Chapter 7

The Biological Systems and Quantum Nonlocality

At present two physical phenomena are classified as quantum nonlocality: magnetic vector potential and quantum correlations. In this chapter, the influence of those phenomena on BSs is considered.

7.1. The Effect of Magnetic Vector Potential on Biological Systems

7.1.1. The physical aspect of magnetic vector potential

In classical electrodynamics, the induction **B** of the magnetic field is determined [62] by equation $\mathbf{B} = curl\mathbf{A}$ where **A** is the magnetic vector potential. If the magnetic field is shielded, that is **B**=0, it is possible that $\mathbf{A} \neq 0$, which is referred to as the field-free magnetic vector potential. The magnetic vector potential has a physical meaning of its own. In 1949, W. Ehrenberg and R. Siday predicted the ability of a magnetic vector potential to directly influence the characteristics of quantum objects, even though there is no electromagnetic field at the location of the objects [83]. In 1959, the possibility of such an effect was considered by Y. Aharonov and D. Bohm [84]. Subsequently, a great number of experiments have been conducted which confirmed the theoretical predictions [85]. In general, these experiments were as follows (see Figure 7.1): the beam of electrically charged quantum objects emitted by a source is split into two beams: C_1 and C_2. Beam C_1 propagates through the area where **B**=0 and **A**=0. Beam C_2 passes through a toroidal solenoid where **B**=0 and $\mathbf{A} \neq 0$.

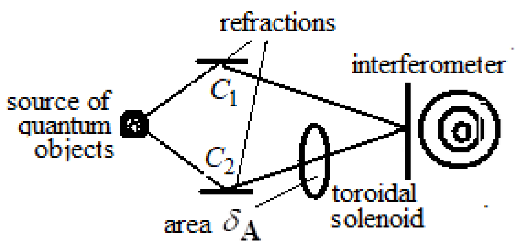

Figure 7.1. Schematic diagram of the experiment on the study of the effects of the magnetic vector potential on quantum objects. The source of the quantum objects emits beams C_1 and C_2. Beam C_1 propagates through the area where A=0. Beam C_2 passes in the area $\delta_\mathbf{A}$ where **B**=0 and $\mathbf{A} \neq 0$. Interference rings are produced by the interferometer.

The solenoid is shielded in such a way that outside the substance of solenoid there is no magnetic field, **B**=0, but the field-free vector potential is present: $\mathbf{A} \neq 0$. Both beams of the quantum objects arrive at the entrances of an interferometer. The appearance of interference rings suggests that there is a change in the wave function characteristics of the quantum objects passing through the area $\delta_{\mathbf{A}}$ where **B**=0 and $\mathbf{A} \neq 0$.

In quantum mechanics, the description of the action of the field-free magnetic vector potential is based on Schrődinger's equation [15] without introducing any physical process.

As the action of the field-free magnetic vector potential takes place in the space where the electromagnetic field is absent, this potential has both a non-electrical and a non-magnetic nature. Let us consider this phenomenon in detail.

The emergence of interferometer rings at the output of the interferometer means a change in the wave characteristics of the quantum objects of beam C_2 moving in area $\delta_{\mathbf{A}}$ (in the area of the action of the field-free magnetic vector potential).

As the wave properties of quantum object are associated with the precession motion of spin of virtual photon created by this object [9,10], the emergence of interferometer rings means that the magnetic vector potential can influence the characteristics of this precession: frequency $\boldsymbol{\omega}_v$, the precession angle (phase) α and the angle of spin's deflection β.

Based on the properties of spin supercurrent (Section 1.2) it can be supposed that the changes in any of the following characteristics of spin: $\boldsymbol{\omega}_v$, α, or β, can be due to the action of spin supercurrent. For proving this supposition, let us consider the characteristics of the virtual photons (they are denoted as **1** and **2** in Fig. 7.2) produced by the electrons creating electric current $\mathbf{I}_e$, and the characteristics of the virtual photon (it is denoted as **3** in Figure 7.2) produced by a quantum object of beam C_2. The characteristics of the virtual photons **1** and **2** are the following: **u** is the velocity, **S** is spin, $\boldsymbol{\omega}_1$ and $\boldsymbol{\omega}_2$ are precession frequencies, α_1 and α_2 are angles of precession, β_1 and β_2 are angles of deflection, r.l. is a reference line. The characteristics of the virtual photon **3**: $\boldsymbol{\omega}_v$, α, β are respectively frequency of precession, angle of precession and angle of deflection of spin **S.**

The spin supercurrent $\mathbf{I}_{ss}$ emerging (see Figure 7.2) between virtual photons **1** and **2** equalizes respectively the values α_1 and α_2, and β_1 and β_2, producing coherent precession of spins of all virtual photons created by electrons of electric current $\mathbf{I}_e$. $\mathbf{I}_{sst}$ is the total spin supercurrent emerging between virtual photons produced by all electrons creating electric current $\mathbf{I}_e$, on the one hand**,** and virtual photon **3**, on the other hand, and influencing the characteristics ($\boldsymbol{\omega}_v$, α, β) of virtual photon **3**.

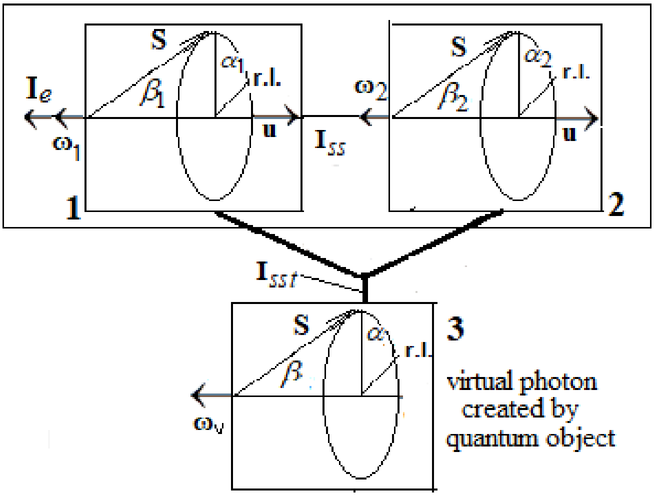

Figure 7.2. The illustration of the action of magnetic vector potential on characteristics of the virtual photon. The characteristics of virtual photons **1** and **2** connected with electric current $\mathbf{I}_e$: **u** is the velocity, **S** is spin, ω_1 and ω_2 are precession frequencies, α_1 and α_2 are angles of precession, β_1 and β_2 are angles of deflection, r.l. is reference line. The characteristics of the virtual photons **3**: ω_v, α and β are respectively frequency of precession, angle of precession and angle of deflection of spin **S**. $\mathbf{I}_{ss}$ is spin supercurrent between virtual photons **1** and **2,** $\mathbf{I}_{sst}$ is the total spin supercurrent between virtual photon **3** and virtual photons **1** and **2.**

Thus, electric current creates in a physical vacuum not only a magnetic field, but spin supercurrent as well that can change the wave characteristics of quantum object: the frequency of precession, angle of precession and angle of deflection of virtual photon created by the object. According to the properties of spin supercurrent, the screening of magnetic field is not accompanied by screening of spin supercurrent. Consequently, spin supercurrent can be a physical process which underlies the action of magnetic vector potential (including the field-free magnetic vector potential) on quantum objects.

7.1.2. The examples of effect of magnetic vector potential on biological systems

In the experiment described below, a device consisting of permanent magnets of 150 mT magnetic induction and arranged in a form of torus was used as a source of magnetic vector potential with the maximum value equal to $3.5 \cdot 10^{-4}$ T m, while magnetic field **B**=0 (Figure 7.3) [86].

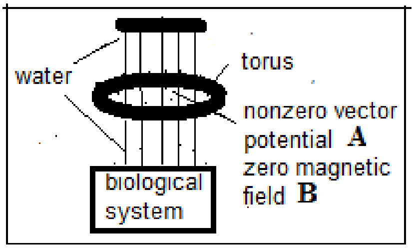

Figure 7.3. Experimental setup. The water passes through the torus center in the area of zero magnetic field **B** and nonzero vector potential **A** to a biological system.

Two types of studies were carried out in the experiment.

1) The “direct” action of field-free magnetic vector potential on the characteristics of spins of the virtual photons created by quantum objects of a BS.

2) The “indirect” action, with the use of an intermediate medium - water exposed to the action of magnetic vector potential. In this type of study, the magnetic vector potential influences the characteristics of spins of the virtual photons created by the quantum objects of water, and then the interaction of these virtual photons with the virtual photons created by the quantum objects of BS follows.

I. The effect on metabolism of carbohydrates in yeasts’ plant

To determine how magnetic vector potential influences intra-cellular processes, the carbohydrate metabolism in yeasts’ plant [86] was used. The CO_2 emission rate measurements started in 30 minutes after preparation of yeast’s suspension and this was at room temperature. The sucrose fermentation rate by yeast culture was determined as a difference in the rates of gas emission in two yeast's suspensions ("control" and "test") isolated from atmosphere: by a change in the volume of gas above each of the suspensions separated from each other by a movable gate.

Let us consider in detail both types of studies that were carried out in the experiment:

1) The "direct" action of field-free magnetic vector potential.

In this case, after 20 minutes of gas emission rate measurement, the cuvette with yeast's suspension was permanently affected for 60 minutes with field-free magnetic vector potential. After the end of the action of this potential, the gas emission rate did not recover to the initial magnitude for at least 120 minutes. The departures of measured values of gas emission from the control quantities are given in Figure 7.4, curve **1**.

2) The "indirect" (i.e., with the use of an intermediate medium) action of field-free magnetic vector potential.

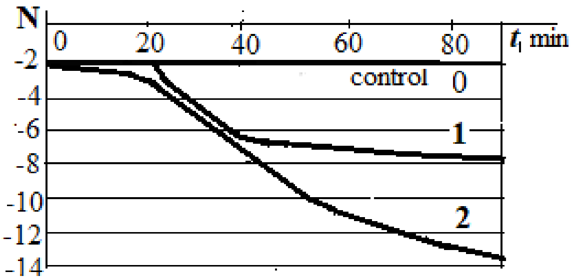

Figure 7.4. Dependence of CO_2 emission rate (in relative units N) against time *t*. Curve **0** is the control measurement value without the use of magnetic vector potential. Curve **1** shows the measured values of CO_2 emission rate when the field-free magnetic vector potential is turned on after 20 minutes of observation (the first type of experiment). Curve **2** shows the measured values of CO_2 emission rate after insertion in the test vessel, before the beginning of measurements, of water "irradiated" by magnetic vector potential (the second type of experiment)

In this case, the initially pure water was at first affected with field-free magnetic vector potential (during 40-50 msec); after that this water was used for production of the yeast's suspension. The technology of measurement of decrease in the gas emission in this portion of yeasts is similar to that used in the studies of the first type, the results are shown in Figure 7.4, curve **2**. In this experiment, the water irradiated by field-free magnetic vector potential is essentially an information matrix.

The comparison of curves **1** and **2** shows that the "direct" action of field-free magnetic vector potential on BS is less pronounced than the "indirect" action of field-free magnetic vector potential on BS with the use of an information matrix - water (in detail see Section 11.2).

II. The effect on infusoria *Spirostomum ambiguum.*

In the conducted experiments the mobility of the simplest hydrobionts (infusoria *Spirostomum ambiguum*) in the water exposed to field-free magnetic vector potential was measured [86]. That is, in these experiments the "indirect" action of field-free magnetic vector potential on BS was used (in this case, water is used as information matrix).

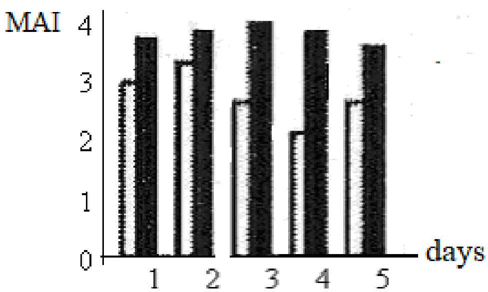

Figure 7.5. The**e** dependence of the motion activity index (MAI) of infusoria *Spirostomum ambiguum* against the time elapsed since the treatment by water. Dark columns are the MAI values of infusoria *Spirostomum ambiguum* treated by the water activated by magnetic vector potential. White columns are the MAI values of infusoria *Spirostomum ambiguum* treated by the non-activated water.

Distilled water was passed through the torus center ("exposed" water); the exposed water dwell time in the area of magnetic vector potential was as great as 40-50 msec. Then the water was added to the solution with preincubated infusoria *Spirostomum ambiguum* in the experimental sample. The relative change in the motion activity index (MAI) (as a number of intersections of a marker line by infusoria for 5 minutes) of the experimental infusoria sample with respect to that of the control infusoria sample was evaluated. In the control sample, the solution with infusoria was supplemented with the same volume of “unexposed” water: i.e., water that had not passed through the area of the field-free magnetic vector potential. The experiments show that the values of MAI for the experimental samples (dark columns) are greater than those for the control samples (white columns) by a factor of 1.5, see Figure 7.5.

Thus, the results of the experiment suggest that the water passed through the area of field-free magnetic vector potential changes the characteristics of the BS.

III. The effect on the extent of lysis in the lymphocyte suspension.

In this experiment, the “direct” action of field-free magnetic vector potential on BS is used [87].

Lymphocytes were extracted from human venous blood using the standard technique of flotation in the density gradient. The suspension of the lymphocytes at 20–25°C was exposed to the field-free magnetic vector potential for 60 minutes. After the exposition, the lysis (cell destruction) extent changed in comparison with the control value of the suspension not exposed to the potential. The action of magnetic vector potential had a stabilization character. If the initial value of lysis extent was ~6%, then in 60 minutes of the action of magnetic vector potential it was equal to ~24% (Figure 7.6**,** curve **1**). If the initial value was equal to ~81%, then in 60 minutes of the action of the potential it was equal to ~70% (Figure 7.6, curve **2**).

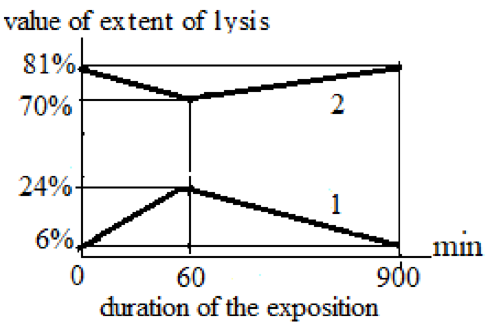

Figure 7.6. The variants **1** and **2** of a change in the extent of lysis in the suspension of lymphocytes against the duration of the exposition of the suspension in the area of the field-free magnetic vector potential.

It is noteworthy that the 900 min long exposition did not result in a difference in the lysis extent.

IV. The therapeutic effect of field-free magnetic vector potential on BS. The effect on the erythrocyte sedimentation rate [86].

In the experiments with the blood of donors having some health problems, it was found that the action of magnetic vector potential on blood *in vitro* results in changes which can be looked upon as “therapeutic”.

Figure 7.7 shows the changes in the erythrocyte sedimentation rate (ESR) in a test-tube containing the donor blood, as a result of the action of magnetic vector potential. If the ESR value was above the norm, then after the action of magnetic vector potential it decreases (curve **1**); however, if it was below the norm (for example, it concerns the donors with a reduced immune potential, which is characteristic, in particular, for oncology and tubercular patients), then after the treatment by magnetic vector potential it increases (curve **2**).

It is possible that the observed effect is associated with that the action of field-free magnetic vector potential activates the immune defenses, in particular, activates the reparation processes.

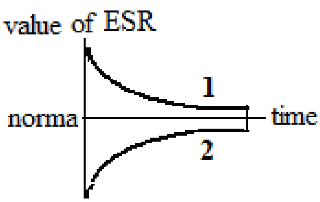

Figure 7.7. Two variants (**1** and **2**) of ESR changes in a test-tube with blood as a result of the action of field-free magnetic vector potential.

It follows also from the experiments that field-free magnetic vector potential may accomplish a therapeutic action on a human exposed to ionizing radiation. Let us consider one experiment. At γ-irradiation of ^{137}Cs source in doze of 1 Gy of healthy donor’s blood, in the experiment there was observed the appearance in lymphocytes of chromosome the aberrations with rate considerably exceeding the background value. However, the holding of irradiated blood specimen for an hour in field-free magnetic vector potential resulted in a decrease in the overall rate of the shown aberrations by 20 percent.

It should be noted the following. It was shown in Chapter 5 that the "strange" radiation accompanying Low-Energy Nuclear Reactions also induces changes resulting in increased resistance of a BS to genotoxic exposures. Simultaneously it was shown in Chapter 5 that the "strange" radiation has all the properties of spin supercurrent. Thus, the analogy of "strange" radiation with the properties of magnetic vector potential supports the above made preposition that the properties of magnetic vector potential are essentially the properties of spin supercurrent.

7.2. The Quantum Correlation Between Biological Systems

7.2.1. The physical aspect of quantum correlation

The essence of the phenomenon can be described using the following example. Let two quantum objects (Figure 7.8) ***a*** and ***b***, which are emitted by the same source and have the same wave function at the initial moment of time, move in different directions.

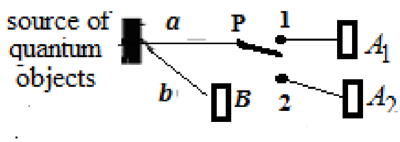

Figure 7.8. Schematic diagram of the experiment that illustrates the quantum correlations between quantum objects. ***a*** and ***b*** are quantum objects; A_1, A_2, and B are detectors; and P is a switch with positions 1 and 2.

Object ***a*** is directed, depending on the position (1 or 2) of switch P, towards either detector A_1 or detector A_2 (these detectors have different characteristics), while object ***b*** is directed towards detector B. According to the postulates of quantum mechanics, the properties of object ***b*** being detected will depend on which detector detects ***a***.

Let us consider the properties of quantum correlations and compare them with the properties of spin supercurrent [9].

1) Quantum correlations take place between quantum objects of zero or non-zero rest mass.

In the experiments showing quantum nonlocality, quantum objects with both zero and non-zero rest mass were used. The quantum object with zero rest mass, i.e., photon, has a precessing spin. A quantum object with non-zero rest mass creates a virtual photon having a precessing spin as well. Thus, the spin supercurrent may emerge between both photons and virtual photons, see Section 1.2.

2) Quantum correlations take place between quantum objects not only at the moment of the simultaneous registration of the objects. Experimentally, it has been determined that correlations between two quantum objects may take place when one quantum object is detected and another quantum object is still in the physical vacuum [88].

It may mean that the quantum correlations between the quantum objects are performed by a process in the physical vacuum. In particular, spin supercurrent may be such process.

3) Correlations take place both between "entangled" quantum objects (which can be generated using an atomic cascade, for example) and between photons of the same frequency emitted by different sources [89,90]. It is an empirical fact that photons with crossover polarization do not correlate.

The main properties of "entangled" quantum objects are equal values of wave function frequencies and the non-arbitrary mutual orientation of the frequencies. As the wave function frequency of photon equals the frequency of photon, the photons with equal frequencies and without crossover polarization are essentially "entangled" quantum objects as well.

The considered conditions of the emergence of quantum correlations between "entangled" quantum objects and between photons having the same frequency and non-arbitrary polarization are in accordance with the conditions of the effective action of spin supercurrent, really:

- the requirement of equality of the wave function frequencies of "entangled" quantum objects is in accordance with Condition (1.20) of the effective action of spin supercurrent: the equality of frequencies of precession spins of interacting photons or virtual photon*s* (the precession frequency of virtual photon's spin is equal to the frequency of wave function of quantum object creating this virtual photon [9,10]);

- the requirement of the definite mutual orientation of these frequencies is in accordance with the definition of spin supercurrent (Eq. 1.12).

4) It follows from experiments that the dependence of quantum correlations on the distance should be weak.

There is an experimental demonstration of quantum correlations over more than 10 km [18]. The unique experiments were conducted in 2017 by Ji-Gang Ren et al. [19]. They conducted the first quantum teleportation of independent single-photon from a ground observatory to a low Earth orbit satellite - through an up-link channel (sputnik channel) at a distance of up to 1400 km.

The degree of dependence of the value of spin supercurrent on the distance can be negligible: for example, the area of the action of spin supercurrent in superfluid ^{3}He-B is only limited by the volume of the superfluid (see property 8 of spin supercurrent in Section 1.2).

5) The speed of quantum correlations is greater than the speed of light; this follows from the possibility of correlations of the photons separated in space and simultaneously emitted.

Experiments exist [64] in which it is shown that the speed of quantum correlations is greater by a factor of 10^4 than the speed of light.

This property is in accordance with property 2 of spin supercurrent: Condition (1.13).

6) It follows from experiments that quantum correlations are of non-electric and non-magnetic nature. They are not screened by electromagnetic screens.

This property is in accordance with the definition of spin supercurrent (Eq.[1.12]) and with property 6 of spin supercurrent (Section 1.2): to pass through electromagnetic screens.

7.2.2. The example of quantum correlations between biological systems: the transmission of disease

Quantum correlations between twins

1) The conducted experiments suggest that the probability of transmission of diseases due to quantum correlations should be high for identical twins, since Condition (1.20) must hold in this case. Indeed, the investigation of a great number (~500) of identical twins showed that only almost 40% of all diseases have a genetic component even though identical twins share 100% of

their genetics. (The author of this work knows that two nine years old twins had an appendicitis attack an hour apart and both boys were subjected to urgent operation.)

The following special notation was introduced: Twin Correlation [91].

2) In 1991, Yu. Tyagotin carried out the following experiment. Cells grown in the same medium (mice cells containing normal splenocyte chromosomes) were divided into two parts. After that, one of the parts was placed in noxious conditions. As a result, not only the cells of that part perished, but also the cells of the other part that were in favorable conditions [92]. It should be noted that, as both parts of the cells were grown in the same medium, the Condition (1.20) holds for the frequencies of the precession of the spins of the virtual photons created by quantum objects of both parts of cells.

Note. The interaction of BSs with each other for many years may make them similar to twins due to the action of spin supercurrent equalizing the respective characteristics of these BSs.

The theoretical aspect of transmission of disease.

At present only one way of transmission of disease from an ill body organ of a BS to a healthy body organ of another BS is known: by means of living pathogenic microorganisms. It is shown in this work that there exists one more way of disease transmission from an ill body organ to a healthy one: by means of spin supercurrent.

In order to prove that a spin supercurrent can transmit a disease, let us consider a particular example: a change in the energy characteristics (the temperature) of a BS2 at a change in the temperature of a BS1 [93]. Let us introduce the following denotations: $(\omega_1)_0$, $(\alpha_1)_0$ and $(\beta_1)_0$ are the frequency of precession, the angle of precession, and angle of deflection respectively, characterizing a virtual photon produced by a quantum object that constitutes BS1, before an increase in temperature; $(\omega_2)_0$, $(\alpha_2)_0$, and $(\beta_2)_0$ are similar characteristics of the virtual photon produced by a quantum object that constitutes BS2 before an increase in temperature. (For simplicity, it is supposed that BS1 and BS2 contain one quantum object each). It is suggested that in the initial state the spin supercurrent is absent because the following equalities hold:

$$(\omega_2)_0 = (\omega_1)_0, (\alpha_2)_0 = (\alpha_1)_0, (\beta_2)_0 = (\beta_1)_0. \tag{7.1}$$

Let us assume that the temperature of BS1 increases by Y degrees at $t = \tau$. In this case, the energy of BS1 changes by value kY (k is the Boltzmann constant) and, according to Eq. (1.6), the precession frequency characterizing BS1 changes by $kY/\hbar$: that is, at $t = \tau$ this frequency (denote it as $(\omega_1)_\tau$) equals

$$(\omega_1)_\tau = (\omega_1)_0 + kY/\hbar \tag{7.2}$$

If the energies of quantum objects of BS1 and BS2, respectively U_1 and U_2, equals their kinetic energy, that is $U_1 = m_1 u_1^2$ and $U_2 = m_2 u_2^2$ (m_1 and u_1 are mass and speed of quantum object of BS1: m_2 and u_2 are mass and speed of quantum object of BS2), then, according to Eqs (1.8) and (7.2), the following expressions are valid.

The angle of deflection of spin of virtual photon created by quantum object of BS1 at $t = \tau$, $(\beta_1)_\tau$, equals:

$$(\beta_1)_\tau = \arcsin(u_1/c) = \arcsin\sqrt{2\left(\hbar(\omega_1)_0 + kY\right)/\left(m_1 c^2\right)}. \tag{7.3}$$

The angle of deflection of spin of virtual photon creating by quantum object of BS2 at $t = \tau$, $(\beta_2)_\tau$ equals:

$$(\beta_2)_\tau = \arcsin(u_2/c) = \arcsin\sqrt{2\hbar(\omega_2)_0/\left(m_2 c^2\right)}. \tag{7.4}$$

where c is the speed of light.

Let us determine the spin supercurrent performing the transmission of the disease from BS1 to BS2 at arbitrary time $t = \tau + \Delta\tau$, supposing that in time interval $\tau \div (\tau + \Delta\tau)$ the changes (as a result of the action of spin supercurrent) in the precession frequencies and the deflection angles of BS1 and BS2 were negligible. Besides, due to equalities (7.1) the spin supercurrent equals zero in time interval $0 \div \tau$ and, consequently, the values of the precession frequencies and the deflection angles of BS1 and BS2 do not change during this interval. Thus, the following valid:

$$(\omega_1)_{\tau+\Delta\tau} = (\omega_1)_\tau, \tag{7.5}$$

$$(\omega_2)_{\tau+\Delta\tau} = (\omega_2)_\tau = (\omega_2)_0. \tag{7.6}$$

$$(\beta_1)_{\tau+\Delta\tau} = (\beta_1)_\tau, \tag{7.7}$$

$$(\beta_2)_{\tau+\Delta\tau} = (\beta_2)_{\tau} = (\beta_2)_0 . \tag{7.8}$$

Using Eqs (1.16)-(1.17), (7.2) and (7.5)-(7.6), one may determine the precession angles of BS1 and BS2 at $t = \tau + \Delta\tau$ (before the action of spin supercurrent):

$$(a_1)_{\tau+\Delta\tau} = (a_1)_0 + \tau(\omega_1)_0 + \Delta\tau \cdot \left((\omega_1)_0 + kY/\hbar\right), \tag{7.9}$$

$$(a_2)_{\tau+\Delta\tau} = (a_2)_0 + \tau(\omega_2)_0 + \Delta\tau \cdot (\omega_2)_0 . \tag{7.10}$$

In accordance with definition, Eq (1.12), spin supercurrent $(I_{ss})_{\tau+\Delta\tau}$ is determined to be:

$$(I_{ss})_{\tau+\Delta\tau} = -b_1\left((\alpha_2)_{\tau+\Delta\tau} - (a_1)_{\tau+\Delta\tau}\right) \\ -b_2\left((\beta_2)_{\tau+\Delta\tau} - (\beta_1)_{\tau+\Delta\tau}\right), \tag{7.11}$$

where from Eqs (7.1)–(7.11) it follows:

$$(a_2)_{\tau+\Delta\tau} - (\alpha_1)_{\tau+\Delta\tau} = -\Delta\tau kY/\hbar, \tag{7.12}$$

$$(\beta_2)_{\tau+\Delta\tau} - (\beta_1)_{\tau+\Delta\tau} = \arcsin\sqrt{2\hbar(\omega_2)_0/\left(m_2c^2\right)} \\ -\arcsin\sqrt{2\left(\hbar(\omega_1)_0 + kY/\hbar\right)/\left(m_1c^2\right)} \tag{7.13}$$

According to Eq. (1.12), the spin supercurrent is directed from BS1 to BS2.

From inequalities (1.14)–(1.15) it follows that the action of the spin supercurrent minimizes the difference between precession angles (Eq. [7.12]) and difference between deflection angles (Eq. [7.13]). From expressions (7.2)-(7.4) and (7.9)-(7.13) it follows that the minimization is possible provided the temperature difference between BS1 and BS2 becomes less than *Y*.

According to property 2 of spin supercurrent (see Section 1.2), this current is a dissipation-free process, that is, it is not accompanied with the loss of energy. (This property of spin supercurrent is in accordance with conclusion by Maxwell: the transfer on angular momentum is characterized by the absence of "*any expenditure of energy*".).

As spin supercurrent is a dissipation-free process, then a decrease in temperature of one of the interacting BSs must be accompanied by an increase in temperature of another BS. As a result of the action of spin supercurrent: not only the transmission of the disease from an ill BS1 to a healthy BS2 and an inverse process: the healing of ill BS1, takes place.

Thus, in system of biological subjects spin supercurrent can perform stabilization action: it equalizes the values of spins' characteristics of spins of virtual photons created by quantum objects of those subjects.