# Low Energy Generation of the "Strange" Radiation

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In the first time the term 'strange' radiation was used in paper of L. Uroutzkoev with co-workes, where in electro-explosive experiments realized on metal wires fixed in a liquid the high-energy radiation has been detected on nuclei photographic plates, located out of explosion camera [1]. In sediment formed in the liquid the essential amount of new chemical elements (up to $10^{19}$ new atoms) are detected. In the paper it has been established experimentally that the radiation detected is electrically neutral but interacts with magnetic field. The authors of this paper put forward a prudent supposition that in the condition of electro-explosion magnetic monopoles can be born or generated. Later with the usage of the conversion Mossbauer spectroscopy it has been shown experimentally that accumulation effect (with further effect of relaxation) of this radiation takes place in ferromagnetic films imbedded in the external magnetic field [2]. In the experiments realized [1, 2] the source of radiation was electro-explosion of metal imbedded into liquid. The discharge parameters of the capacitance battery were the following: the tension 5 kV and the value of the current 150 kA.

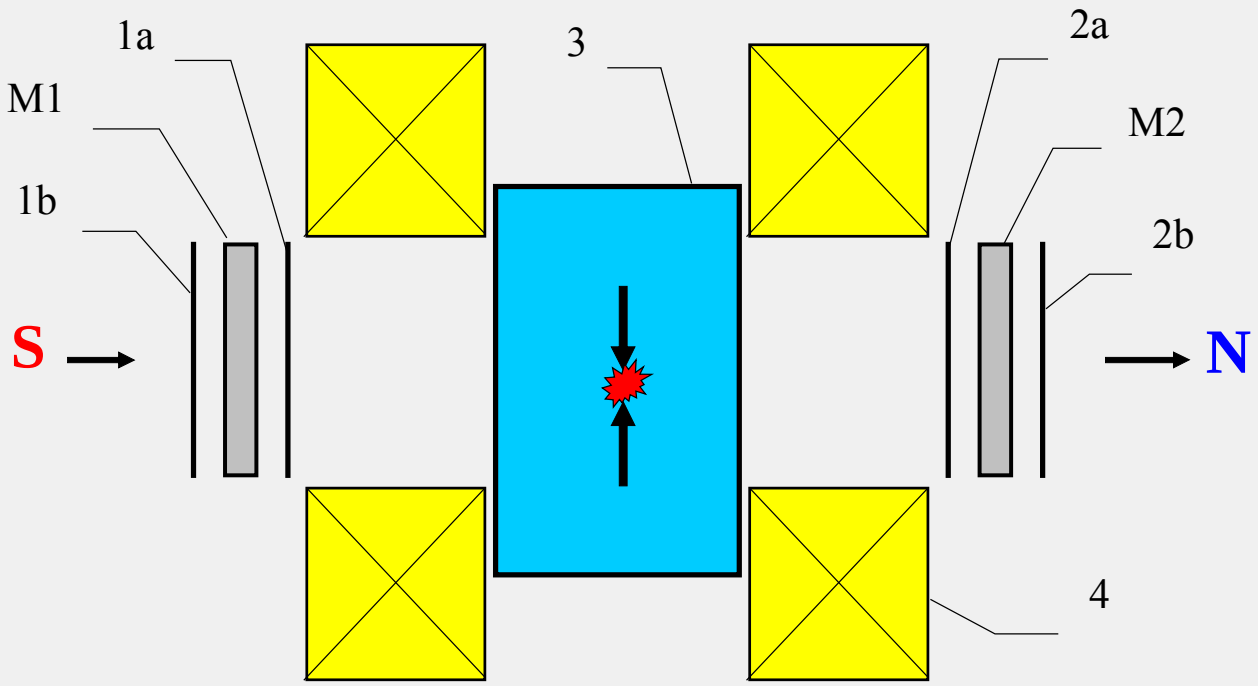
In the given work we solved the problem of generation of similar radiation at low-energy consumptions and investigation of the nature of this phenomenon. For solution of this problem the radiation was studied for two types of generation:

a) in condition of low-energy electric discharge in a liquid, and

b) excitation of beta-decay products by magnetic field.

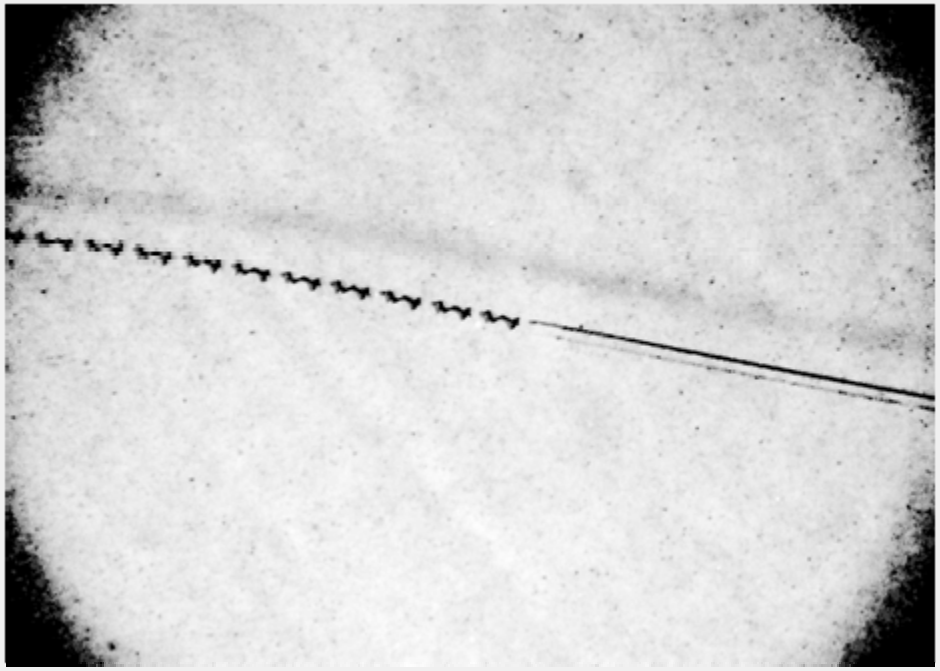
On experiments of the first type the desired radiation was detected at the electric discharge that was realized between carbon electrodes in a liquid at the value of the current not exceeding 40 A and voltage of electric arch was fixed on the level 80 V. In the initial stage of these experiments the distilled water was used and the desired discharge was realized in a cylindrical vessel made from thin plastic. A small magnetic field (about 150 Oe) created by the Helmgoltz induction coils was applied in the plastic vessel (Fig.1.)

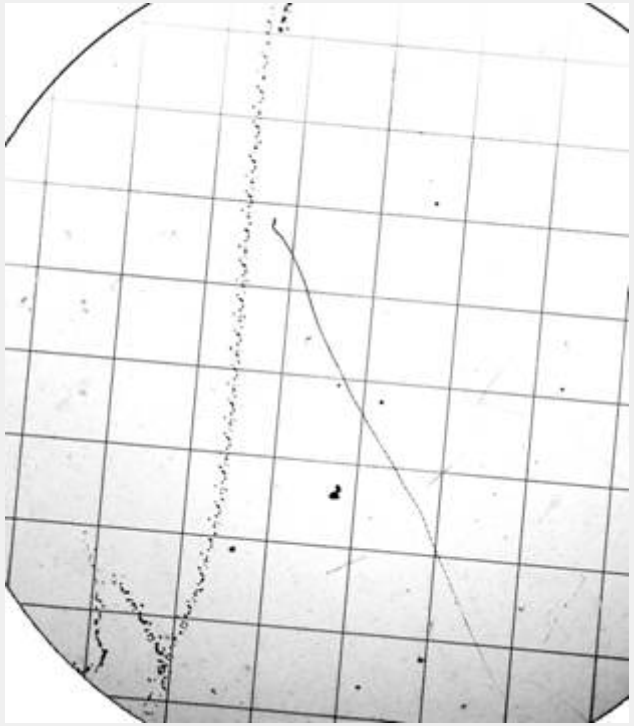
# Fig.1. The scheme of the experiment realized



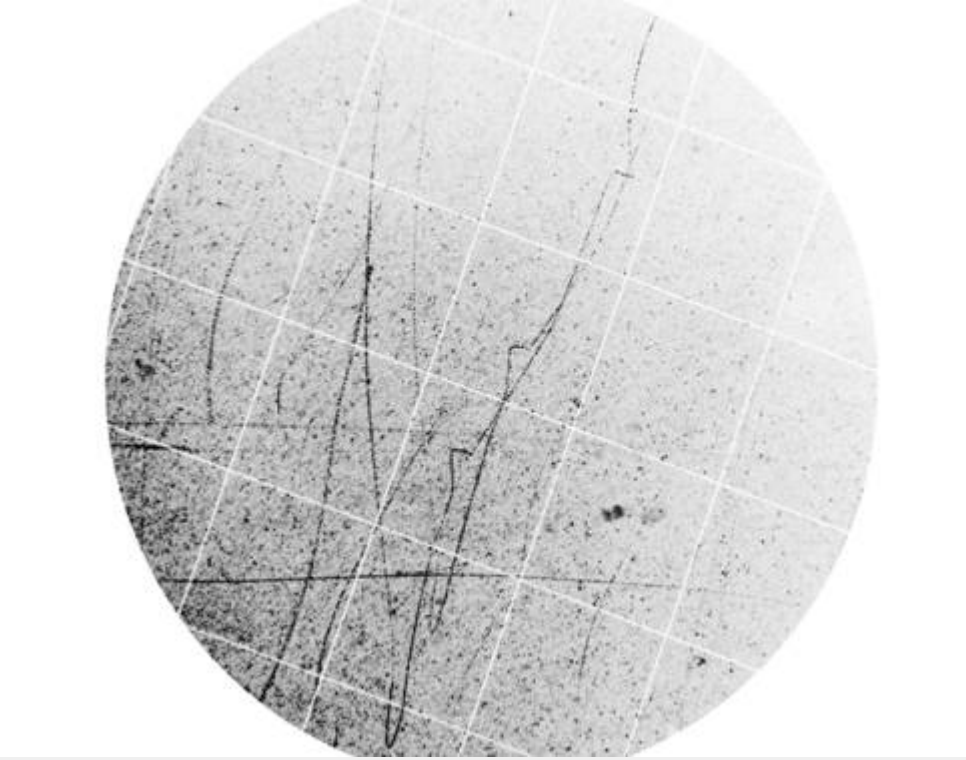

1 and 2 – X-ray photoplates, M1 and M2 – the material investigated. 3 – the thin wall plastic vessel, 4 – Helmgoltz induction coils. **S** → **N** – direction of magnetic field.

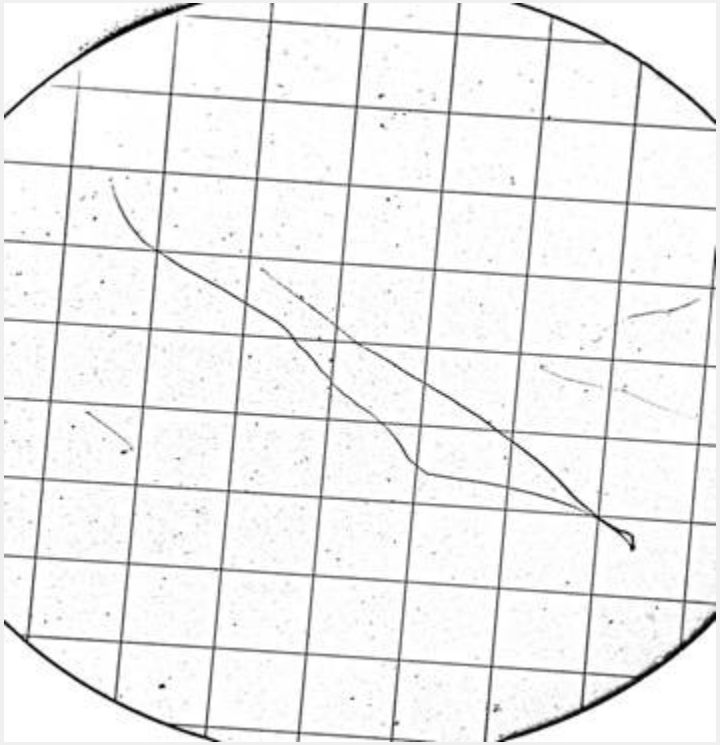
As a detector of radiation we used low-sensitive two-side X-ray photographic plates with the thickness of the sensitive layers 8–10 and polymer ground 180 micrometers correspondingly. The film having size 5 × 7 cm in double-layer package made from black photopaper imbedded perpendicular to the tension lines of magnetic field on the distance 10 – 15 cm from the source of radiation. After exposing at 3-10 minutes of discharge the film was developed over standard technology accepted for X-ray films. After that it was analyzed under microscope with magnification 20 up to 100 with fixation of the obtained image on digital camera. Some photos obtained by this manner are given below.





On this photograph we are giving the net with the step 1 mm.





On this photograph we are giving the net with the step 1 mm.

The tracks given on these photos are completely identical to the tracks obtained at the high-energy electro-explosives conditions. [1].

The long length of the path (sometimes more than 10 mm) of the particles registered in the limits of the thin photo-layer means that these particles interact with boundaries dividing two dielectric medium. The nature of this interaction is not clear and requires additional research.

During these experiments we discovered that addition of glycerol to the distilled water increases the number of registered tracks. Explanation of this fact probably is related with dielectric properties of the liquid mixture used. The optimal concentration lies in the limits of concentration 30 – 40%.

The further experiments were performed to interaction the radiation obtained with different substances. On the way of the radiation beam in the north-south direction we used two films and inserted different materials with the thickness 50 – 400 micrometers between them. Number of tracks registered by photographic films located on the different sides of materials under the control helps to judge about reflective and absorbed properties of materials related to this radiation.

The results can be summarized as follows:

1. Number of the registered tracks during the fixed time is not constant if the regime of electric discharge is fixed. This value is varied during one day from zero up to 10 tracks during 10 minutes (the area of the films used 35 $cm^2$). Sometimes tracks are absent during some days round. The reasons of such large deviations are not clear and require additional research.
2. The totally absorbed radiation materials are ferromagnetic ones as Fe and Ni metal films. These experimental results correspond to theoretical supposition of V. Martem'yanov and S. Khakimov related to a probable accumulation of magnetic monopoles in ferromagnetics [3], and with the previous results of our research, where such kind of accumulation have been observed [2].

3. The metal Al demonstrate weakly absorption and reflection properties. Based on these properties we replaced the plastic vessel on the aluminum one which is more stable to higher temperatures which are increased near the boiling point created by electric discharge.
4. Good reflection properties have a glass and monocrystallic Si and Ge.
5. In experiments realized with reflective materials on registered films located before reflective material we observed pairs of tracks having symmetry with inversion center. The frequency of such paired tracks are not large and gives 5% from the general number of the tracks registered. These double tracks are appeared obligatory on opposite sides of the detected film, that it is easily confirmed by the microscope tuned for the certain sharpness. More detailed analysis of the forms of these paired tracks allows to discover some geometrical differences. These discrepancies are increased with the increasing of the distance between the centers of the corresponding tracks.

An example of such paired tracks with the distance 3 mm between them is given on Fig.5. on the background of the 1 mm net.

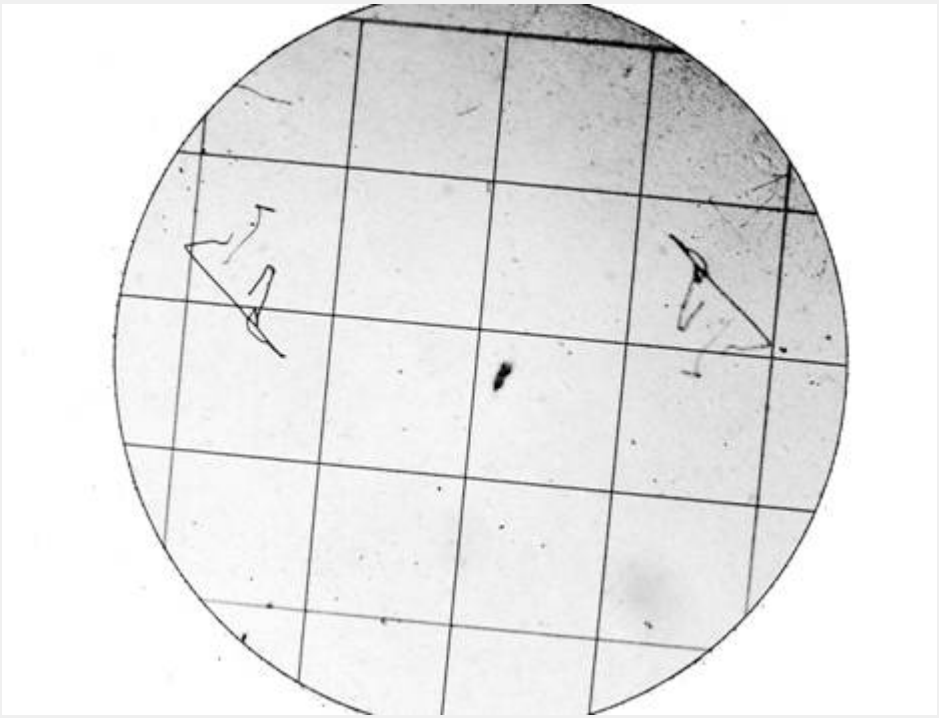
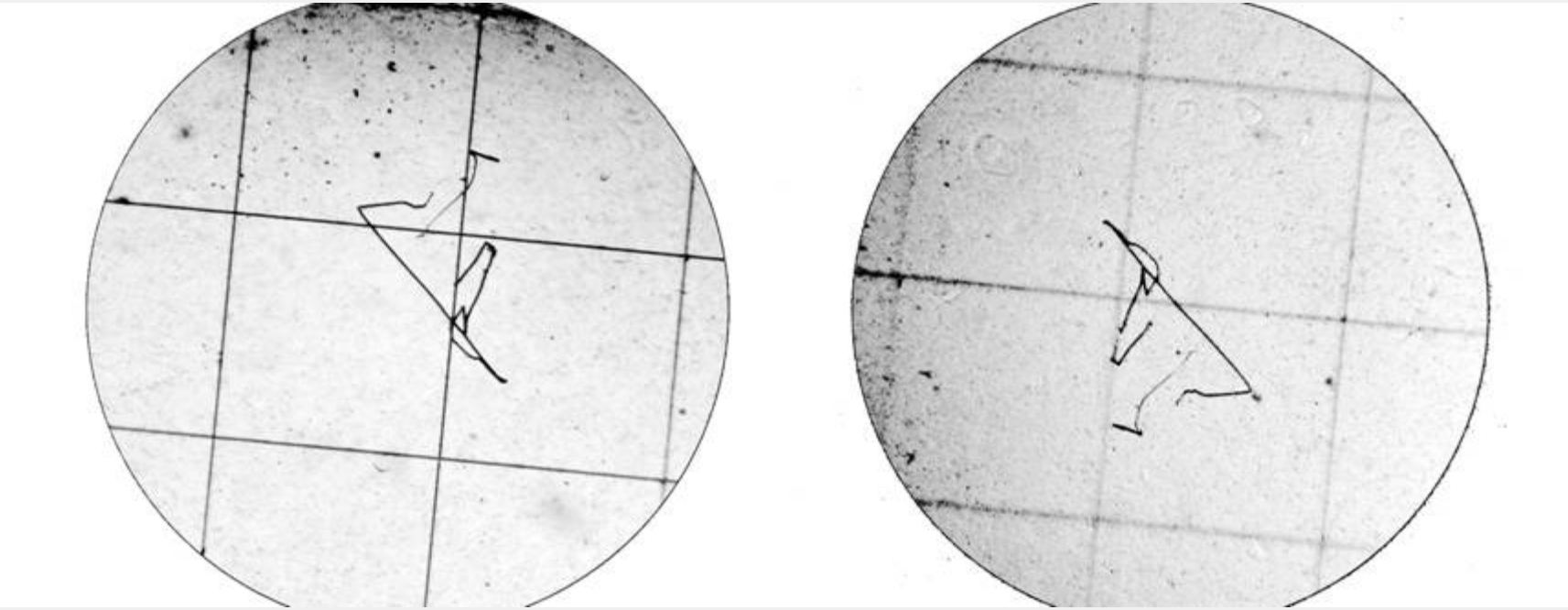


Fig. 5. Symmetrical «pair». The sharpness is tuned on the upper (left) track.

# Separate tracks with large magnification (the microscope was focused on the track itself)



a) b)

Photo 6.

a) track on the photofilm from the side of the source of radiation;

b) the same track registered from the reflector side.

The frequently observed tracks distortion one can explain by the fluctuations of magnetic field evoked by temporal and spatial instabilities of the electric arch used. It's magnetic field is small (not exceeding 5 Oe) and perpendicular to the external magnetic field. But nevertheless the registered particles moving along the photographic layer are sensitive to small variations of the changing of magnetic field. The similarity in behavior of double tracks means that these particles were registered practically simultaneously on the background of the fast fluctuations of electric arch.

The character of the double tracks obtained makes a reasonable supposition that the registered pair particles have opposite sign of interaction with external magnetic field, in other words they have different magnetic charge. Each track from the pair observed has chiral symmetry to the opposite component. Such behavior of the particles having different magnetic charges one can present graphically on different sides of the film with two photo-layers. (see Fig.2).

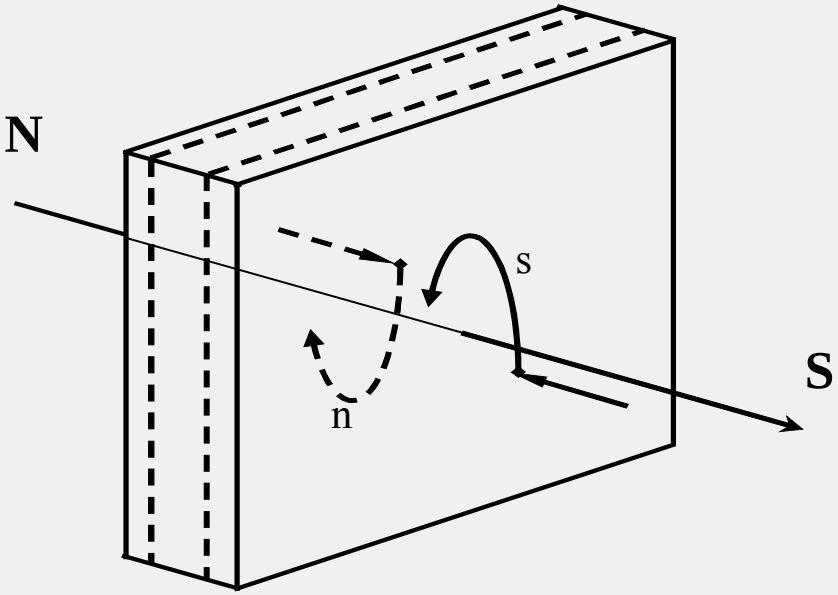



Fig.2. Behavior of particles flying in opposite directions along radial fluctuated magnetic field.

The chiral symmetry of magnetic monopoles has been predicted by G. Lochak 20 years ago. [4]. According to his work in contrast to the usual electric charge symmetry «+» and «–», magnetic symmetry corresponds to the left and right monopoles, i.e. to the south and north magnetic poles, correspondingly.

It is necessary to note the fact that the registered particle fixed by photographic film is deviated transversely to the initial direction of motion and is moving along photo layer. From this fact it follows that it is necessary to prescribe to this particle the zeroth (or close to) mass. Such property coincides again with the characteristic of the Lochak's monopole. In his papers [4,5] magnetic monopole is appearing as massless solution of the Dirac's equation obeying to laws of symmetry obtained by P. Curie for magnetic charge. Being massless or having the very 'light' mass magnetic monopole can be born at electromagnetic phenomena and can be interpreted as magnetically-excited state of neutrino.

The last supposition of G. Lochak is very important and attractive for further experiments. If one can suppose that the registered particle is the Lochak's monopole and taking into account the simplicity of its registration **we performed the direct experiment on excitation of neutrinos irradiated at beta-decay of instable nuclei at the presence of magnetic field.**

As it is known any beta-decay is characterized by irradiation of two particles (beta-particle (positron or electron) and neutrino (or antineutrino) The energy of decay is redistributed arbitrary between these particles and so the energy of the β-spectrum is continuous. The maximal energy of these particles is defined as the upper limit of beta-decay.

As a sources of neutrino we chose two unstable isotopes: $Sr^{90}$ with activity $1,2 \times 10^6$ Bk and $Cs^{137}$ with activity $2,0 \times 10^8$ Bk. The source $Sr^{90}$ is defined as the pure β-decay source with maximal electron energy 2,2 MeV. The maximal electron energy at decay of $Cs^{137}$ is 0,52 MeV. The decay of $Cs^{137}$ is accompanied by irradiation of gamma-quanta with energy 661 kev. This high-energy radiation is absorbed in the detected film in a small amounts and did not evoke a strong darkening. The highest contribution to the darkening comes from electrons and its slowing-down radiation. The maximal radiation treatment time with the source $Cs^{137}$ was 10 min.

On working with photographic films together with radiated films the control films were passed through all stages except radiation stage. As control films in this experiment we used photographic films located (during the same time (10 min) as radiated films) in the constant magnetic field with the tension 20 kOe. After processing we discovered on the control films the same tracks as we found on the radiated films registered at the burning of electric arch in a liquid. These tracks we defined as the ***control background*** (CB). In the case of location of control films near with the source the CB is not registered. In the presence of magnetic field and the usage the source ($Sr^{90}$) the number of the registered tracks was increased in double time with comparison of the CB. At this registration the part of tracks has clearly radial direction from the center where the radioactive source was located. The same result was obtained for the source $Cs^{137}$.

We performed more than 20 experiments of such kind with our beta sources. The results of these experiments can be summarized as follows:

1. The value of the CB (number of tracks registered on photographic films in magnetic fields without the neutrino source) is instable in time. The variations of the CB correlate with the quantity of tracks on the radiated films due to the arch discharge (parallel experiment in the limits of one laboratory) One considers this relationship as the fundamental one and the disclosing of this relationship could bring the understanding of the generation mechanism and the nature of magnetic monopole at whole. Now one can consider that the source of the CB is the cosmic radiation, which contains unstable particles to beta-decay achieving the Earth surface. As a potential candidate of such unstable particles one can consider μ-mesons [6]. So this CB is associated with cosmic component.

2. Number of tracks located on the different poles of the electromagnet used practically coincides with each other.

3. The decreasing of magnetic field leads to simultaneous decreasing of the cosmic component and increment of number of tracks evoked by neutrino source. Undoubtedly, it is interesting to realize similar experiments in the strong magnetic fields.

4. At presence of the cosmic component the source of neutrino in magnetic field increases the number of tracks registered on the film. This increasing one can interpret as a direct prove of the theoretical foresight of the G. Lochak about authenticity of magnetic monopole and magnetically excited neutrino.

5. Approximately equaled result obtained for two significant different at activity of beta-sources used gives us evidence about predominant role of unstable cosmic particles participating in the process of generation of magnetic monopoles.

Generalizing results of two sections of this work, it is possible to try to formulate the following basic conclusions:

1. At electro-explosion or discharge in liquid the flowing current compressed serves as a source of large magnetic field. This created field in turn stimulates the birth of magnetically excited neutrino (monopoles), which are generated at beta-decay process.

2. Unknown component of cosmic irradiation serves as a necessary factor of generation of monopoles at beta-decay of unstable nuclei located in the magnetic field.

3. S- and N-magnetic monopoles are born by pairs.

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