

Unconventional research in USSR and Russia: short overview

(updated and revised version)

Serge Kernbach

CYBRES GmbH, Research Center of Advanced Robotics and Environmental Science,
Melunerstr. 40, 70569 Stuttgart, Germany, serge.kernbach@cybertronica.de

Abstract—This paper provides a brief overview of unconventional research in the USSR and Russia from the end of 19th to the beginning of 21st centuries in areas of weak biophysical interactions, electromagnetic fields of biological organisms and psycho-biophysical mechanisms of the brain. The review is based on scientific and journalistic materials published in the open press. Originality of instrumental research related to generation and detection of biologically-active non-ionizing emissions is emphasized. The history of its emergence from the USSR's state programs on new physical fields, biophysics and early quantum communication is shown. Maximal funding for all areas of unconventional research over 40 years is estimated at \$0.5-1 billion, which is comparable to similar U.S. programs. This work discusses involvement of this research in development of 'non-classical' weapons under the doctrine of nuclear deterrence and its potential in a new biological 'quantum arms race'.

I. INTRODUCTION

The USSR and Russia, from about 1921 to the present, have been conducting many different research activities in the areas of weak biophysical interactions, electromagnetic fields of biological objects, and various paranormal phenomena. Since the USSR had no non-state-supported research, unlike the USA and Europe, where it can be financed by private capital, such research can be interpreted as a state program. The studies of individual scientists such as A.L. Chizhevsky, N.A. Kozyrev, N.I. Kobozev and others who worked outside these programs encountered significant difficulties and were largely unknown to their contemporaries.

Such research programs have not been officially published until now. For example, the OGPU and NKVD (predecessors of the KGB) archives – more than 80 years later – are still closed. Already published materials from the 90s and early 00s began to disappear from public access after 2014, and a certain state censorship was established on new publications on these topics. Therefore, information about these works originates mainly from indirect sources, such as interviews of participating persons, scientific [1]–[6] and popular [7]–[12] publications, especially from last years [13]–[15] are foreign sources [16]–[22]. Unfortunately, there are also a number of unserious publications.

This paper attempts to estimate the boundary of unconventional research in the USSR and Russia. We demonstrate that these works are historically concentrated within three large areas: (1) long-distance biological signal transmission, inc. plants, animal and humans, mind-matter phenomena, different ESP effects and similar topics; (2) electromagnetic emissions

in biological organisms and their role on metabolism, biochemistry and cognitive functionality of the brain; (3) generation and detection of biologically-active non-ionizing emissions known under different names: non-electromagnetic, penetrating, torsion, microlepton, axion, spin-spin interactions, etc. All three areas are interconnected, many well-known laboratories, e.g. led by Yu.V. Gulyaev and E.E. Godik [23], were engaged in research in all three areas.

In terminology of this paper, the areas (2) and (3) are considered as 'unconventional research'; this review deals only with a narrow topic (3), which is called 'instrumental line of research' or 'instrumental psychotronics' [24]. For in-depth overview, especially in the 'classical' area (1), we can suggest other works [1], [2]. Since unconventional research in the USSR and Russia has a cyclic character, we distinguish three following periods: from 1917 to 1937, from 1955 to 1980, from 1980 to 2003. These periods are different from the viewpoint of their character, obtained results and position of government. To complete the picture, we shortly demonstrate the state before 1917 and after 2003.

The paper notes the historical roots of Soviet unconventional studies and their specific focus, caused by ideological position of the state, which did not accept technological vitalism [25]. As a result, instrumental lines of research and developments have emerged that differ in many ways from American and European works. More generally, unconventional developments in the USSR and USA were considered as non-classical weapons within the doctrine of nuclear deterrence [7], [15], and resulted in various non-lethal weapons and national security programs [12], [26]–[29]. In this regard, it is noted both the positive aspects in communication, metallurgy and biophysics [30]–[32], and a dangerous potential in a new biological 'quantum arms race' [33] as well as examples of unethical use in USA in 50s [34], in USSR in 50s-70s [35], in Moscow in 90s [36], and in the 'Havana Syndrome' incidents of 2016-2022 [37], [38].

The original version of this work was prepared within the presentation in the institute for frontier areas of psychology and mental health (IGPP institute) in Freiburg, Germany, in October 2013. After publication in the preprint archive arXiv.org [39], a large number of publications appeared in the media [40], [41] and an extensive discussion arose, also with former intelligence officers who supervised these works in the USSR. Modern research on macroscopic entanglement [42], quantum biology [43], effects of consciousness [44] and changes in geopolitical situation after 2014 opened new aspects and required to re-

evaluate the original work. Therefore, a new version has arisen, which takes into account changes of last 10 years after the first publication.

This article is a part of historical reviews [24], [45]–[47] devoted to weak biophysical interactions, technological vitalism, philosophical and mystical-religious currents of different eras. The goal of entire series is to present a critical mass of material from many countries and historical epochs related to human psyche, biophysical phenomena and various social processes based on them.

This paper has the following structure. In Sec. II several prerequisites of unconventional research in the USSR and Russia are shown. Secs. III, IV, V, VI are devoted to corresponding historical periods. In Sec. VII we shortly survey the current state, in Sec. VIII – the nuclear spin research in the context of early quantum communication and quantum biology. Finally, this work is summarized in Sec. IX.

II. UNDERSTANDING THE BACKGROUND OF UNCONVENTIONAL RESEARCH

For a proper understanding of the situation in Russia and the USSR in the field of unconventional research, it needs to note the positive perception of unusual and supernatural phenomena among the general population. In folklore, mythical creatures such as 'Baba Yaga', 'Koshei the Deathless', 'Zmey Gorynych', the Princess Frog, brownies and others, as well as the popular belief in e.g. 'evil eye' – are an integral part of fairy tales, novels, films and are in cultural, publicity and everyday use. This cultural specificity, in the terminology of positive 'operator effect' [48], [49], [50] was also emphasized by several western researchers [16].

Contacts of psychics within regime – G.J. Rasputin and the last Tsar' family [21], W. Messing and J.W. Stalin [51], E.Y. Davitashvili ('Juna') and L.I. Brezhnev [52] or a group of psychics at B.N. Yeltsin [53], [54] – were present in the days of the Russian Empire and the Soviet Union. Due to such contacts, the phenomena demonstrated by these people are scientifically explored by the Soviet Academy of Science. Despite the fact that the Soviet Union conducted a large amount of state-funded unconventional research, the official position to this research, especially in boundary areas of psychology, was negative. It was conditioned primarily by ideological considerations. Unfortunately, the same trend is also observed in Russia after 1991, however originating not from the political, but from the academic community. Thus, there is an extremely polarized response of different government agencies with a lot of supporters and opponents of these programs at various levels of hierarchy. Depending on the involvement into governmental programs, researchers can receive support and funding, and vice versa lose their jobs (and freedom at the time of the NKVD) for being engaged in 'alternative technologies'.

So-called alternative or traditional medicine is widespread: 'according to data published by the Research Center of the Academy of Medical Science, 80 percent of patients are addressed by the healers and sorcerers' [55]. In Soviet time 'unlawful practice of medicine' was a criminal offense (Article 221 of the Criminal Code of the RSFSR), in 1997 the concept

of 'traditional medicine' was introduced, for which a 'healer diploma' and not a medical license was required. Horoscopes drawn up on a variety of topics – the so-called 'astro-forecast (astroprognoz)' – can be found on pages of many newspapers, even central ones such as *Russiyskay Gazeta*. At the making of 'Battle of psychics'¹ (Russian version of 'Psychic Challenge') a long queue of people appeared each time, who consider themselves gifted by various abilities.

It is necessary to note a large appearance of New Age literature after 1991. Almost all publishers have one or several series devoted to this topic. This situation is radically different from the state before 1991. In the USSR, esoteric literature was generally prohibited, and published in small amounts in the form of underground samizdat [56]. Among the authors, it needs to point out E.P. Blavatsky [57], especially in the Soviet era, whose Hermetic philosophy had a great influence on researchers.

In the first and second decades of the 21st century, various national-patriotic movements [58], such as the Valdai or Izorsk clubs, the movement of 'methodologists', etc., gained momentum. They include elements of Russian cosmism with its religious and mystical roots [59]. V.V. Putin repeatedly quoted some theses of Russian cosmists [60], this topic is popular in the Russian Academy of Public Administration under the President of the RF [61]. The connection between mysticism and Russian politics, as well as its symbolism in recent years, is widely discussed in the press [62], [63].

III. BEFORE 1917

The first official contact between the Russian science and phenomena, denoted today generally as paranormal, occurred in the 70s of the 19th century. The commission, headed by D.I. Mendeleev, investigated the phenomena of spiritualism [64]. The commission included, among others, A.M. Butlerov and N.P. Vagner who believed in the existence of these phenomena. The traces of this commission can be found in correspondence between the Russian and German scientists and even in the works of H.P. Blavatsky [65]. The conclusion of the commission in 1876:

'Spiritualistic phenomena occur on the unconscious movements or conscious deception, and spiritualistic doctrine is superstition'.

Despite the commission denying these phenomena, many questions remained open. Taking into account books and periodic publications of Butlerov, it can be assumed that further discussion was sharply polarized. This polarity in the acceptance and rejection of research on any paranormal phenomena is characteristic for all future Russian and Soviet studies.

To explain the phenomenon of mental suggestion, Butlerov hypothesized that the nervous system and the brain are a source of specific radiation. By analogy, the movement of 'nerve currents' in the body is similar to the electric currents in conductors, as shown in Fig. 1. Transmission of signals from the brain of one person to another one occurs due to the 'electro-inductive' effect. Despite this assumption sounds naive from

¹<http://bitvaextrasensov.tnt-online.ru/>

today's point of view, this attitude was typical for the late 19th century. It was primarily motivated by developments of radio at that time, where many researchers tried to find 'radio-waves' also in psychic areas. For example, W.Crookes assumed the human brain is capable of sending and receiving some sort of electromagnetic rays of very high frequency. A similar view was shared also by Albert Abrams [66], whose work led to the emergence of radionics in USA. However, Russian engineering works, despite a similar start in the 19th century, evolved in a different direction as it will be shown later.

Vitalistic theories also had their own development in Russia. For example, the famous psychiatrist Y.L. Ohtrovich, since 1867 developed a magnetic hypnotic therapy based on the theory of animal magnetism (Mesterism) [67]. Following Ohtrovich, all living organisms emit a 'particular magnetic field' (in the Ohtrovich' terminology – Hard-rays), which is of organic origin. In 1910-1912 he lectured on this subject and even was awarded by the Paris Academy of Sciences.

It should be mentioned that Y.Ohorovich has devoted many years to study the phenomena of telepathy and mediumship. After a series of experiments with well-known medium E.Palladino, the scientist came to the conclusion that these are manifestations of an organic energy of the medium, which can be investigated by experimental methods. The result of his research was a five-volume work 'mediumistic phenomena'. In his book 'The Secret Knowledge in Egypt' (1894), which complements even the modern Egyptology, Y.Ohorovich argues that paranormal phenomena, being physical, consist in the transmission of a low-level energy, which are however measurable by technical means' [67].

It can be assumed that between the report of Mendeleev commission in 1876 and the revolution of 1917, there was an interest in the study of mental phenomena by means of physiological research. It was driven by a scientific community not only in Russia but also abroad. For example, in 1890 the Russian society of experimental psychology formed a commission to study the phenomenon of 'mind reading'. In 1907 it published the works of the first All-Russian Congress of Spiritualists. In 1907, the St. Petersburg Research Institute of neuropsychiatrics was founded by decree of Emperor Nicholas II [68]. V.M. Bechterev was the founder of this institute, which was one of the main centers, where unconventional studies were later conducted. Bechterev's works before 1917 are related to various aspects of mental suggestion:

'In view of all what has been said, it is impossible not to agree with the fact that hysteria and spoilage largely owe their origin to the side of home life of Russian people. It is obvious that peculiar superstitions and religious beliefs of people give a psychic coloring of the disease state, which is known under the name of spoilage, hysterics and possession. The question of the development of these diseases in our nation is deeply interesting. In this respect, it plays apparently a huge role involuntary suggestion experienced by individuals under different conditions' [69].



Figure 1. Work of A.Barchenko on 'mental suggestion' and a distant transfer of thoughts, published in 1911. A.Barchenko is known from the Soviet OGPU programs in 1921-1937.

To summarize the period before 1917, it should be noted that a well-known school of 'mental suggestion' was formed in Russia. Here some vitalistic works and original psychological developments can be found. On the technological side, there is a tendency to explain these phenomena by electromagnetism, which is typical for that time. In performed experiments we observe an attempt to measure these mental effects. Due to extensive contacts between Russian and European researchers, there was a similar formulation of problems and experimental methodology. In subsequent periods, the number of scientific communications was dramatically reduced, and the topics of Russian works increasingly took a specific character, which was subsequently referred to as 'the Soviet program'.

IV. THE PERIOD BETWEEN 1917 AND 1937

The period after 1917 is primarily related to the October Revolution. As we will see, the unconventional research in Russia is characterized by periodical movement from broad support to almost total closing. The first such period began in 1917-1918. Organizations, not supported by the new regime, were closed. This was especially related to masonic and spiritualistic movements [11]. The parapsychological journal 'Rebus',

published since 1881, was closed [2]. A new scientific system appeared where scientists also played some roles in relevant government agencies. For example, Bechtereve was a member of the Academic Council at the Commissariat (Ministry) of Education [70].

It can be assumed that a coordinated Soviet program began in 1924, when the Commissar (Minister) of Education A.V. Lunacharskiy formed the Russian Committee for Psychical Research. Many authors [2], [7], [71] point to a program of the USSR's Commissar of Defense in 1932-1937, related to the transmission of information by biological means. These works were conducted in two places: in Leningrad at the Bechtereve's Brain Institute, led² by L.L. Vasilyev and in Moscow at the laboratory of biophysics, Academy of Science, led by P.P. Lazarev and S.Y. Turlygin. The Biophysics laboratory was asked to investigate the physical nature of telepathy. For instance, the first results of biological emission from humans were obtained in Moscow's laboratory. In Leningrad, the Brain Institute was requested to perform more psychologically oriented works, such as transferring visual images and remotely influencing the percipient. Both research organizations did not know about the works of each other [7].

The book by B.B. Kazhinskiy [72] points to works of A.V. Leontovich, L.L. Vasilyev, V.M. Bechtereve and P.P. Lazarev, which are related to electrophysiology and were made between 1916 and 1921. Thus, in the 20s there were various groups of researchers, both in Leningrad and Moscow. The fundamental works of Kazhinskiy, Leontovich, Vasilyev and Bechtereve focus on the effect of suggestion [69] and signal transmission in a biological way, see Fig. 2 (for example experiments with animals performed by Lev Durov [73]).

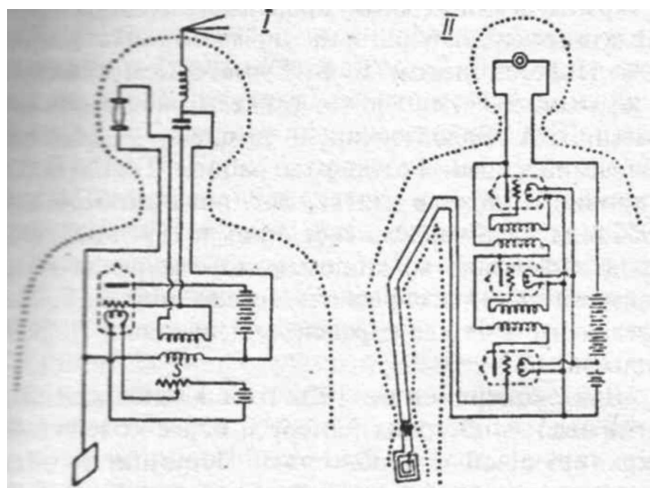


Figure 2. The original scheme of transmitting and receiving bio-circuitry of the human nervous system, image by B.B. Kazhinskiy [72].

It was already clear in 1927, that electromagnetism does not explain the nature of telepathy:

'Chambers (Faraday cage) were made of metal. The subjects were first placed in the chambers, then the experiments were conducted outside the chambers.

²V.M. Bechtereve died in 1927.

There was no difference! The phenomenon of telepathy manifested equally in the chamber and outside it! It turned out that the iron walls of the chambers were not a barrier to telepathic radiation? Well, then it is not radio waves...' [11].

Since these experiments, the 'telepathic radiation' is denoted as 'high-penetrating' and 'non-electromagnetic'. However, the works with EM emission have shown that mechanisms of higher nervous activity can be affected by technical means, in particular by microwave radiation. In this context, the effects discovered by B.G. Michaylovskiy can be mentioned. It is about impact of medium/short EM waves modulated by low-frequency signals on separate areas of the brain, which are responsible for emotional state and functionality of different organs [11]. Turlygin [74] described the biological effects of electromagnetic radiation:

'Various biological effects can be explained by unequal absorption of microwave energy by different tissues of the body, as well as by an excitation of some parts of a nervous system ... This method is new and apparently powerful enough to estimate this absorption of electromagnetic energy from both qualitative and quantitative sides. Indeed, if the absorption of electromagnetic energy takes place in nerves and nerve cells, a negligible portion of the energy absorbed by the nerve is enough to produce a number of secondary phenomena in the body caused by the excitation of a nerve. It is essential that such secondary processes occur due to a comparatively high internal energy of the body (for example, due to the energy of tissues, which are innervated by the 'modified' nerve in our experiments), but not due to a relatively insignificant absorbed external energy by the nerve. Thus, all parts of the electromagnetic spectrum contains some bands, which act differently on biological objects, in particular, on the nervous system of a living organism ... The search for radiation emitted by organisms represents the second way of finding biologically active waves and of clarifying the issues of absorption of the electromagnetic field. If the experiment confirms the existence of an active emitting of electromagnetic waves by a living organism, it is necessary to clarify the biological significance of it, since it is no matter how small is its intensity, it can be one of the strongest factors in the daily life of living organisms' [74].

Thus, Turlygin confirms the orientation and the subject of Soviet pre-war program. This program, as it is followed from open publications, focused on problems of information transfer and their practical applications for biological organisms. Similar works were carried out in other countries [72]. For example, the well-known experiments were made by Ferdinando Cazzamalli in Italy for the detection of meter and centimeter EM waves emitted by the brain during increased mental activity [75]. As it can be seen from the publishers of this book (Research Laboratory of the U.S. Army, fort Balvuar), this research was also pursued in other countries.

The role of special services in shaping the USSR' unconventional programs should be mentioned separately. Apparently, OGPU-NKVD was interested in the possibilities of this technology. As an example, the name of A. Barchenko can be indicated. In 1921 he organized an expedition to the Kola Peninsula on Bechtere's orders [76]. Another Barchenko's expedition to the Crimea was financed by the OGPU, and was related to the chief of special department G. Bokia. Some sources mentioned the existence of several special laboratories. For example, one of them – the 'neuro-energetic' laboratory at the special department of the OGPU [11] – was initially with the Moscow Power Engineering Institute, after 1934 (1935) – in the building of the Institute of Experimental Medicine. The name of Barchenko's work is very characteristic: 'Introduction to the methodology of experimental influence of volumetric energy field' [10] (unfortunately the text of the work is not publicly available). Funding of some Barchenko' projects was apparently performed on personal instructions of F. Dzerzhinskiy [11], [76]. Since Barchenko's documents are still classified, we can only guess what was happening in his laboratory.

'(Barchenko) undertook repeated attempts to organize an expedition to Tibet, made a trip to the caves of the Crimea, 'bear corners' of the Kostroma region, the Altai, where many occult objects were collected... The scientist was a consultant during investigations of all kinds of healers, shamans, psychics and hypnotists. To test these 'human anomalies' Bokia's department equipped a special 'black room' [11].

The pre-war research was performed within a narrow program, supervised by the state. Single researchers, even if they obtained interesting results in this area, were strongly persecuted. In this context the name of A.L. Chizhevskiy can be mentioned. Despite Chizhevskiy collaborated with Bechtere and Kazhinskiy in Durov's zoo-psychological laboratory [7], his fate is different. In 1930-1936 he expressed an interesting theory about unknown Z-rays in sun emission. These rays are presumably of non-electromagnetic nature, possess a 'high-penetrating' character and interact with biological organisms [77]. The standard test for erythrocyte sedimentation under the influence of 'high-penetrating' emission has also been developed by Chizhevskiy [77], [78]. He invented so-called 'Chizhevskiy Chandelier' in the 30s, which has an effect of aeronisation, see Fig. 3. As it revealed later, this device is also a generator of 'high-penetrating' emission [79], whose design is similar to another generator – the so-called 'Veinik's choral generator' of the 90s.

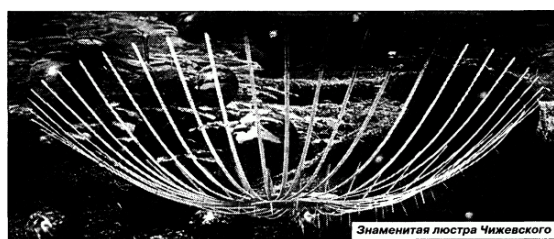


Figure 3. So-called 'Chizhevskiy Chandelier'. A high voltage is applied to this object to create the aeronisation effect.

Chizhestvskiy's Z-rays can be related to N.P. Myshkin, who introduced 'pondemotor forces of the light field' and also have a 'high-penetrating' character [80]. In connection with Chizhevskiy, it needs to mention the name of K.E. Ziolkovskiy, who was also a supporter of *Russian cosmism* and whose philosophic and ethic works had been classified for a long time after his death [81].

As indicated by many sources, all these studies and programs were partially or completely collapsed in 1937. Some of the researchers and their families were repressed. Barchenko, Bokia, as well as some members (see e.g. [9]) of Roerich's Central-Asian expedition were shot [11]. In 1936 Chizhevskiy was dismissed as 'incompetent' and in 1942 was arrested for 'counter-revolutionary activities' and exiled. All research results and manuscripts were classified, only Turlygin published abridged results of his research in the field of human microwave radiation in early 40s [74].

Closing programs for almost 20 years indicated the first cycle in the development of unconventional research (and also several more general areas of parapsychology) in the USSR. Due to tightening of totalitarian regime, war and ideological differences, several western works have been 'overlooked' and remained almost unknown in the USSR, e.g. in the field of radionics, screw effects and instrumental parapsychology. These works also dealt with 'high-penetrating' emissions, but from different points of view. For example, the idea of 'subtle-field resonances', which is characteristic for radionics, was unknown in the Soviet Union, at least in the 60s and 70s. This is also related to the 'strange non-biological radiation' detected by Chizhevskiy and Myshkin, which was also found in the West, for example in the works of Thomas Hieronymus (including radiation from celestial bodies) [66], [82] and Victor Schauburger [83]. Further Soviet works at the end of the 50s and early 60s began with repeating experimental results made prior to 1937.

V. THE PERIOD FROM 1955 UNTIL 1980

Many sources indicate that the post-war Soviet works began with a study of German 'Ahnenerbe' archives removed from the castle 'Altan' [84]. We cannot say whether this is true or not. On the one hand, these sources claim the documents have not been worked out in the 60s (only later in 80s-90s). In publications of that period, we cannot detect any significant breakthrough in the field of unconventional research. However, on the other hand, it is indicated that German NS specialists were involved in U.S. programs such as MKULTRA [85], who were taken to the United States as part of operation 'Paperclip' [86]. The Soviet analogue of this operation is 'Osoaviakhim' [87]–[89], which dealt with high-frequency technology, nuclear and biophysical research. Specialists, members of their families, as well as research organizations, equipment and production facilities were taken to the USSR. According to some reports, up to 5000 German specialists worked for the Soviet military industry [89].

The question of continuing unconventional research in the Soviet Union was raised by the president of the USSR's Academy of Science in 1961, which was resolved positively [2]. It can be assumed that works from the Ahnenerbe archive,

as well as contacts with German technologies in the NII-160 'Istok' led by N.D. Devyatkov, in the von Ardenne and Hertz institutes in Soviet Georgia [90]–[92] were known to Soviet top leaders, and they stimulated extensive studies in the 60s and 70s.

The research in this period was split into a few areas. First of all, the classic parapsychological experiments with a variety of phenomena exhibited by psychics were continued. Second, the program on the influence of EM radiation on biological organisms received essential attention. This is the largest program with many sub-branches and funding, which eventually led to the emergence of the 'psychotronic weapons' discussed in media. Both the first and second programs had open and closed parts. And third, a new direction related to the 'non-ionizing emission of non-biological nature' was founded. In this review, we pay more attention to this research.

Let us return to the work of S.Y. Turlygin [8], [72], [74]. Turlygin was a well-known expert in the field of high frequency EM technologies [93], thus he possessed an excellent understanding of the subject of experiments. The structure of one of Turlygin's experiments is shown in Fig. 4.

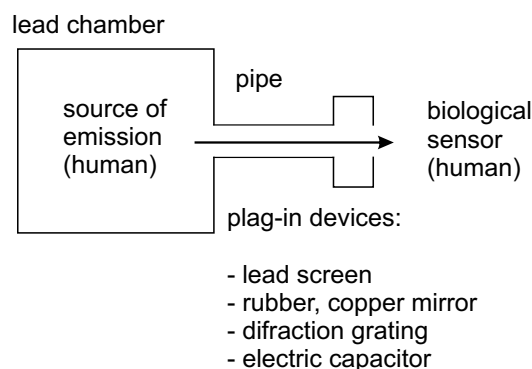


Figure 4. Structure of experimental setup developed by S.Y. Turlygin.

We will quote from [8]:

'Among used removable devices, that supply a pipe, was a lead screen, which should presumably delay a radiation. This radiation should also meet a hard rubber or copper 'mirror' intended to reflect the radiation flux. By passing through the grating it must demonstrate a diffraction pattern – the highs and lows of the energy density. In some cases, the alleged flow of radiation can pass between the plates of a capacitor. After going through a particular plug-in device, which transformed it, the radiation reached the test person. Thus, the study was intended to clarify a purely physical picture of the phenomenon, and the test person has served as a bioindicator, the hypnotist – as a biogenerator of radiation. Analysis and summary of the results gave Turlygin a weighty reason to come to the conclusion that the lead shield holds the radiation. This was manifested by increasing time until the test person fell down in comparison with experiments in which the screen was not used. The experiments with mirrors confirmed the presence of radiation and 'optical' law of its reflection. Experi-

ments with a diffraction grating allowed to determine the wavelength of the radiation – it was in the range of 1.8-2.1 mm. However, the electric field of the capacitor does not deviate the radiation.

Some concluding Turlygin's remarks are interesting. He wrote: 'From the viewpoint of physics, the most significant fact is that the behavior of a test person – the duration of the exposition – gives a clear optical picture, which can be explained only by the presence of radiant energy'. He continues, 'These experiments do not leave us in doubt about presence of radiation emanating from the human body' According to him, he [Turlygin] came to the conclusion that some of the properties and parameters of recorded radiation differ from electromagnetic radiation, for example, it does not deviate in the electric field of a capacitor' [8, p.72].

This work is extremely important, as it establishes the possibility of physical manipulation with 'biological' radiation. Thus, Turlygin's works in the 30s are very close with the works of Hieronymus, also in the 30s. Hieronymus also found that 'specific radionic' radiation has some electrical and optical properties. However, as we said in the previous section, neither Hieronymus nor Turlygin knew about each other. After the war, in 1952, Turlygin carried out a series of telepathic experiments with D.G. Mirza and opened a laboratory for the study of parapsychology in 1955. After the death of Turlygin in 1958, Mirza became a head of the laboratory. The question about continuing the research in this laboratory was decided not only by the Institute of Biophysics, but most likely splashed in the Academy of Science. However, in 1958, no specific decisions or activities followed from this side.

The next phase of research begins in the 60s. A special meeting at the President of the USSR's Academy of Sciences M.V. Keldysh considered the question about the laboratory led by Mirza in 1961 [2]. Academicians E.L. Asatryan, A.I. Berg, Y.B. Kobzarev, A.D. Minz, I.E. Tamm, A.A. Kharkevich attended this meeting. The question about the laboratory was resolved positively. Apparently 1961 represents the beginning of a new program, since after 1961 the books of Kazhinskiy [72] (1963) and Vasiliev [94], [95] (1962, 1963– new edition from 1959) appeared. They contained results from the 30s and provided the first look into Soviet pre-war research. Since the parapsychology in the USSR belonged to the category of 'bourgeois mysticism', the publication of these books has meant the state gave a 'green light' for starting works in this area.

Another hypothesis about starting a new program is expressed in [7]. The Minister of Defence R.J. Malinoskiy received documents in 1960 about U.S. attempts to use telepathy in military purposes (about the submarine 'Nautilus' contacted by telepathy). Although these publications appeared later as unserious, they triggered the USSR and in turn the USA to new military programs. Further development of this Soviet program, in particular in marine, is related to many names, e.g. G.A. Sergeev [96]. He worked at that time in the Popov Higher Naval Academy of Radio Electronics in the field of hydroacoustics. Surprisingly, we found a number of his patents,

e.g. [97] from 1964, which dealt with the measurement of biological potentials, in particular EEG. This would confirm the hypothesis of starting military programs after 1961 (EEG are used to measure brain activities also in Perov's experiments with rabbits in underwater communication with submarines [7]).

Thus, in 1961 the Soviet unconventional research received new impulses. Their main motivation was the concept of nuclear deterrence developed in the late 50s - mid 60s [98]. The Caribbean crisis of 1962 demonstrated the need to develop non-classical weapons outside the nuclear framework, for example, intensive development of biological weapons began at the same period, see the history of the Aralsk-7 laboratory, which was closed only in 1992 [99], [100]. The high level funding and interest from the Central Committee of Communist Party was explained by the strategic importance attached to these developments. A number of separate subprograms have been launched in open and classified areas performed sometime by the same organization and researchers.

I. Parapsychological works. Based on publications of Vasiliev [94], [95] and Plekhanov [71], it can be argued that the orientation of research on biophysical fields and information transfer remained the same. We can give some examples of studies in the 60s. In 1963, Vasiliev, together with the Bechtrev's Brain Institute conducted successful sessions of telepathic communication between Leningrad and Sevastopol. They repeated results of such experiments from the 30s – this was one of the first works intended to replicate experimental data. In 1965-1967, the group led by V.P. Perov held telepathic experiments on rabbits, which had implanted electrodes in the lateral nucleus of the anterior hypothalamus. Rabbits-inductors and Rabbits-percipient were removed from each other on the distance of 7 km. The behavioral responses of rabbit percipients in relation to rabbit inductors stimulated by 1.5-2.5 volt signal were investigated. A series of 36 experiments have been carried out, which included 535 cycles. As pointed out by Perov [101]:

'... the number of matches is well over a half of the total number of cycles. The probability of obtaining these results randomly, determined by the significance level, is very low, which gives reasons to accept the hypothesis of existence of connection between rabbits, distant from each other at a distance of 7 km'.

As claimed in [7], these rabbits were used as a system of biological communication in marine experiments, in particular with submarines.

Different academic institutes started the study of 'dermo-optical perception' of Rosa Kuleshova in the 60s, and later in the 70s – the telekinesis of Nina Kulagina. In 1969, a studio of science-documentary films created the first movie about Nina Kulagina and her abilities. This film marked the beginning of film making about parapsychological research. The U.S. report 'Defense Intelligence Agency document: Controlled Offensive Behaviour - USSR, July 1972' stated that the USSR in 1967 had more than 20 centers for the study of paranormal phenomena, with a budget of \$21 million.

One of the most important points in the early 70s is the special commission established by P.N. Demichev – the Secretary

of the Central Committee of the Communist Party. The commission was requested to investigate psychic phenomena and to provide a scientific conclusion to Soviet leaders. Between the meeting in the Academy of Sciences and this commission was about 10 years – during that time a sufficient amount of experimental results were collected to enable the assessment by the commission. This again points to the intensity of work in the 60s. The Commission recognized the reality of psychic phenomena. The report was published in 1973 [102], one year later it was translated into several languages, including English, German, French and Italian. V.P. Zinchenko – member of the commission – said about this report:

'The main thing: we were able to articulate and to defend a principal point. The phenomenon exists. The communication channel is unknown. The affecting channel is unknown. Fans can look for!' [103].

This report pointed to the high priority of research on non-ionizing biological emissions and paranormal human abilities (that was in the focus of commission) in the first half of the 70s. This coincides with the early psychotronic movement and first symposiums (in 1970 and 1973) as well as with public information about U.S. programs. It is likely that both countries have used each other in arguments to fund such studies. The Soviet representative in the International Association for the Study of Psychotronics was G.A.Samoilov from the Ministry of Internal Affairs [7], and well-known psychics and representatives of the KGB were included in the Soviet delegation [26].

II. Impact of electromagnetic fields on biological objects. The idea about the electromagnetic nature of biological radiation was rejected already in the 20s and 30s. However, studies on the impact of EM radiation on biological objects were continued and enlarged. Following the work of Michailovskiy and others from the 30s, it was found that the EM field, with certain parameters, can cause a variety of bio-physical and mental effects. It can be assumed that the psycho-physiological effects of microwave emission were actively investigated during the NS regime in Germany [12], and after 1945 the technology was adopted by the countries-winners. According to another version [104], auditory hallucinations caused by pulse-modulated EM radiation were first mentioned in 1956. Anyway, already in the 50s, the USSR and the USA had their own programs on studying the impact of EM fields on biological objects.

In 1953 the USA started the program 'MKULTRA' – the CIA program, in which, according to the U.S. Supreme Court [34], about 80 institutions, including 44 universities, 12 hospitals, three prisons and 185 private researchers participated [105]. As mentioned in the public documents, the program to some extent was motivated by the corresponding NKVD's program, with similar strategies of using psychotropic (e.g. drugs) substances and technical equipment.

According to some authors, several German physicians with experience from NS concentration camps, were involved into MKULTRA [85]. This supports the hypothesis about works by Hitler's Germany in the field of psychotronics and the role of Ahnenerbe documents in Soviet programs. In the mid-70s, the program drew public attention; in 2011 some of these documents were declassified. Part of the MKULTRA program

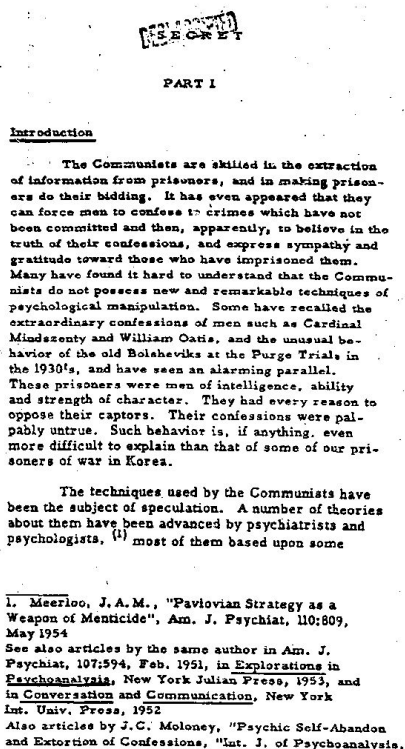


Figure 5. Note on a possible connection between methods to influence the 'objects' from the project MKULTRA (1953) with Soviet works from the 30s, image from wikipedia.

was also devoted to the influence of EM fields on human physiological and psychological conditions [106].

In the 60s and the 70s the Soviet Union had a large number of studies and research results on this topic. Y.A.Cholodov [107] in 1982 so described the situation:

'Proceedings of the listed symposiums and conferences [more than 20 in 70s] constitute only a small part of the literature that are scattered in various journals and publications. After the publication of the collection of works on [subject] 'The effect of magnetic fields [MF] on biological objects' [1971], published by the Scientific Council on complex problems 'Cybernetics', Academy of Sciences of the USSR; several books and review articles were published. Dozens of dissertations were defended on specific issues of biological activity of magnetic field. There were published a number of bibliographies. In 1978 the second collection of the Scientific Council on complex problem 'Cybernetics' was published, entitled as 'reactions of biological systems to magnetic fields'. Today, there are more than four thousand references on biological effects of magnetic field, most of which appeared in the last decade. Approximately half of the publications devoted to the reactions of the nervous system to MF'.

In the area of affecting biological objects by EM fields, several

authors point to utilization of research results in the form of new weapons (in the USA and the Soviet Union), see e.g. [108]:

'Over the past years, U.S. researchers have confirmed the possibility of affecting functions of the NS [nervous system] by weak EMFs [electromagnetic fields], as it was previously said by Soviet researchers. EMFs may cause acoustic hallucination ('radiosound') and reduce the sensitivity of humans and animals to some other stimuli, to change the activity of the brain (especially the hypothalamus and the cortex), to break the processes of formation processing and information storage in the brain. These nonspecific changes in the CNS [central nervous system] can serve as a basis for studying the possibilities of the direct influence of EMFs on specific functions of CNS' [107].

Moreover, according to various authors [12], [106], documents confirm appropriate developments of the USSR:

'The top-secret works were supervised by the twice Hero of the Soviet Union Marshal E.Y.Sawicki. It is said in one of the inquiries related to this invention, and stamped by the Institute of Radio Electronics of the USSR's Academy of Sciences: 'In 1973, the military unit 71592 of the city Novosibirsk, established the first installation 'Radioson' and conducted pre-tests. The positive results are reflected in the act of tests of this military unit ...'.... according to calculations made in 1974, the generator 'Radioson' can effectively 'treat' the city of about a hundred of square kilometers, plunging its inhabitants into a deep sleep – and at a distance of up to 55 kilometers away from the transmitter' [12].

The work [106] claimed that the act of testing, in addition to stamps of military unit and academic institution, was also signed by already mentioned Kobzarev and Godik.

The use of microwave SHF and EHF³ radiation for affecting the psyche was covered many times in the press. The most well-known facts are microwave exposure of the U.S. Embassy in Moscow from 1953 to 1979 [35] and incidents with Russian President B.N. Yeltsin:

'In the early 90's all headlines reported about this sensational discovery. In the media Yuri Malin confirmed: 'Experts have concluded that the antenna has been installed to provide psychological impact on the president' [12].

Generally, the psychotronic SHF and EHF emission represents a topic for separate survey. On the basis of these studies, so-called non-lethal weapons have been developed in the 90s [109]. Although many of modern generators utilize the source of EHF waves [110], [111], it was shown that 'high-penetrating' emission has some characteristic properties, which differ from electromagnetic radiation [112]. For those who are interested in more detail, a good overview of research in the 70s and 80s can be found in [113]. It should also be noted that the impact of EM and other non-ionizing radiation on biological objects

³Super High Frequency and Extremely High Frequency, 3–30 GHz and 30–300 GHz.

has become a topic of academic research [114]–[117], which is no longer related to either parapsychology or unconventional studies.

III. Instrumental psychotronics. Parapsychology of the 60s refers primarily to the field of psychology, for example, the members of Demichev commission are well-known psychologists. However, technical aspects of biological radiation, in line with the Turlygin's experiments and books of Kazhinskiy and Vasiliev, were also of interest for technically-oriented scientific community. In 1965, the section of bio-information was organized by the Moscow's board of scientific and technical society of radio engineering, electronics, and telecommunications, chaired by I.M.Kogan. In 1968, the technical section of parapsychology and biointrospection was organized under the central board of scientific and technical society of the instrument-making industry, led G.A. Sergeev.

It seems that the breakthrough in unconventional research and its separation from parapsychology is related to discovery of non-ionizing emission from non-biological origin. Even in the 30s it was already known that such an emission possesses properties of light and EM radiation, and can be handled with prisms and gratings, as well as with screens and mirrors.

Before the 70s, Myshking's 'pondemotor forces' (related to spinning objects) and Chizhestvskiy's 'Z-rays' (from sun emission) were two approaches of generating non-biological emission. However in that time, nobody connected these early works with the performed parapsychological research. The first approach of operator-independent detection of this emission is related to the Chizhevskiy-Velchover effect, discovered in the 30s, and repeated in the 60s and later. This effect is about changes in metachromasia of corynebacterium several hours prior to changes of sun activities [118]. The second approach was developed by the family Kirlian, they received a patent in 1949. In 1964 the book of Kirlians [119] appeared, which described the glow effect of objects in the strong EM field, see Fig. 6. Interest in the Kirlian effect in the context of unconventional research emerged later, with the development of psychotronics, in particular, with the first conference on psychotronics [120]. The third approach of detecting the emission goes to N.A. Kozyrev and is about a change of conductivity and mechanical properties in some materials and systems. The first 'unconventional' Kozyrev's work had been published in 1958 [121]. However, since he was not in the framework of state programs [122], his work became known only after his death in 1983. Thus, several approaches for generating and detecting the 'high-penetrating' emission without human operator were developed in the early 70s – it was only a question of time before somebody started to connect these independent results. This process started in the mid-70s.

The first instrumental generators of non-biological 'high-penetrating' emission were created in 60s by Robert Pavlita in Czechoslovakia. Pavlita's talk at the First International Conference on psychotronics caused a furore, the conference itself was reported in central Soviet scientific journals of that period – for example in the journal 'Science and Technology' for 1974 [123]:

'Experiments of Czechoslovak researchers R.Pavlita and D.Krmesski prove the possibility of remote im-

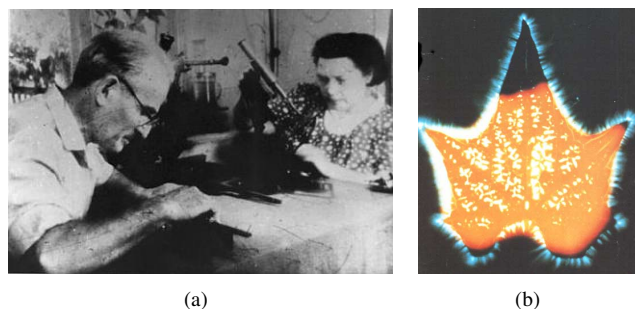


Figure 6. (a) Family Kirlian, image from log-in.ru/articles/effekt-kirliana/; (b) Kirlian' image of a leaf with cut part, image from lebendige-ethik.net/4-kirlian-pribor.html.

pact to light moving objects. To enhance the impact, R. Pavlita offered a special device – an 'accumulator' of energy. These 'accumulators' are made of different materials and have different shapes ... R. Pavlita found a number of other interesting properties of the investigated energy. Empirically, it is found that seeds of beans irradiated by this kind of energy germinated earlier than usual, the plant itself has evolved significantly faster than the control specimens ... R.Pavlita also discovered the accelerated deposition of aqueous suspensions under the influence of bio-energy. For example, if a water contaminated with industrial waste was filled into a container with metal shavings, irradiated by such energy, then 12 hours later the water becomes crystal clear. Furthermore, the chemical analysis shows that this is achieved with a very high degree of water purification. If the same water was 'in contact' with non-irradiated metal shavings, then the effect was not observed ... It is also necessary to point out the findings of the Estonian physicist T.Neeme. He experimentally confirmed an accelerated deposition of colloidal solutions under the impact of human bioenergy'.

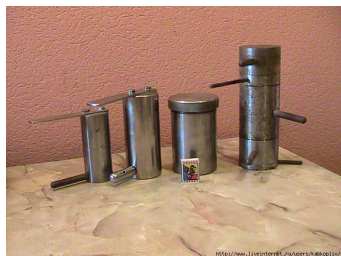
As the term parapsychology 'embarrassed' Soviet researchers due to a relation to 'inexplicable and mystical phenomena' – which was contrary to the spirit of materialistic science in the USSR – the term 'psychotronics' fitted well in the scientific picture of that time and has remained in use. On the contrary, the word 'psychotronics' is not widely accepted by Western parapsychologic community.

Intelligence services (KGB and DIA) were also interested in the works of R.Pavlita. As published in [124] and reprinted in [125], in 1972 Czech Ministry of Internal Affairs asked the USSR to assist in the investigation of Pavlita's devices. Two representatives: from Academy of Science – A.Kitajgorodskiy and from KGB – Y.Azarov arrived in Czechoslovakia. Kitajgorodskiy was a well-known opponent of such phenomena [126], it seems this choice was motivated by two-side policy of the USSR in this area. He later wrote a number of skeptical reports. However, the KGB representative became very interested in these devices. Here is a quote from the book of David Sutter 'Age of Delirium: The Decline and Fall of the Soviet Union' (quote from the Russian version of the book):

'They talked about parapsychology and problems of communication. In the end, one that was lower and active, said that they are interested in experiments with a plate because they want to get an answer to a very important question. They said they have information that the Czech parapsychologist named Pavlita developed an apparatus for creating a biological field without human presence, and added that this discovery is of great interest, and that they need to find Pavlita, unfortunately, two years ago he disappeared, and they heard nothing about him. - When he died - talkative one said - he was not buried in the cemetery. We have checked all the cemeteries in Czechoslovakia. Block and Hronopulo suddenly lost all desire to participate in the experiment, because there was only one organization able to check all the cemeteries in Czechoslovakia' [127].



(a)



(b)



(c)

Figure 7. Different versions of the generator 'Cerpan', images are published with permission of kabkopLIV. (a) generators A.A.Beridze-Stakhovsky from the movie 'Lambada for Hiller'; (b,c) generators 'Cerpan', the comment from a modern manufacturer (www.liveinternet.ru/users/kabkopliv/post145559206/): 'The first three are original samples produced for Beridze-Stakhovsky. The fourth one is the 'advanced' design created by us. The first two samples were made of stainless steel, the third one - of titanium, the fourth one - of steel. The main difference of the fourth sample - it has complex internal structure associated with our ideas about the geometry of space and its energy properties'.

As mentioned in [128], the U.S. Defence Intelligence Agency (DIA) also indicated interest to Pavlita's work. He has registered many patents, however the secret of these devices he never opened (he died in 1991) - so we can only assume the working principles of his generators. Based on some interviews [22], it

can be assumed the generators are passive devices that use so-called 'effect of shapes' ('effect of forms'):

'We saw a gallery of objects - matt and shiny, rough and smooth, made of steel, bronze, copper, iron and gold, which were presented to us as 'psychotronic generators' ... Mystery generators - claimed by Pavlita - lies in their form. Important is also the material from which they are made. A position and shape of the material, which they are made from, are able to cause the desired effect. If the generator is designed properly, as claimed by Pavlita, it is able to accumulate bio-energy from all living things - animals, plants, humans - and then release it outside' [7].

In the USSR, the first works of that time on the device-based generators were made by A.A.Beridze-Stakhovsky. His generator 'Cerpan', as shown in Fig. 7, is a passive device. The exact structure is unknown, both A.A.Beridze-Stakhovsky and R.Pavlita feared unethical use of their devices. According to some researchers [129], testing and verifying the work of these generators was controlled at the level of the Central Committee of CPSU.

VI. FROM 1980 TO 2003

Works of the 80s and early 90s are primarily characterized by centralized strategic programs at the level of the State Committee for Science and Technology at the Council of Ministers (SCST USSR). The role of the SCST USSR was to determine the main directions in development of science and technology, planning and organization of major developments of national importance (e.g. nuclear power). Thus, the strategic role of some unconventional areas, including instrumental psychotronics, was recognized. These works also received a significant amount of funding. Selection of 1980 (early 80's) as the last period in the development of unconventional research is motivated by the following reasons.

First, the instrumental generators of the mid 70s, have been improved and the first experimental results of their work are obtained in 80s, as shown in Fig. 8 for generators of Beridze-Stakhovsky. Most of these works have been performed in Kiev. In general, Kiev was one of the main centers of instrumental psychotronics during this period.

The developers of 'Cerpan' demonstrated an interesting contract with the military unit 64688 dated by December 14, 1990. The purpose of experiments is to determine the effect of 'Cerpan' on the resistance of animals to ionizing radiation.

'The results obtained. The most informative indicator in this experiment was the death of animals after irradiation for 30 days. It was shown that after exposure to DZU [Cerpan] N33 (group 4), the death of animals after exposure to ionizing radiation occurred on the 14th day (in the control group on the 10th day) and ultimately amounted to 30% (in the control group 40%). **Conclusion:** in the group of animals exposed to DZU N33 (group 4), after exposure to ionizing radiation, a delay in the death of animals was

Experiments carried out with CERPAN invented by Beridze-Stakhovsky.

№	Date of experiments	Content of experiments	Place of experiments	Outcomes of experiments
1	1981	Impact on human blood <i>in vitro</i>	Kiev Hematology Research Institute	*Candidate of Medical Science A. Yanovskaya recorded substantial changes of blood ferments <i>in vitro</i>
2	1980-1981	Impact on drought- and frost- resisting ability of plants.	Kiev Plant Physiology Research Institute.	*Candidate of Biological Science T. Reshetniouva recorded unique stimulation of immune system of vine and wheat after impact.
3	1981	Impact on nucleus level	Kiev General and Inorganic Chemistry Research Institute.	*Candidate of Biological Science V. Teraovaya and Candidate of Biological Science T. Reshetniouva recorded great effect on magnetization of hydrogen nuclei in seeds of wheat, tobacco and buckwheat.
4	1981-1982	Impact on plants germination.	Charkov Vegetable and melon-growing Research Institute	*Candidate of Biological Science S. Bondarenko recorded 200-250% increase of plant germination
5	1983	Impact on drinking water.	Kiev Water Research Institute-	Candidate of Technical Science O. Smirnov record effects of changes in water conductivity and hydrogen index. The number of intestinal bacilli in 1 m.l. of water decreased to 4 after impact as compared with 111 in me blank one.
6	1985	Impact on plant photosynthesis	Kiev Hydrobiology Research Institute.	Candidate of Biological Science V. Yaroslavsky recorded affects on cell membrane potential and changing of light and dark plant reactions.
7	1986-1989	Impact on plant characteristics. Investigation of impact nature. Comparative analysis of human and device impact.	Kishinev Ecological Genetics Research Institute. BIOTRON Research Center.	Candidate of Physics and Mathematics S. Maslobrod recorded changes in all plant characteristics. Cell membrane potential underwent the greatest changes. Emanation possesses high capacity to practically penetrate through all barriers known in physics including biological one. Emanation was recorded to have wave characteristics. Human and device emanation is of the same character
8	1989-1990	Impact on snail neurons.	Moscow Physics and Technical Research Institute.	Candidate of Technical Science D. Logunov and Candidate of Technical Science M. Konnov recorded the impact without official comment and interpretation.
9	1990	Impact on bioinformational taxis.	Kiev Biochemistry Research Institute	Doctor of Physics and Mathematics Y. Levchuk: using the diagnostic facility for laser correlation spectroscopy recorded changes up to 20% as compared with the blank group.
10	1990	Impact on animal resistance to ionizing radiation	Moscow Aviation and Space Medicine Research Institute	Candidate of Medicine V. Nekrasov and candidate of Medicine A. Strelchenko recorded differences in integral radiobiological indices as compared with me similar indices in the blank group.
11	1990	Impact on human blood <i>in vitro</i>	Ukrainian Center of Clinical Immunology	**Professor, Doctor of Medicine G. Drannik: recorded an increase of human immunity to infection.

Figure 8. Survey of experiments conducted with the generator 'Cerpan' from 1981 to 1990, data from www.liveinternet.ru/users/kabkoplivENG/, published with permission of kabkopLIV.

noted compared to the control group. **General conclusion:** Experimental studies have shown that after preliminary exposure to DZU (method presented by G.F. Kolesnik) on animals (white outbred rats), the radiobiological parameters differed from those in the control group'.

V.A. Sokolova describes experiments that were carried out in 1984-1987, which are supervised by the USSR's Ministry of Health, the Ministry of Agriculture, and which took an interest in the Ministry of Defence.

'Works with torsion generators are mainly performed on the basis of Biophysical Laboratory of the Patrice Lumumba's University in the period from 1984 to 1987. In addition, our torsion generators have been tested in Moscow's leading institutions – the Institute of Virology of Academy of Medical Sciences, Institute of Bioengineering, at the Gamal's Institute, Pharmacological Institute, NPO 'Volna', NPO of engineering, Institute of Crystallography, etc. Moreover, our team and generators are tested in a production environment in some farms of the Moscow area: cattle farm 'Kamenka' in Podolsk district, plant growing on state farms, and the farm 'Tarasovskay' in Pushkin area. With us at the farm 'Istra' worked

...' [130].

As a part of these experiments various virological, biological, medical and agricultural works were carried out. The objects of these experiments were microorganisms, mice, plants, and even medical works with patients. According to Sokolova [130], already in 1986 more than 30 torsion generators were produced.

Second, due to contacts between authorities and psychics (it is assumed there existed contacts between Juna and Brezhnev [52]), various research institutes received official orders to explore these phenomena. In 1980, the SCST and the Presidium of the USSR's Academy of Sciences commissioned the Institute of Radio Engineering and Electronics, AS USSR – the lead agency of the Academy of Sciences to study weak signals – the program of studying physical fields from biological organisms. The goal was to create fundamentally new methods of medical diagnostics. In particular, it included a study of physical fields from E.Y. Davitashvili (Juna) [131]. These works were carried out under supervision of U.V. Gulyaev and E.E. Godik [23]. Name of Gulyaev is closely linked with other two names – D.B. Kobzarev and N.S. Kulagina. The group of academics Gulyaev and Kobzarev investigated the phenomenon of Kulagina [4], which has been studied since 1977 in the St. Petersburg Institute of Fine Mechanics and Optics, where we meet the name of G.N. Dulnev [132]. These works stimulated the development of a 'psychic line' of Soviet parapsychology.

Contacts between national security agencies of the USSR and psychics have been taking place since the 70s and reached their maximum in the 90s. The work [26] gives numerous examples of cooperation between the KGB and the Ministry of Internal Affairs with Sergei Vronsky, Vladimir Safonov, Tofik Dadashev (for example, he prevented a plane hijacking in 1989) and others. Military psychics have been active in counterintelligence and anti-crime operations. The KGB kept all more or less well-known psychics under close scrutiny, and the Ministry of Internal Affairs was engaged in mass testing of the population for psychic abilities.

Third, in the 70s and 80s United States had a number of programs in the fields of applied parapsychology and psychotronics. The first declassified (in 1995), and therefore the most well-known, state program of studying psi phenomena is the program on clairvoyance (non-local perception). Experts believe that there are actually a few independent programs in the CIA, counter-intelligence, naval and air forces. Two of them are the most famous. The first one was held on the CIA initiative since the early 1970s and since 1989 in SRI International (formerly known as Stanford Research Institute) and then from 1992 to 1994 at SAIC (Science Applications International Corporation), and later known as 'Anomalous Mental Phenomena'. The second program, known by various names – e.g. 'Star Gate', was conducted under the auspices of counterintelligence. There are different opinions about these programs (although the CIA declassified 80,000 pages of text) [133], [134]. In Russia there are several books on this subject, such as the work 'Secrets of remote viewing' [135].

It is obvious that the USA and USSR 'competed' in this area – research on the one side stimulated equivalent studies on the other side:

'In general, in 80s, in this country, it was created a system of well-organized and conspiratorial work to develop new methods and means of resolving interstate and internal political problems without involving intimidating power forces and damaging effects. It includes methods of obtaining timely information, other than the traditionally known⁴.

Since the mid-80's the central coordinator of unconventional research became the State Committee for Science and Technology at the Council of Ministers (SCST USSR) with the direct participation of the Ministry of Defense and the KGB. N.I. Ryzhkov⁵ on a memo about the perspectives of torsion technologies wrote a resolution in 1986: 'Take steps to organize the works' [136]. Many authors⁶ point to the classified document by the Central Committee of the CPSU and the USSR Council of Ministers N137-47 of 27 January 1986 about the program 'Management of living objects, including human'. For obvious reasons, the text of this resolution is not in the public domain, but this document has several indirect evidences. In May 1991, the Committee on Science and Technology at the Supreme Council of the USSR received a document from the member of the USSR' Academy of Sciences E.B.Aleksandrov, which states:

'From the mid-80's the defense agencies and KGB funded disjointed pseudoscientific closed developments, related to the problems of communication, weapons, and drug-free impact on human. In 1986, different groups were consolidated: they have entered into a document of CM [Council of Ministers]' [137].

It is clear that Alexandrov is referring to the above mentioned decree of the Council of Ministers of the USSR from 1986. The instrumental psychotronics became a part of open programs on 22 December 1989. Decree N724 formed a Center of unconventional technologies that should deal exclusively with instrumental psychotronics, see Fig. 9.

A.E.Akimov became the head of the Center. From 1989 to 1991, these studies were open and coordinated by the Center. The unconventional works of the late 80s – early 90s are mainly associated with this organization. In 1991, there appeared the well-known conflict between the Center and some representatives of the USSR's Academy of Sciences [137]. On 26 June 1991 the SCST USSR created the interdisciplinary center of unconventional technologies 'Vent', which received all functions, including financial ones, for coordinating the program, see Fig. 10. However, a week later, on 4 July 1991 the Committee on Science and Technology of the Supreme Soviet of the USSR issued the resolution about 'Vicious practice of financing ...', where it blamed the performed unconventional research and the Center. This is the oddest fact when the committees on science and technologies of the legislature and executive branches issue two diametrically opposed decrees, which had dramatic consequences for the whole country.

⁴Interview of the head of Energy and Information Laboratory Russian NAST Academy major general FSO B.K.Ratnikov to the magazine 'Security' on August 29, 2010.

⁵The last chairman of the Council of Ministers of the USSR – the head of the government of the USSR.

⁶see psyterror.narod.ru, interwiki.info/index.php, www.uznai-pravdu.ru

Приложение
к постановлению ГКНТ СССР
от 22 декабря 1989 г.
№ 724

ПРИМЕРНЫЙ ПЕРЕЧЕНЬ

межотраслевых нетрадиционных технологий,
подлежащих созданию и внедрению в 1990-1995 гг.

1. Разработка технических средств и технологий спинорной связи, передачи и обработки информации, в том числе разработка спинорной передающей и приемной аппаратуры, аппаратуры обработки информации и аппаратуры управления.
2. Отработка спинорной технологии получения сверхчистых материалов и материалов с новыми физическими свойствами.
3. Разработка методов и средств долгосрочного, краткосрочного и оперативного прогнозов землетрясений на основе использования нетрадиционных технологий.
4. Разработка спинорных средств очистки природных и техногенных сред.
5. Разработка спинорных методов и средств для оценки физиологического состояния человека, в том числе в условиях гипербарии.

Figure 9. Annex to the Resolution of the SCST USSR N724 from 22.12.89 on the establishment of a center of unconventional technologies at the State Committee for Science and Technology USSR, from [137].

As it is repeatedly stressed in this work, the Russian unconventional research is characterized by a strong antagonistic position of supporters and opponents. As stated by Akimov [137], [138], this program should be about 500 million rubles (more than \$500 million). It seems that several organizations claimed the coordinating role at the end of the 80s, including the Academy of Science, which traditionally dealt with these issues.

According to the statement of A.V.Bobrow, published in [137], the center 'Vent' – in different forms – existed until 2005, with funding and active works up to the end of the 90s. According to publications [137], the work of the center has lasted at least until 1995, more recent publications are related to the 'International Institute of Theoretical and Applied Physics'. Publications, see Fig. 11, show that the peak of research activity associated with instrumental psychotronics, continued until 2002-2003.

It should be noted that in addition to the program supervised by SCST USSR, there were several other activities relating to parapsychology. One of them is the Association of applied eniology created in 1989 by the Federation of Soviet engineers, led by F.R. Hantseverov [139]. As stated in [139], there was a close cooperation with the International academy of energy science (MAEN). In 1991 the Vasilev fund of parapsychology was created. From 1991 to 2000, this fund published the magazine 'Parapsychology and Psychophysics'. After 1991 a lot of organizations began to appear, such as the scientific committee 'Bioenergy', headed by V.P. Kaznacheev; the Center for psychotronics and traditional healing, led E.K. Naumov; the International committee of the socio-scientific human ecology

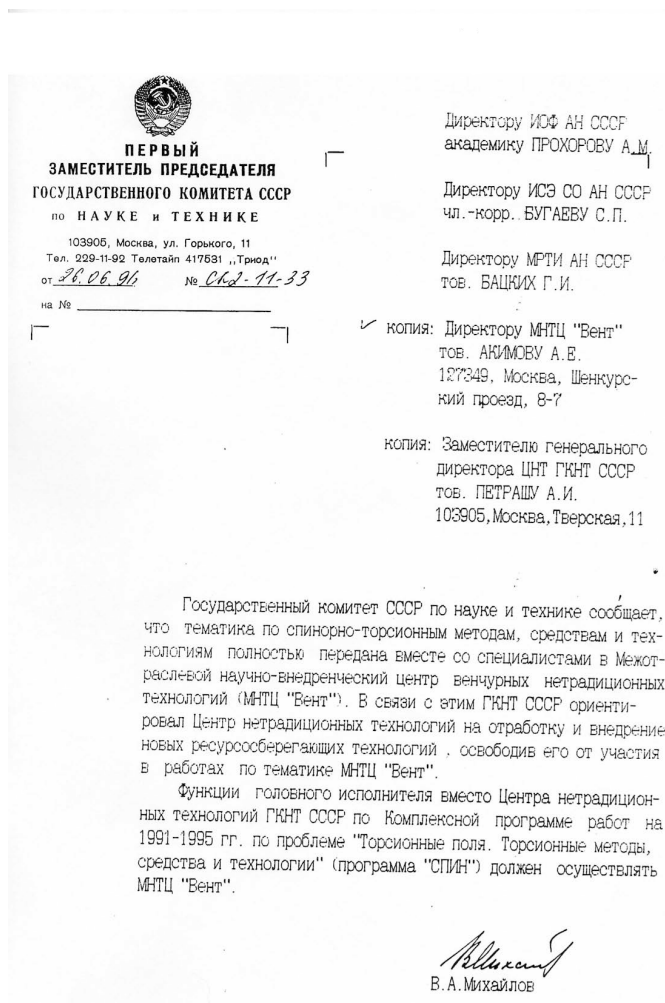


Figure 10. Resolution of the SCST USSR CK 2-11-33 establishing the ISTC 'Vent', from [137].

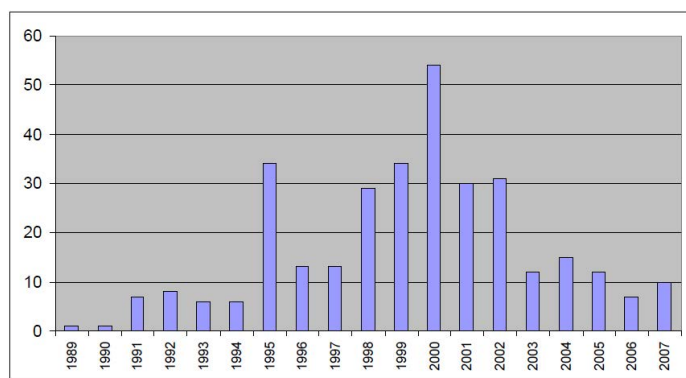


Figure 11. Number of publications on the spin-torsion interactions, image from [137] with permission of V.A.Zhigalov.

and energoinformatics, led by V.N. Volchenko. In 1994, in St. Petersburg the Energy technology center, led G.N. Dulnev, was established.

Unfortunately, information about many unclassified, state-funded studies has not been published. Diverse experiments have been carried out between 1989 and 1995 at the Air Force

Academy in Monino (through MGNIPP 'Altair', see Fig. 12) and at the Mechnikov State Medical Academy in St. Petersburg. Leading psychics and scientists involved in this topic were invited to Palanga (Lithuania) from all over Russia to conduct experiments under the auspices of KGB and Ministry of Defense. A wide variety of detectors and radiation generators were assembled and tested in Monino according to the 'device-to-device' and 'operator-to-device' schemes. Even after 20 years, these results in many cases remain unsurpassed. Whereas before 2014 reports on contracts with MGNIPP 'Altair' can be found in the lists of publications of various researchers, after 2014 the information about these projects and 'Altair' itself has been completely removed from the public information space.

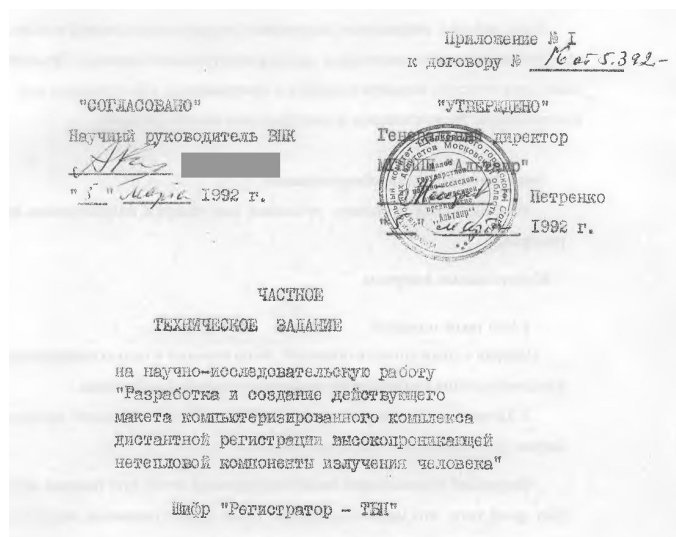
According to many sources, 2003-2004 represents the end of this period in unconventional research. After 2000 the group of Kreml' psychics [140] was dissolved; the magazine 'Parapsychology and Psychophysics' was closed; many laboratories, see e.g. [111], were closed in 2004; at the end of 2003 the military unit 10003, led by A.Yu. Savin, established in 1989 to explore the possibilities of military use of paranormal phenomena [141], was eliminated.

'One of the main directions of our military program was the organization of large-scale training of military personnel, law enforcement officers and counter-intelligence according to the methodology developed by us for revealing psychic abilities' [26].

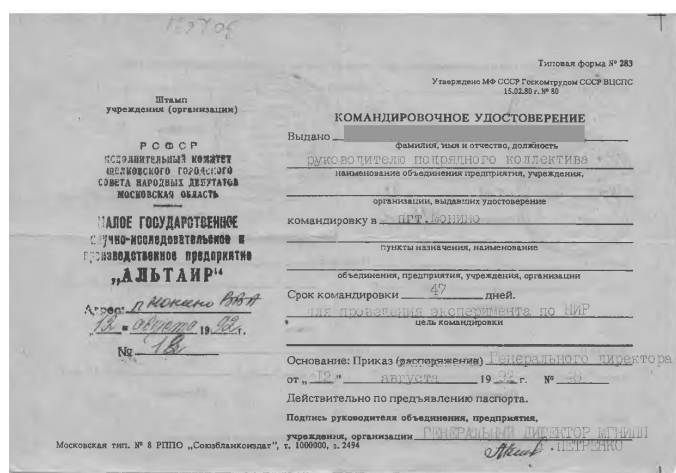
The psychics trained there took part in the operations of the KGB/FSB, the Ministry of Defense and the Ministry of Internal Affairs. Many of them have received government awards. The meeting between Edwin May and Larisa Vilenskaya – representatives of US unconventional programs – also took place under the auspices of this military unit. Unfortunately, most of organizations that arose in the early 90's – without proper funding and under ideological pressure from the Russian Academy of Sciences – no longer existed in the first decade of 21st century.

Summing up the section on the period from 1980 to 2003, it should be noted that with the collapse of Soviet Union in 1991, these program are first reduced, and around 2002-2003 completely closed. Due to a conflict with the Academy of Sciences – that is attributed by many authors to the financial conflict inside SCST USSR and not to scientific issues – the whole unconventional research was announced as 'pseudoscience'. Due to this conflict, even a publication of already obtained high-quality results was canceled – researchers feared losing their academic jobs. It seems this conflict caused essential damages to Russian science in total, since it stopped (or essentially delayed) early quantum research. In this period we observe again a cyclical development with breaks in 1917, 1937 and 2003.

Due to academic and non-academic researchers the instrumental psychotronics, denoted sometimes as torsionics, still continue to grow, but we cannot speak about government programs in Russia any longer. Private investors finance small projects, mostly of a practical nature. However, without proper publications and without an influx of young researchers, the groundwork of previous years is slowly being lost. There are cases when studies of entire laboratories, for example [142],



(a)



(b)

Figure 12. (a) Title page of the technical description signed by MG-NIPP 'Altair' and (b) travel certificate in Monino VVA (Air Force Academy). Unclassified material, scientist's name blacked out for ethical reasons, published with the permission.

[143], are lost. After 2014 the persecution of unconventional trends by Academy of Sciences has decreased, however, state censorship has appeared on certain types of publications. With changes in geopolitical situation and the buildup of arms race, the situation from the 60s-70s is reappearing again – the search for alternative weapons systems. Since modern unconventional topics are being transformed into certain quantum areas, such as macroscopic entanglement or quantum biology, the question arises of their participation in a new biological and biophysical 'quantum arms race' [33].

VII. DEVICES AND RESEARCH OF THE PERIOD 1980-2003

The breakthrough in unconventional research was archived with the development of operator-independent ways to generate and to sense the emission, which was previously detected only by human operators. A critical amount of experimental data for instrumental generators appeared first in the 80s. If in the 70s

mostly passive generators were developed, already in the mid-80s at least two active generators were present: one developed by A.F. Ohatrin [106] and another one developed by A.A. Deev [144], [130] ([144] claims that Deev's devices were tested at the Institute of Clinical and Experimental Medicine led by Kaznacheev in 1981). The Deev's generator was based on spin-polarized materials [144], this is one of the first references to nuclear spin and early quantum topics in unconventional programs.

Major General of the KGB N.A. Sham, who was engaged in industrial and scientific counterintelligence in those years, and later headed the entire direction of extrasensory perception and new technologies in the KGB, speaks about the Deev's generator in the following way:

'Further on, I found materials of a special impact associated with the transfer of a geometric image to a material carrier. One photo shows a large bush with broad leaves. In another photo there are figurines: stars, circles, triangles. And then the results of the experiment – when exposed to the generator, holes were formed on the leaves of living bushes in the form of figures located next to the generator. Some materials were related to changes in radiation activity by these means. The graphs showed that after a short operation of generators, the radiation levels fell ... Later, I met Deev himself and introduced him to the leadership of KGB and the Ministry of Defense. It was decided to conduct a series of experiments. We started with a large-scale experiment on the effects of the Deev's generator on armored vehicles. The generals gathered, a fully equipped tank battalion was put up. The essence of the experiment was whether it is possible to disable all engines at the same time. Everything worked well, the success was so resounding that I expected the creation of a new direction in the defense industry' [26].

As indicated in other sources, the thickening of fuel was the reason for disabling tanks. Experiments with transfer of geometric images to plant leaves (a metal washer to cotton leaves) were repeated at the Institute of Clinical and Experimental Medicine of the Siberian Branch of the USSR Academy of Medical Sciences. This effect was confirmed in independent experiments [130], where we found a description of another interesting experiment:

'... natural cattle milk with normal fat content was placed in a flask and a torsion effect was directed on it. Before irradiation, we dipped the measuring electrodes of the 'Biosym' device into this milk. A few minutes after the exposure, the deviation of the RDC [relative dispersion of conductivity] took on such a grandiose scale that the whole process was like a continuous chain reaction ... after 6-8 hours, the milk turned into a solid. When the flask was inverted, it did not pour out, and separation from the aqueous phase was not observed. This hardened milk did not resemble any other dairy product, and under mechanical action and introduction of a rod into it, it

was found that its entire mass underwent a change, which in turn indicates a very serious change in the structure of this vital suspension' [130].

In parallel with practical developments, researchers tried to understand the working principles of their devices, and often, not from theory to practice, but rather from practice to theory. Successful instruments were analyzed; researchers then tried to build a theory that would explain how they work. When in the experimental area a measurable progress was observed, in the theoretical area many questions remained unanswered. In the period from 1980 to 2003, a large number of such theories appeared; they often required reviewing of all the physics from the 16th century. A short overview of that research can be found in [112] – although a detailed analysis of all those approaches would require a much larger work. Here we would like to focus on three interesting topics that emerged during that period: 1) research on passive structures (the effect of shapes/forms); 2) the works, performed within the state program through the center 'Vent', which received a solid grounding in the theory of G.I. Shipov; 3) studying the impact of generated emission on a variety of materials and the development of instrumental sensors.

Passive structure (shape/form effect). In 1983, at a meeting of the Novosibirsk's Branch of the Entomological Society of AS USSR V.S. Grebennikov introduced the discovered 'effect of hollow structures' [146]. The magazine 'Tekhnika Molodezhi' in N6 for 1984 wrote:

'Physiologists, physicists and doctors are deeply interested in this phenomenon. We are carrying out research to find instruments that could capture and detect this effect ... its nature (of the phenomenon) is not clear, even approximately' [146].

Although the effect of hollow structures was known prior to this publication, e.g. from the French authors of the 60s and 70s [147], [148], both the paper and works of Grebennikov [145] have stimulated a lot of research in the 80s and in the 90s: 'Veinik hedgehogs' [149], 'Cylinders' [150], research on effects of pyramids [151], [152], [153]. The first reference and research on 'Veinik hedgehog' refers to the period before 1981 [154], but this manuscript, apparently, had not been published in the '80s. Widely known are Golod's pyramids [155], which from the beginning of the 90s were built in many cities of Russia, which triggered a broad public debate.

It is assumed that passive structures – based on so-called shape/form effect – are similar to active instrumental generators. First passive generators were objects of complex geometry. There is even such a notion as 'Pavlita geometry' [156], which should represent the basis of passive generators. Active generators, as shown in Fig. 15, use the effects of forms. Some of such famous structures are shown in Fig. 13.

Works within the center 'Vent'. Since the center 'Vent' was planned as a central coordinator of the program, all real works were performed by subcontractors with different research organizations. According to Akimov [138] about 20 such organizations were involved after the collapse of the USSR in 1991. After the funding of programs was reduced, the core of researchers remained connected within the network.

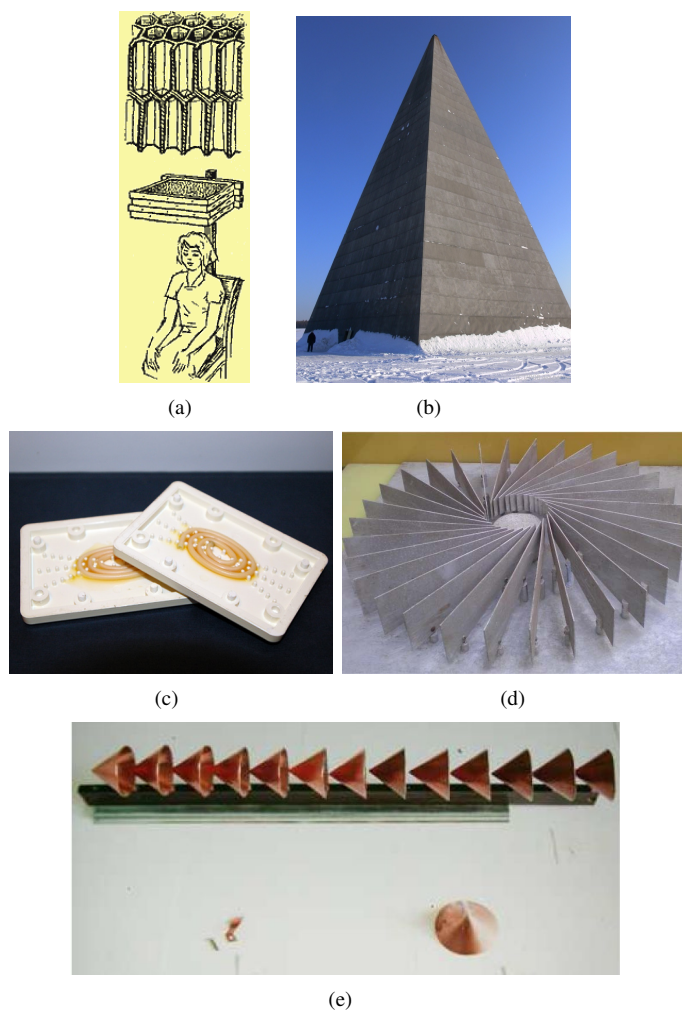


Figure 13. (a) The effect of hollow structures, image from [145]; (b) Golod's Pyramid at Riga highway near Moscow, image from ivg.name/2009/02/02/pyramid/; (c) Passive generator 'Gamma-7' of A.F.Ohatrina, image from interwiki.info; (d) The 'Veinik hedgehog'; (e) Smirnov's passive generator, image from [14].

They organized and performed special conferences and created various research groups on the territory of CIS countries. Therefore, the works within the center 'Vent' mean, in fact, a very broad section of topics, of different authors, and of different organizations. The majority of developments in the instrumental psychotronics in Russia after 1991 was united in this movement. The 'Vent' research program was related to five following topics, see Fig. 9: communication, material research, new sensing technologies (e.g. for forecasting earthquakes), water cleaning, medical diagnostics.

There are not many known facts about the appearance of the center 'Vent' and backstage financial deals within SCST USSR in 1986-1991. According to akimovae.com, Akimov in 1977-1983 worked at the Moscow Scientific Research Institute of Radio, in 1983-1987 at the Research Institute for Communication Systems and Control, and in 1987-1991 as the department head at the Research Institute of Microdevices (NII MP). Research topics covered by Akimov related to communication systems, thus we find the theme of communication as the point N1 in

the list of unconventional technologies. There are many copies of contracts between the NII MP and the various research institutes regarding the study of the 'spin' fields, as shown in Fig. 14, where NII MP provided generators of 'torsion fields' [157]. In these contracts Akimov acted as a supervisor on this topic. It can be concluded that the instrumental generators were developed by NII MP from the second half of the 80s, and the texts of resolutions for SCST USSR were prepared in this organization. However, the communication experiments from 1986 were performed at the Research Institute for Communication Systems and Control – this implies that many top Soviet research institutes were involved in these programs. As mentioned in [7], the general Hantseverov also prepared a proposal for the program, however due to some reasons, Akimov's program was accepted.

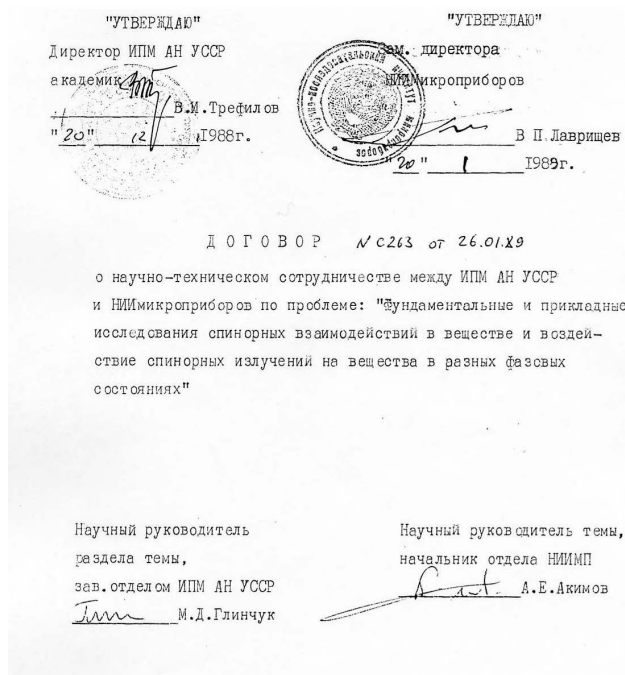


Figure 14. Example of contracts between NII MP and other organizations for the study of 'spinor' emission of late 80s, from [137].

The 'Vent' publications indicate a good knowledge of corresponding literary sources, including Western patents, up to the beginning of the 20th century. For example, N4 in the list of technologies – water cleaning with spin generators – this topic has been developed in the 70s by R.Pavlitia; direct links to Western patents in the 'policy document' [158]; wording of the patent [159]. On the one hand, it can be assumed that 'spinor' and early quantum topics were carefully studied in the NII MP, probably long before 1988. On the other hand, such concepts as the microlepton field of A.F.Ohatrin, the axion field of V.Tatur were not included into the 'Vent' program – this points to a certain ideological competition⁷. 'Old' works on morphogenetic fields of A.G. Gurvich or on 'psichons' of B. Kobozev were also not followed further.

⁷See e.g. the work of L.I.Holod, I.V.Goryachev, 'On vacuum models developed by Y.Terletskiy, G.Shipov, A.Akimov and A.Okhatrin-B.Tatur'.

The word 'torsion' appeared after 1990 (probably in 1991). Before 1990, the 'spin concept' was used. In the list of Akimov's publications, one of the first works about nuclear spin systems refers to 1987 [160], in collaboration with Boldyreva and Sotina. [144] described that Akimov, around 1986-1987, was greatly impressed by Deev's works with spin-polarized materials. The basis of [160] represents the model of Dirac vacuum. After the start of cooperation with G.I.Shipov the concept received the name 'torsion' (or spin-torsion) and includes the torsion effects [161]. However, analysing literature, e.g. [19] (prepared probably by intelligence service), comparing Puthoff's [162] and Akimov's patent [159], we found a number of evidences, that the issue of 'torsion generators' is closely related to the Aharonov-Bohm effect [163], and to several effects of quantum phenomena in macroscopic systems [164]. It is very characteristic, that patents [162], [159] and the work [19] appeared in a short time at the end of the 80s–beginning of 90s. Moreover, it seems this represents a connection between Russian and Western quantum works.

Almost all experiments in the late 80s and early 90s within state programs were performed with so-called small and large Akimov's generator, see Fig. 15.

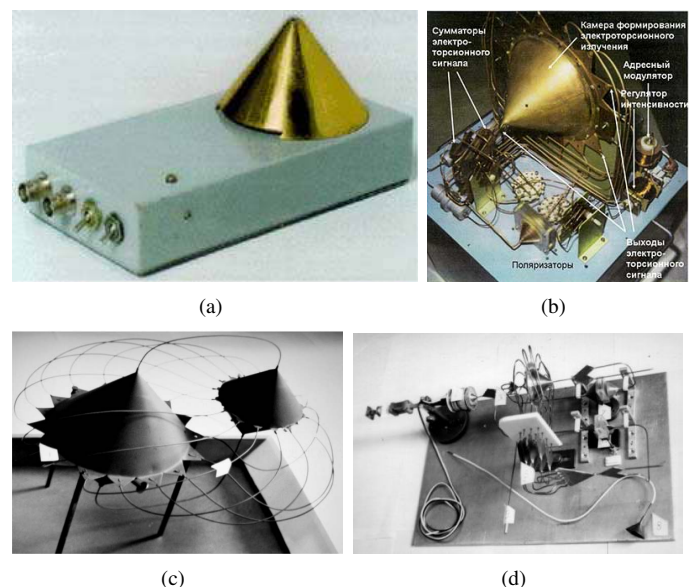


Figure 15. Examples of instrumental generators of a high-penetrating emission developed at NII MP or under contracts with the center 'Vent': (a,b) small and large Akimov's generators, (c,d) generators of A.Y.Smirnov, images from [137].

Other generators of that time, e.g. developed by A.Y. Smirnov [111], also had a similar philosophy for their design and operating principles. Later, other generators appeared based on principles described in [158], and some new ideas, such as LED generators of A.V. Bobrov [165]. An overview can be found in [14].

3) Development of instrumental sensors. One of the main problems associated with the 'high-penetrating' emission is the problem of detection. Without generators it is not possible to develop the sensors, and without sensors it is not possible to design generators. This is well-known cycle of instrumental

psychotronics, without resolving this problem it is impossible to do research in this area.

In the early 80's there were known detectors based on Kozyrev's works (changing the conductivity of materials and the impact on mechanical systems), publications of Chizhevskij (settling red blood cells) and the Kirlian effect (glow in the strong EM field). In addition to this, widely used methods were dowsing (more generally biolocation) and biological sensors, such as the germination test. In 1982-1984 the Kozyrev's method was further explored, in particular with biological systems [166]. However, these works were fragmented, researchers often did not know each other. This situation substantially changed after 1989.

In 1988 the first note of A.V. Bobrov about the electric double layer (EDL) [167] as a sensor had appeared. In his book [168], he confirmed the program of the USSR's Ministry of Defense on the study of psychics and instrumental psychotronics. Bobrov's EDL sensors have been proven as very sensitive (but also unstable) devices. The book edited by Lunev [30] describes the work carried out at the Tomsk Polytechnic University from 1983 to 1993, including a number of sensors based on quartz resonators and detectors of radioactivity. In 1989 a patent of G.A. Sergeev [169] on capacitive sensors is issued. Since 1989 various tests with crystallized structures are conducted [170], [171] and, further, with the melting of metals. Attempts were made to develop sensors on that basis. In the early 90s sensors of Y.P. Kravchenko appeared [172], based on measurements of electric fields. In the Institute of Physics, St. Petersburg State University, the results related to Kozyrev's sensors are verified [173] (these and other works have stimulated the development of solid-state sensors). The book of Dulnev and colleagues [3] describes the research conducted between 1995-1998 at the Center for Energy and Information Technologies at the St. Petersburg State Institute of Fine Mechanics and Optics. In those experiments more biological, optical, magnetic and thermal sensors are used. Interesting works are performed on bioelectrogenesis of plants [174] and the application of such sensors in experiments [175]. By 2000, there is already a large amount of works on the impact of 'high-penetrating' emission on different semiconductor devices [32]. In the review [112] we found 19 groups of physical effects that can represent a basis for sensor development.

The appearance of generators and detectors in 2003-2004 indicated the beginning of a new stage in the development of instrumental psychotronics. These effects can be examined by independent researchers and even by non-technical (e.g. biologists) experts. This factor played a major role in the evolution of this research area after minimizing and closing governmental programs.

VIII. RESEARCH ON NUCLEAR SPINS IN THE CONTEXT OF EARLY QUANTUM COMMUNICATION AND QUANTUM BIOLOGY

The study of spin phenomena in the USSR began in the 80s at various institutes of the Academy of Sciences and led to world-famous publications, for example, in the areas of ortho- and para-isomers of water [176]. The USSR had at

that moment one of the leading roles in the world in these studies, some devices and results are still unique and not reproduced in other countries [177]. The works of Akimov, Deev, Boldyreva in the 80s also used spin terminology, which reflects another dimension of unconventional work in the USSR – the development of early quantum communication. This trend is associated with the name of Yu.A. Tolmachev, the head of the KGB Directorate of Government Communications in 1973-1985, later – the Deputy Minister of Communications of the USSR. Afghan war 1979-1989 demonstrated the need for more advanced communication, which resulted in relevant projects in research institutes, under the auspices of the KGB and study of new physical fields, see Fig. 16. Akimov's works were conducted within the framework of these projects, which explains their telecommunications terminology.

Taking into account modern experiments on quantum information transfer [178], [179], this decision turned out to be correct. The choice of spin terminology showed the commonality of three disciplines – spintronics, biophysics and quantum theory. Early spintronics tried to use the spin polarization of various materials for applied purposes [180], for example, foreword by ac. V.N. Lisina to Sokolova's book treats her results in terms of spin polarization [130]. The quantum interpretation of observed phenomena, in particular the entanglement in macroscopic systems, has now received numerous experimental confirmations [181]–[184], as well as for the entanglement of multicellular organisms [185]. Therefore, modern works confirm the historical correctness of Akimov [175] in the polemic with Aleksandrov [186], [187]. Quantum biology is a rapidly developing modern field that studies involvement of spin phenomena in biochemical metabolism and cognitive functions of the central nervous system [188], [189].

Due to commonality of three disciplines, programs of the USSR almost always had an interconnection of external physical fields, instrumental developments and human psychobiological mechanisms. As an example, we can cite the Bobrov's and Akimov's works with the Air Force Academy in Monino (MGNIPP 'Altair') in 1992, and with Ministry of Defense (JSC 'Inteltech') in 1996, in which the focus is set both on technical developments and on the study of psychobiological effects, see Fig. 16. In a more general context, this topic borders on studies of ultra-weak interactions with biological organisms and is popular in Russia, see publications of A.A. Kokay [190], E.M. Trukhan [191], congresses 'Weak and superweak fields and emissions in biology and medicine', St. Petersburg and other conferences. Modern academic works in this area develop towards spin-spin interactions and quantum research in theoretical [192], [193], biophysical [194], and applied [195] areas.

The growth of the arms race and changes in geopolitical situation after 2014 create a risk of militarization of quantum research in the field of human biophysics. Appearance of new terminology 'quantum arms race' [33] reflects this situation. For instance, the 'Havana Syndrome' incidents [37], [38] are interpreted as manifestations of microwave weapons, however they are more consistent with other types of unconventional weapons, whose roots can be traced back to early quantum-biological developments of the USSR [196].

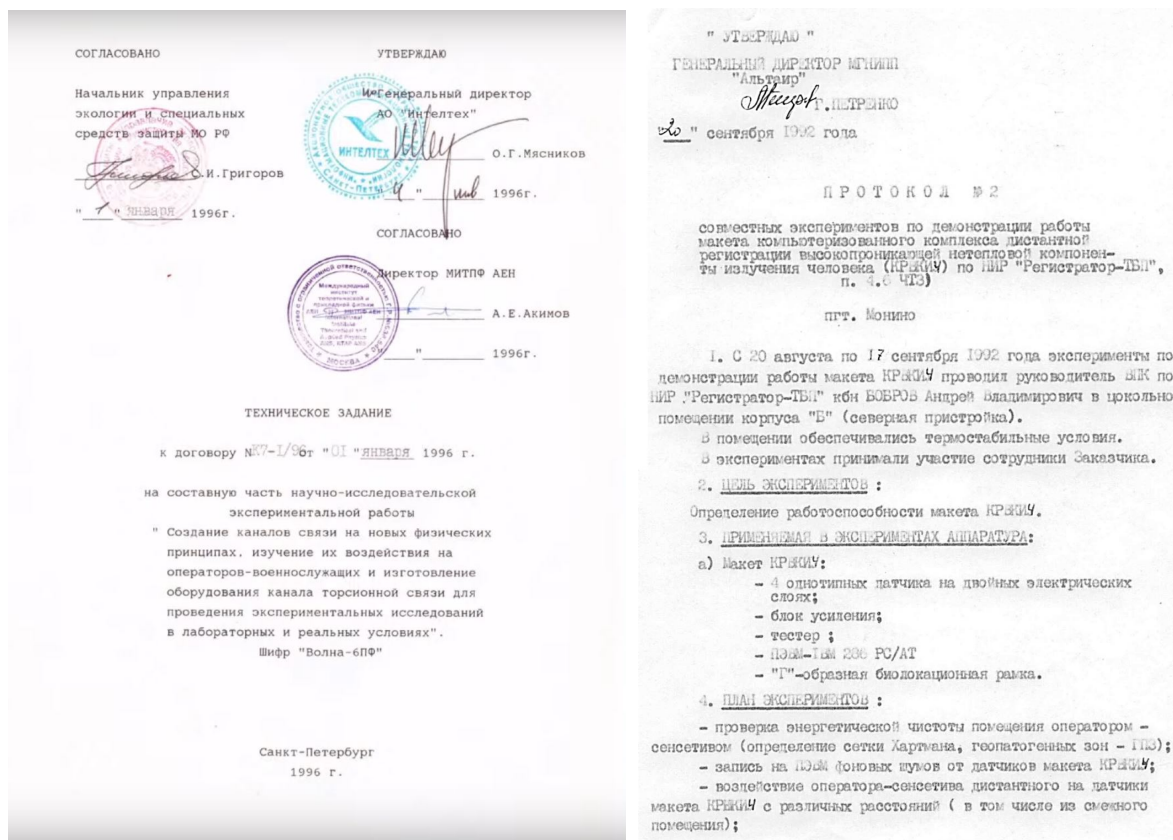


Figure 16. Examples of the relationship between technical developments and psycho-biophysical effects in programs of the late USSR: excerpts from the protocol of Bobrov's experiments at the Air Force Academy in Monino in 1992, and the title page of the contract N X7-1/96 between the Ministry of Defense (JSC 'Inteltech') and the International Institute of Theoretical and Applied Physics of the Russian Academy of Natural Sciences lead by Akimov for research and experimental work, the development of a communication channel based on new physical principles, the study of their impact on servicemen (military operators of communication system) and the production of torsion communication equipment for experimental research in laboratory and real conditions. Code 'Wave-6PF'. St. Petersburg, 1996. From the conference in memory of A.E. Akimov 'Torsion fields: past, present and future', 02/10/2022 and an international seminar dedicated to the 90th anniversary of A.V. Bobrov, 11/21/2021.

IX. CONCLUSION

Summing up this review, we note a characteristic feature of the Soviet program – the position of the state, which financed certain biophysical research and blocked all other developments. In addition, since 1917, international contacts were significantly reduced and even stopped. This resulted in emergence of specific research areas related to the brain and its psycho-biophysical mechanisms, new physical fields and the biophysics of weak non-ionizing emissions. Due to rejection of technological vitalism, a new 'instrumental line' appeared, which attributed the observed effects to some unknown radiation or fields (in the present, to nuclear spin phenomena at quantum level). By 2003-2004 in Russia, a completely independent line of research has been formed, which combines sources and detectors of such emissions, their psycho-biophysical manifestations, and investigates the observed effects in various materials and systems. Analyzing Western works, such as USPA conferences⁸, SSE⁹, relevant European and American journals, we note only a small number of publications on related topics.

⁸USPA – U.S. Psychotronics Association, www.psychotronics.org

⁹The Society for Scientific Exploration (SSE), www.scientificexploration.org

Second, an existence of many enthusiastic researchers in Russia after 1991 should be underlined. The concept of 'firm in the garage', widely known in the West, has a special meaning in Russia, since many studies have been performed not only by the academic community, but also by private researches. Regarding the difficulties in these works we can refer to the statements of Plekhanov [71], Kulagina [4], Dulnev [132] Bobrov [168], and many others. It should be noted that the Soviet Union coordinated the activities in this area at the Scientific Council of the USSR's Academy of Science in the 60s, 70s and 80s, while after 1991 the Academy of Sciences suddenly announced this research as 'pseudoscientific'. Such a rapid change is surprising and points to financial origin of this conflict after the collapse of USSR. This conflict caused essential damages to Russian academic science, since it stopped (or essentially delayed) research of 'strange quantum effects' even at institutes of Academy of Sciences.

Regarding the funding we found the following data¹⁰: the DIA Report 'Controlled Offensive Behaviour USSR, July 1972' estimated the budget \$21 million in 1967 (in the area 1), Hantseverov's estimation [17] about 700 involved researchers

¹⁰Exchange rate of 1 Soviet ruble was slightly larger than 1USD.

after 1987 (about 7 million ruble per year in the area 1), Akimov's estimation about the required 500 million ruble in 1990-1995 [137] (the area 3), data from [137] about spent 23 million ruble from Ministry of Defence around 1986-1989, data from [17] with estimated 400 involved researchers after 1990 (about 4 million ruble per year in the area 1), data from [141] about the military unit 10003, which consumed 4 million ruble per year and existed for 15 years (the area 1). Based on these data it can be estimated that open funding in the 80s and 90s was between \$200 million and \$400 million. Extrapolating data from the 60s and 70s it can be assumed that the upper boundary for open funding in after-war programs was about \$500 million.

However, there is no data about studies from KGB and USSR's Ministry of Defense in areas 1 and 2. Bobrov in [137] and in discussions reported about studies performed at Air Force Academy in Monino and Mechnikov State Medical Academy in the 80s and 90s. These studies are open and covered a large number of technical systems and human operators. It would make sense to assume that classified programs in the area 1 were larger than open programs. Since the area 2 was a strategic program, its funding should be assumed larger than of 1 and 3. In total we can assume an upper boundary of \$0.5-1 billion for all areas within 40 years. It is vital to repeat these are estimates based on published data and some common sense consideration. To compare, U.S. Startgate program costs about \$20 million [197], some programs for nonlethal technologies \$37.2 million [198], MKULTRA – \$87.5 million [198]. Thus, Soviet and U.S. costs are comparable at least on a level of separate programs.

Third, it needs to underline the ethical position in instrumental developments. Akimov in 1995 at the conference 'KGB: Yesterday, Today, Tomorrow' wrote:

'As we are the leading organization in Russia on torsion technologies, I can responsibly say that while technological experiments allow sometimes obtaining results that go far beyond our fantasy, modern torsion generators are rather primitive, and it is difficult to expect that tomorrow or the day after tomorrow may appear sources of torsion radiation that could solve the problem of controlling human behavior. I do not believe in this. There is an international organization of scientists involved in the study of electromagnetic radiation, including their effect on humans. From a technical point of view, there is no reason why it would be impossible to make a machine, which impacts the human. And I have no doubt about the fact that this kind of technique exists in many countries of the world' [199].

It is necessary to pay attention to the dangerous potential of unethical application of this technology, for example, in the case of distant information phenomena, studied on plants and laboratory animals, see [110], [111], [200]–[205], biological manifestations of the Aharonom-Bohm effect and magnetic vector potential [19], [163], [191], [206], patents of Putof [162] and Akimov [159] or other researchers [207].

To conclude this work, it should be noted that after 2003, the instrumental psychotronics in Russia was developing further, although not as fast as before. There are conferences, work-

shops, seminars and published specialized journals. According to [17], the number of Russian researchers in the areas around instrumental psychotronics is between 400 and 700 in 1987-1993. Currently, based on major conferences, this number can be estimated between 200 and 500. We believe that this figure is kept at this level and beyond, but there is a noticeable increase in the age of researchers. There is also an interesting process of spreading this research to the West and East, and transferring it to the academic domain due to fast-growing quantum areas.

X. ACKNOWLEDGMENT

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