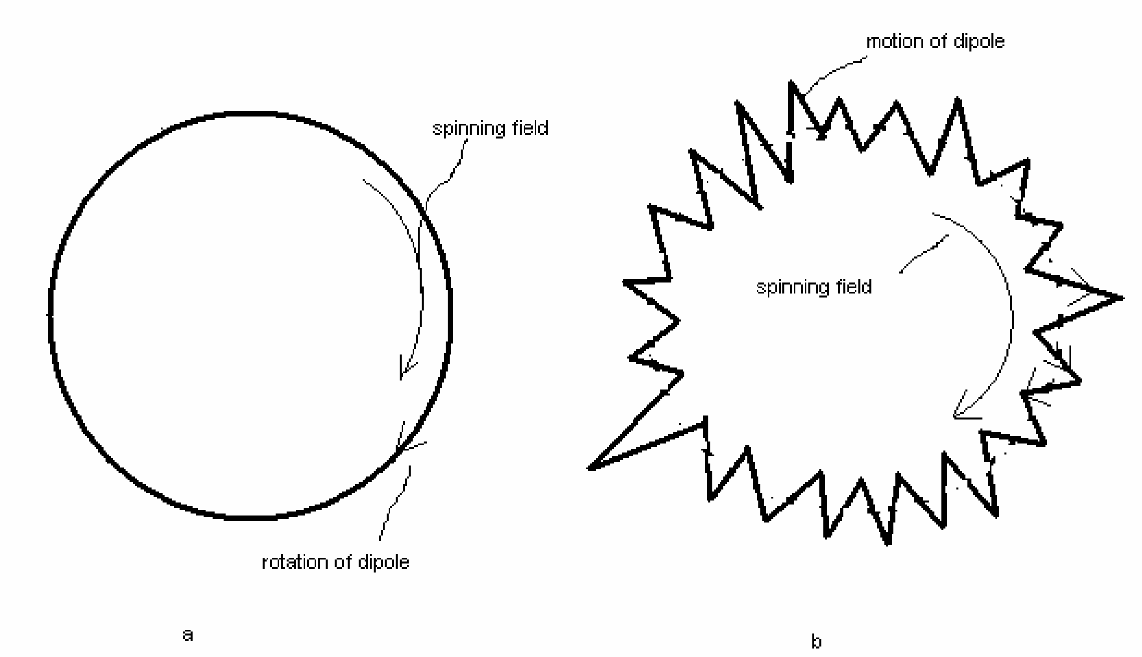

Fig.2

a. Trajectory of rotating dipole in the spinning field with no external distortions;
b. That when chaotic motion is superimposed.

In a case of electrical rotation, the rate of angular velocity will be much more than that of macro gyroscope. External electric spinning field can turn molecular dipoles with $\omega \sim 10^{10} rad/s$, while gyroscopes provide $\omega \sim 10^{3} rad/s$. If we consider dominating the paradigm of the rotational motion in Kozyrev's effect, we can suppose that phenomenon of changing weight will be considerable for electrically driven molecular rotation. The rotation will take place around Y-axis as shown in Fig.3 bellow.

However, the calculations done for molecules of water according to the expression (4) return $\Delta Q/Q$ even less than Kozyrev's 10^{-5} for the gyroscopes he used.

The paradox can be explained due to the paradigm of modern physics, considering that torsion field propagates information rather than energy.

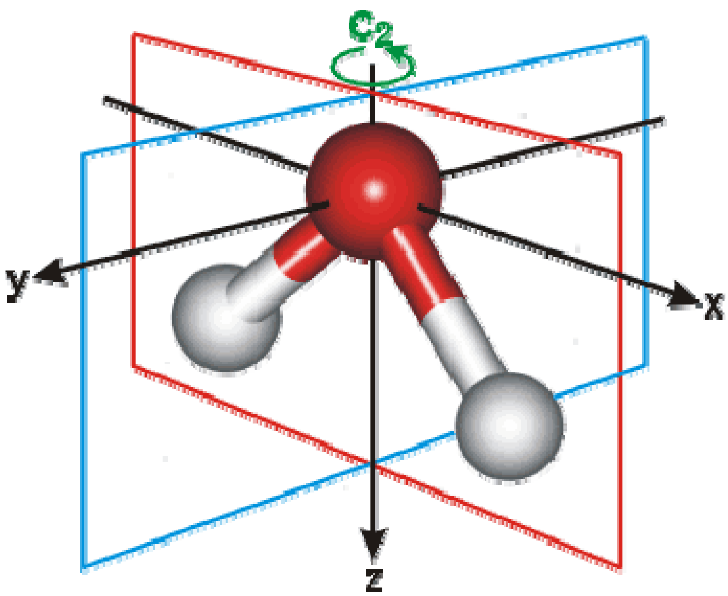

Fig.3

H_2O molecule (http://www.lsbu.ac.uk/water/index.html)

Its own dipole moment is allocated along Z-axis. When the spinning field rotates around Y-axis in ZOX plane, so does the dipole. Its own rotation along the Z-axis doesn't influence the considered process.

Direct verification is based on measuring weight of a sealed vessel with saturated water vapors under applied spinning electric field. Experimental installment, Fig.4, provides both clockwise and counterclockwise rotation of water molecules. Also, variation of the spatial direction of the axial vector of rotation is envisaged. Here, the spinning electric field is created between two pairs of spatially perpendicular conductive plates (quadrupole capacitor) fed with shifted for $\pm 90^0$ voltages. Changing sign of the phase shift changes direction of the spinning.

Another verification is based on the supposed variation of time when light propagates in opposite directions along the axial spinning vector of rotating dipoles. Technically, it can be accomplished by means of measuring interference patterns produced by a laser interferometer, Fig.5.

We have to note, that the experiment with the laser interferometer, Fig.1, has to be considered as a basic experiment for studying phenomenon of the spinning electric vector. If the spinning influences space-time metrics, then it will affect propagation of the laser beam depending on parallel- anti-parallel condition. Direction of the spinning can be easy changed by means of the controlled +- 90 degrees phase shifter.

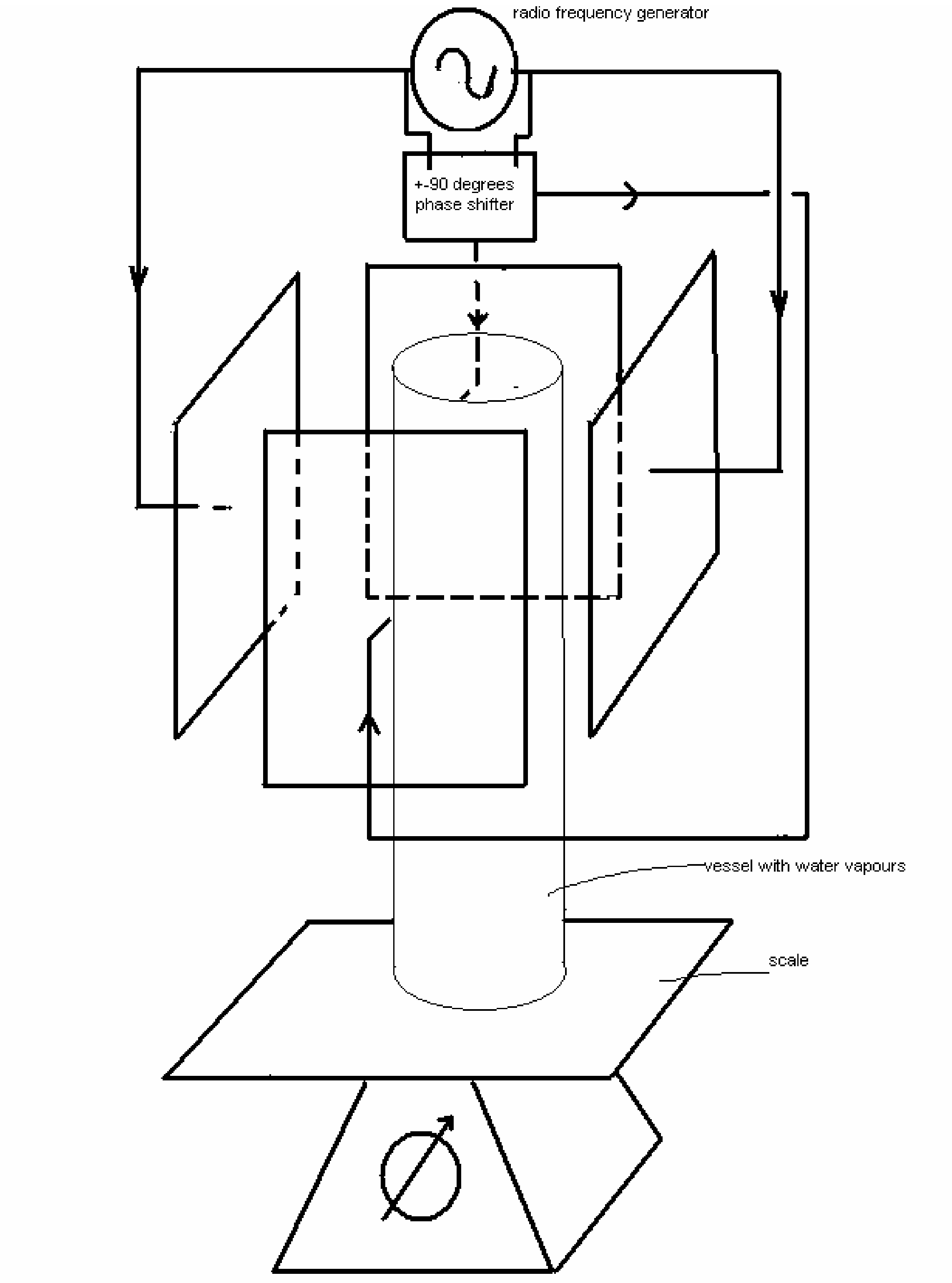

Fig.4. Direct verification of Kozyrev's gyroscopic effect on molecular level. The condition of non-stationary rotation is furnished by superimposing natural chaotic motion on rotation of the molecular dipoles.

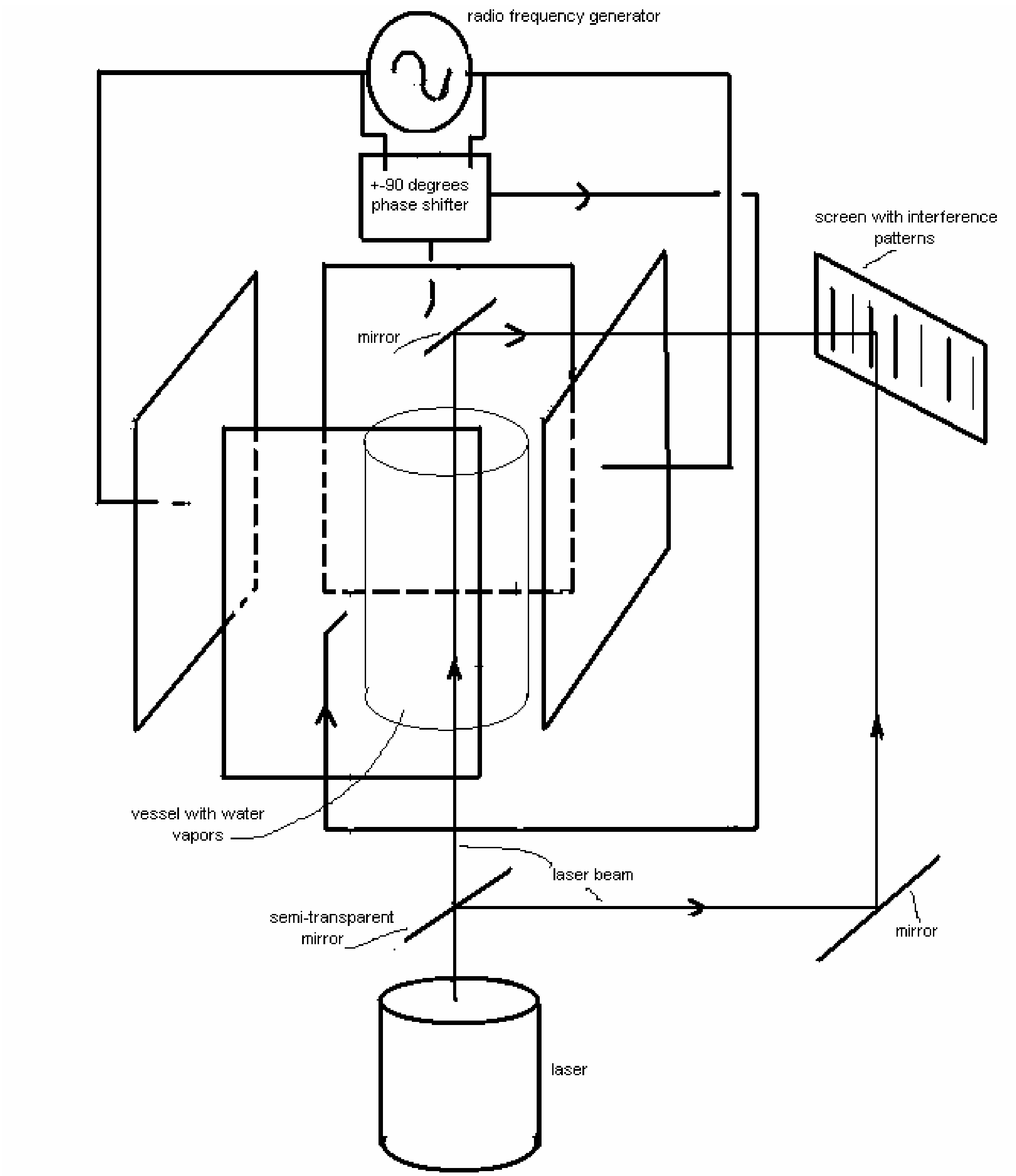

Fig.5. Laser-interferometer-based experiment to reveal an influence of rotating molecular dipoles, driven by the spinning electric field, on the space-time metrology.

Summary

1. Phenomenon of the spinning electric field is considered as rotation of the virtual gyroscope.
2. Basing on studied by N.A Kozyrev phenomenon of changing weight of the rotated bodies, related effects of variation gravity within the spinning electric field are considered.
3. Changing space-time metric as the result of rotation of the field is supposed.
4. Driving induced angular momentum in polar molecules is considered in terms of Kozyrev's effect of changing weight.
5. Assumption about reducing rate of chaotic collisions of rotating polar molecules in the spinning electric fields $\sim 10^{10}\,Hz$ is spoken out.
6. Analytical expressions for the related processes are derived.
7. Experiments with the oscilloscope in a vector mode, the laser interferometer, clock and the weighting vessel with vapors, based on influence of the rotating field on space-time metric, are offered.

Shown above prospective experiments require precision equipment. ECO DOWSING L.L.C. appeals to all the interested research institutions to conduct these experiments.

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