# 2010 year is the year of 100th anniversary since the birthday of S.N.VERNOV

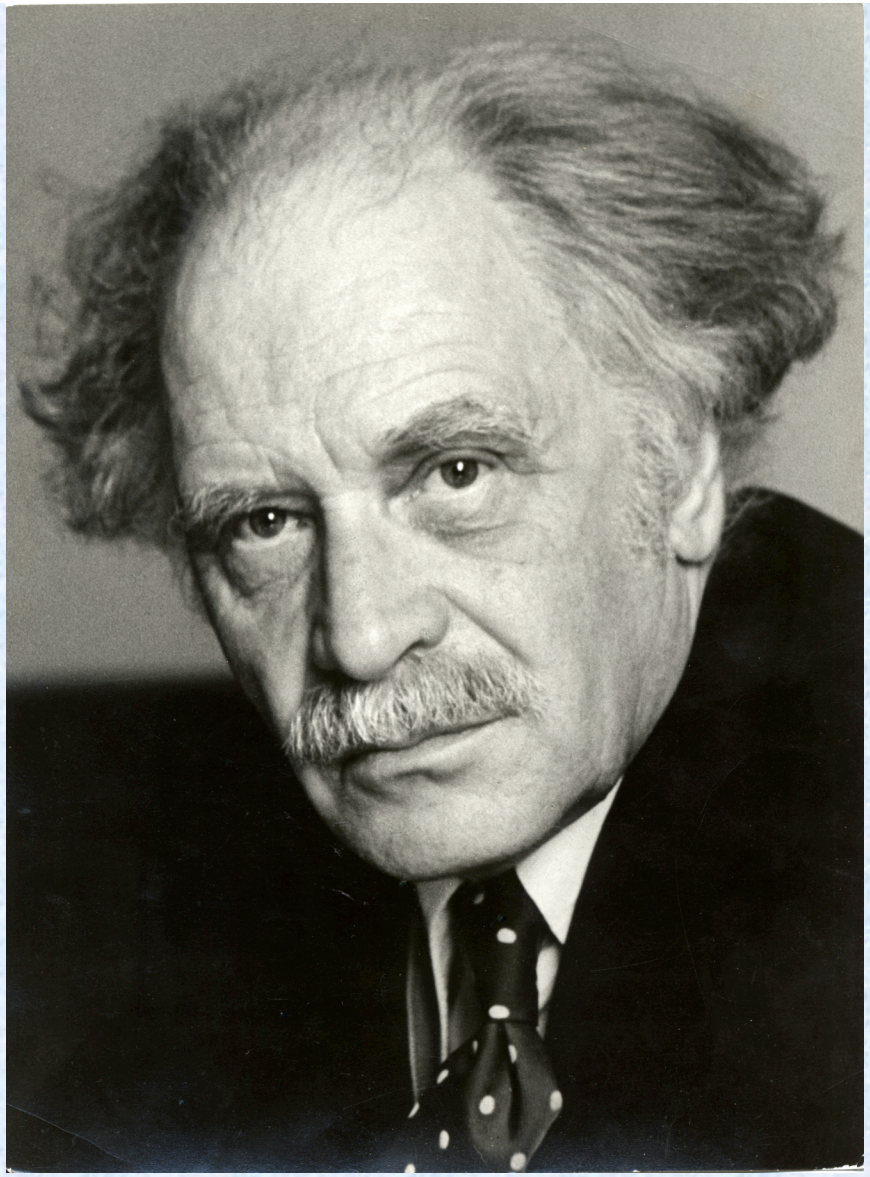
(June 11, 1910 - September 26, 1982)

# Scientific activity of Academician Sergei Vernov in Apatity (Kola Peninsula) and Leningrad during 1968-1982 years

*V.A.Dergachev*

22nd European Symposium on Cosmic Rays

Turku, Finland, August 3 – 6, 2010



**Academician Sergei Vernov (1910-1982), an outstanding Russian space physicist was the first national scientist who initiated the program of cosmic ray and radiation studies on board of the first Soviet artificial satellites. He was the initiator of holding of All-Union conferences, seminars, winter schools on space physics and was the chairman of these events.**

# Table of content

# 7th European Cosmic Ray Symposium
## (Leningrad Polytechnical Institute, September 15-19, 1980)


**There is this photo enough high quality**

# 7th European Symposium on cosmic rays

On the opening ceremony of the VII European Symposium on cosmic rays in the Leningrad Polytechnical institute on September, 15, 1980 S.N.Vernov gave a sincere speech. He was emotionally talking about his teacher, Dmitry Skobeltsyn, whom Vernov met in 1932 in Polytechnical Institute *and whom we are obliged not only by cosmic ray physics, but also by the physics of high energy. In 1980 Skobeltsyn still was a head of the cosmic ray school in Soviet Union, despite of his 88 years age.*

S.N.Vernov emphasized that many problems in cosmic rays have been solved on the International Leningrad seminars (so far there were 11 seminars). In the end of his speech S.N.Vernov had suggested not to stop on what is done.

The following speakers welcomed the participants of the VII symposium: *the secretary of the International commission on cosmic rays (IUPAP) and its future chairman*, Prof. Wolfendale from England, *former chairman of the same commission*, Prof. Somogyi from Hungary, *vice-president of the Polytechnical Institute*, Prof. Alexandrov.

Prof. G.N.Alekasndrov on behalf on the Leningrad Polytechnical Institute congratulated S.N.Vernov with his 70 birthday and with awarding him by a title of Hero of Socialist Labor for his outstanding merits in scientific, teaching and social activity.

# From the speech on the opening ceremony of the VII European Symposium on cosmic ray

## Secretary of Commision on Cosmic Rays, IUPAP, Prof. A.Wolfendale

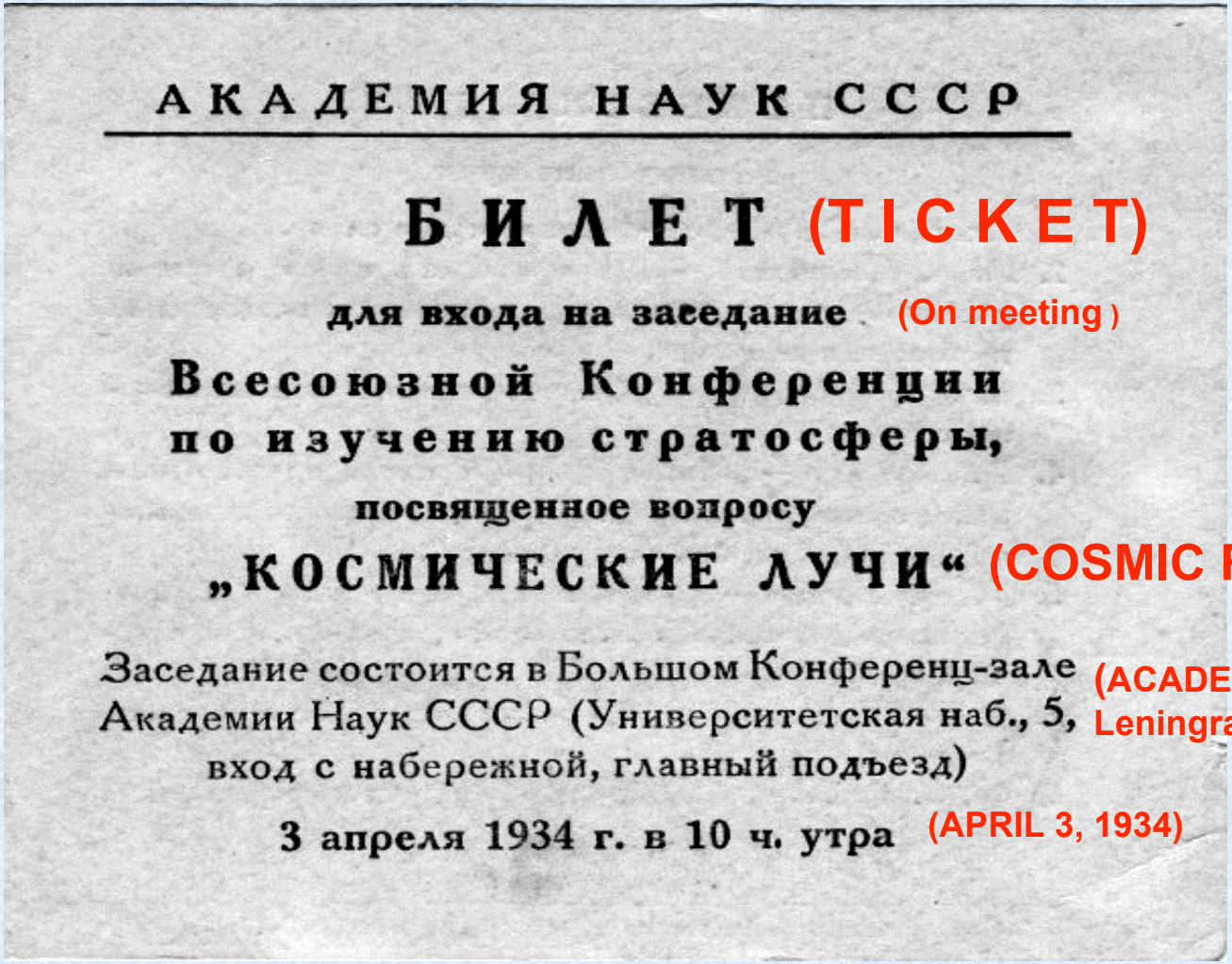
- ***Well for a start I would like to thank academician Vernov for many things including telling secretes about the Cosmic Ray (CR) commission. And to me a great pleasure to hear you, Mr.Vernov, in this famous place and hearing about the famous names of the past and of course some of the famous names of the present, and I am sure, among the audience there will be famous names of the future……***
- ***In conclusion, I must say a few words about our subject. There can be no doubt about the continuing interest in it, indeed the size of today's audience shows how popular it is. There are continuing developments in virtually every aspect some of which have been enumerated today: from neutrinos to heavy primaries, from particles in solar wind to Extensive Air Showers at 10 and 20 TeV.***
- ***And I must say too how impressed we all are from abroad I know with the magnitude of the Soviet work in the cosmic ray field. It's really magnificent.***
- ***I hope it is a lighter vein… it is exciting to see how far the interest in cosmic rays is spread in this country. Thank you!***

- **Finally, S.N.Vernov highly estimated the symposium,** ***with the number of participants more than 300 scientists. The whole number of contributed talks was 455, the number of invited talks – 22.***
- **Opposite to previous symposiums, the proceedings of this one have been published,** ***both as a separate issue, and in the Bulletin of the Academy of Sciences: Physical Series.***
- **S.N.Vernov also mentioned: '*I think that the cosmic ray field is so large and science is developing so fast, that we should meet every year. Every second year there should be International conferences, and in between – European symposiums. One year is a long enough period.'***

# 1. From the biography of S.N.Vernov

- **Sergei Nikolaevich Vernov was born on June 11, 1910 in the city of Sestroretsk near Leningrad (St. Petersburg).**
- **His farther was a post–officer, and his mother was a teacher of mathematics in school.**
- **After the graduation of the middle school, in 1927 he had become a student at the physical-mechanical faculty of the Leningrad' Polytechnical Institute (Saint-Petersburg State Polytechnical University at present). S.Vernov has graduated this institute in 1931 *and got a diploma of physicist-engineer.***
- **As told S.Vernov later, after his acquaintance in Polytechnical Institute with D.V.Skobeltsyn, he has selected the cosmic rays as a topic of his PhD thesis. Moreover, since that time, and until the end of his life, his main scientific interests were connected with the cosmic rays.**
- ***S.N.Vernov was working in Radium institute since 1930 until 1936.* During postgraduate period he investigated cosmic ray flux with Geiger-Mueller counters and wrote a review 'New data in cosmic ray study'.**

# S.N.Vernov taken part in the First All-Union conference on stratosphere study (1934), which dedicate to “COSMIC RAYS”



АКАДЕМИЯ НАУК СССР

**БИЛЕТ (TICKET)**

для входа на заседание (On meeting)

Всесоюзной Конференции
по изучению стратосферы,

посвященное вопросу

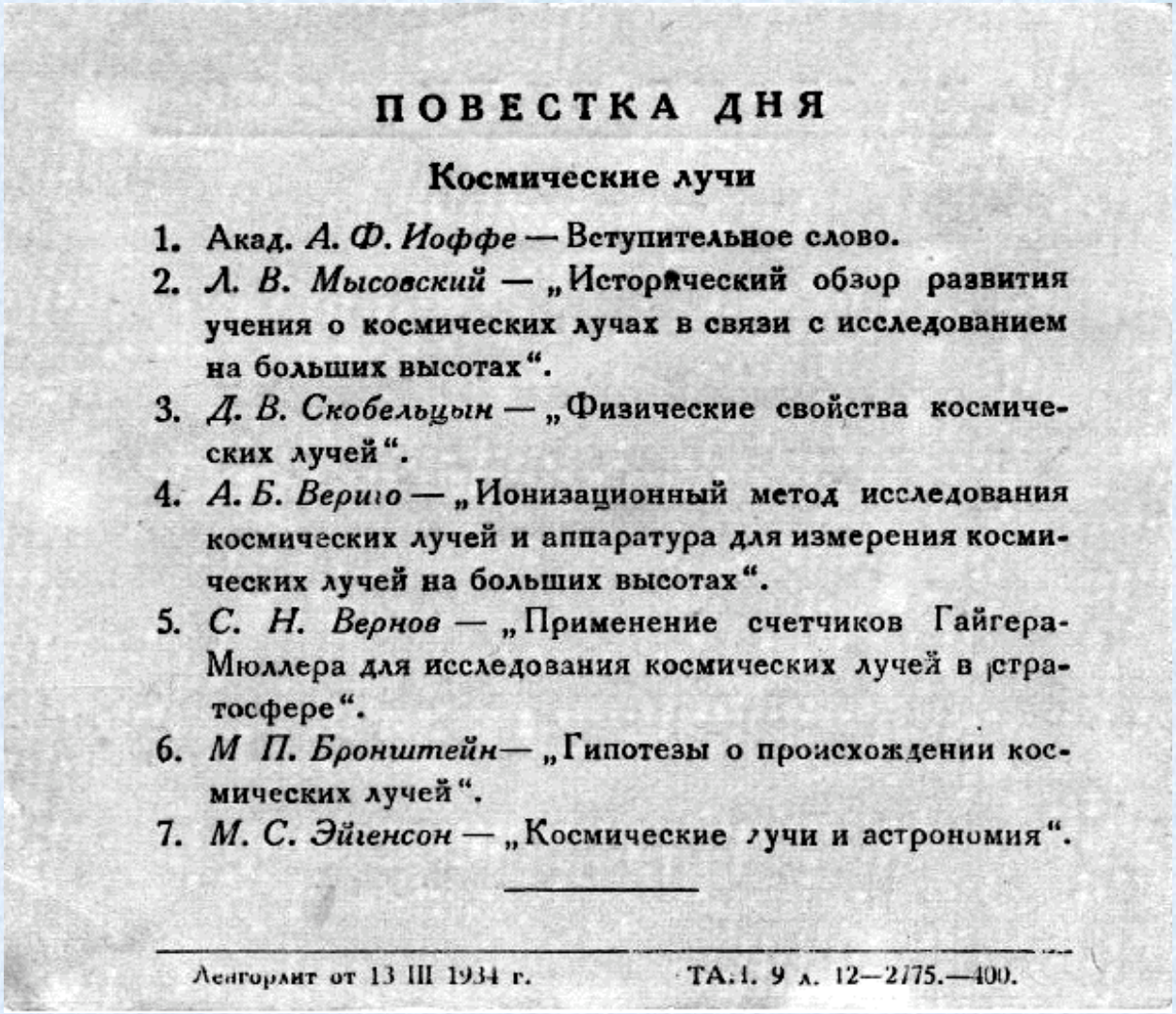
„КОСМИЧЕСКИЕ ЛУЧИ“ (COSMIC RAYS)

Заседание состоится в Большом Конференц-зале Академии Наук СССР (Университетская наб., 5, вход с набережной, главный подъезд) (ACADEMY SCIENCE, Leningrad)

3 апреля 1934 г. в 10 ч. утра (APRIL 3, 1934)

# The committee agenda “COSMIC RAYS

## Program of session which included the Vernov’s talk



ПОВЕСТКА ДНЯ

Космические лучи

1. Акад. *А. Ф. Иоффе* — Вступительное слово.
2. *Л. В. Мысовский* — „Исторический обзор развития учения о космических лучах в связи с исследованием на больших высотах“.
3. *Д. В. Скобельцын* — „Физические свойства космических лучей“.
4. *А. Б. Верцо* — „Ионизационный метод исследования космических лучей и аппаратура для измерения космических лучей на больших высотах“.
5. *С. Н. Вернов* — „Применение счетчиков Гайгера-Мюллера для исследования космических лучей в стратосфере“.
6. *М. П. Бронштейн* — „Гипотезы о происхождении космических лучей“.
7. *М. С. Эйгенсон* — „Космические лучи и астрономия“.

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Ленгорлит от 13 III 1934 г. ТА.1. 9 л. 12—2775.—400.

S.N.Vernov. An application of Geiger-Mueller counters in cosmic ray study in the stratosphere.

Reprinted from THE PHYSICAL REVIEW, Vol. 46, No. 9, 822, November 1, 1934
Printed in U. S. A.

# The Physical Review, 1934, vol. 46, No. 9

# On the study of cosmic rays at the great altitudes

## On the Study of Cosmic Rays at the Great Altitudes

The ionization produced by cosmic rays at different titudes has been measured by many investigators. [. Cosyns, P. Kipfer and A. Piccard[1] have observed smic rays at the great altitudes by means of one counter. ut it is especially interesting to determine at various titudes the number of coincidences, produced in a train Geiger-Müller counters, for in this way only corpuscular ys are recorded. T. H. Johnson[2] and B. Rossi[3] have udied the cosmic rays by this method on mountains at e altitude 4–2 km. T. H. Johnson has found that the mber of coincidences does not increase so rapidly as it uld be expected from the ionization measurements. Rossi has detected a great number of secondary rays the altitude 2370 m.

It seems to be necessary to undertake these measure-ents at higher altitudes. For this purpose there has been nstructed a portable apparatus, which can be taken by lloons. For the automatic recording of coincidences the ethod of Moltchanoff's radio-sounds has been used. The paratus, which consists of 2 Geiger-Müller counters, ldered in glass tubes, registers double coincidences, lected by an amplifier similar to that of B. Rossi.

To reduce the influence of secondary rays, a lead plate cm thick was placed between the counters. The potential 1400 v was supplied to the counters by a small storage ttery used in radio-sounds. A constant temperature was aintained inside the apparatus by means of a special ermoregulator, and all the apparatus was surrounded a thermal insulation. Besides the recording of co-cidences this apparatus determines from time to time e total number of discharges in one of two counters. e switching is made by a barograph, and the number of itchings gives the pressure data.

To test this apparatus the latter was taken up at the lway station Shosseynaya (10 km from Leningrad) by airplane under steerage of the pilot S. S. Lwoff. The servation of the cosmic rays in the airplane was made B. B. Lobatch-Joutchenko. The results, obtained in is way during the flight on July 27 to the altitude 5810 m are represented in Figs. 1 and 2. In Fig. 1 is shown the dependence of the number of coincidences per min. on the altitude (after subtraction of accidental coincidences). Because of the small number of coincidences the probable error is 10–20 percent.

The results are in accord with those of T. H. Johnson, who has found an increase of 3.78 times for the altitude 4.33 km. They also give a smaller value than that which is given by the ionization measurements. Fig. 2 represents the dependence of the total number of discharges in one counter on the altitude.

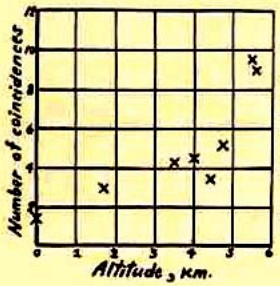



FIG. 1.

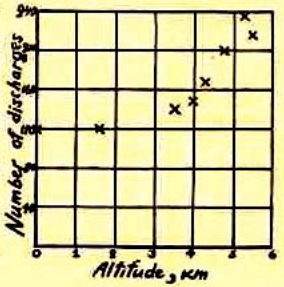



FIG. 2.

In conclusion I wish to express my sincere thanks to Professor P. A. Moltchanoff for his continued interest, his many helpful suggestions, and for permission to do this work at the Aerological Institute.

S. N. VERNOFF

Aerological Institute,
Slootsk,
and
State's Radium Institute,
Leningrad.
September 11, 1934.

[1] M. Cosyns, P. Kipfer and A. Piccard, Bull. de l'Acad. Roy. de Belgique, 5-me série, 19, 214 (1933).
[2] T. H. Johnson, Phys. Rev. 45, 569 (1934).
[3] B. Rossi, Phys. Rev. 45, 212 (1934).

From 1935 S.N.Vernov worked in Lebedev Physical Institute. Under the guidance of S.I.Vavilov and D.V.Skobeltsyn he forms his own scientific style, combining experiment with a comprehensive scientific analysis. In 1935 S.N. Vernov got his Phd in "Studying cosmic rays in stratosphere using radio-probes" and Master's degree in 1939 *with the work called "Wide cosmic rays effect in stratosphere and checking the cascade theory".* In 1943 he transfer to the Moscow State University.

The peak of Vernov's scientific and organizing activity took place in 50-60 (fifties-sixties) years of the last century. The sphere of his scientific interests in the field of cosmic rays has considerably increased when he started to use cosmic rays as a tool to investigate interplanetary space, solar activity and other objects.

Reprinted from THE PHYSICAL REVIEW, Vol. 70, Nos. 9 and 10, 769–770, Nov. 1 and 15, 1946
Printed in U. S. A.

# The Physical Review, 1946, vol. 70, Nos. 9 and 10
# Transition effects of the soft component of cosmic rays

## Transition Effects of the Soft Component of Cosmic Rays

S. N. VERNOV AND O. N. VAVILOV*
*P. N. Lebedev Physical Institute, Academy of Sciences of the U.S.S.R., Moscow, Russia*
October 20, 1945

THE existence of the hard and soft components becomes evident on examination of the absorption of the cosmic radiation in lead.[1,2] The properties of the soft component may be described by the cascade theory if, as is usually supposed, this component is composed chiefly of photons and electrons.

According to this theory, on transition from air to lead an appreciable transition maximum should be observed, similar to that observed in the stratosphere. The existence of such a maximum follows simply from the fact that in air the average energy of particles of the cascade component (which is of the order of the critical energy) exceeds by more than ten times the average energy of these particles in lead.

Calculations show that cascade multiplication should increase the number of the electrons by 4–6 times in comparison with the initial value. It should be mentioned that the latest calculations of S. Z. Belenky,[3,4] which we employ here and in which account is taken of the variation of the photon absorption coefficient with energy and of scattering, introduce appreciable corrections in the cascade curves for heavy elements. These calculations flatten out the theoretical transition curves and bring them more nearly into agreement with those experimentally observed by us.

The transition curves obtained previously by Schindler,[5] Street and Young,[2] and others in general do not exhibit any appreciable transition maximum. D. V. Skobelzyn[6] pointed out that the results of these experiments sharply contradict the cascade theory. It was shown by one of us[7] that this discrepancy may be owing to scattered cosmic-ray electrons produced in the lead, which miss the measuring instrument. Computations carried out by Tamm and Belenky[8] indicate that a large fraction of the electrons produced in lead as a result of cascade processes possess very small energies (30 percent of the electrons have energies below 0.6 Mev and 75 percent below 7 Mev); thus these electrons are considerably scattered in lead and even in the comparatively thin walls of the measuring instruments they may be appreciably absorbed.

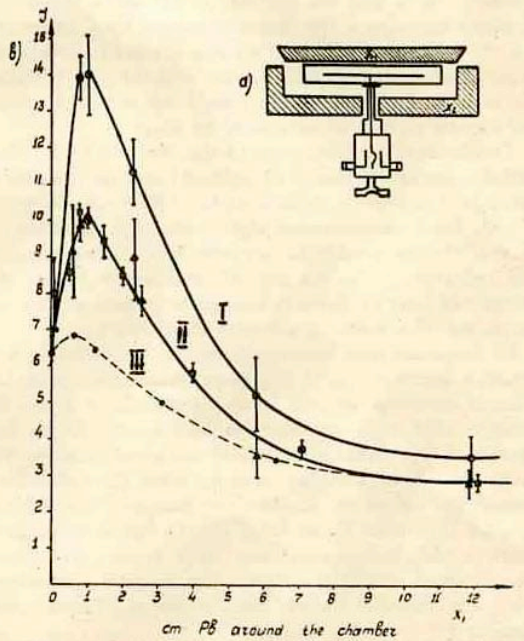



FIG. 1. Absorption curves of cosmic rays in lead at altitude of 3860 m. (a) Scheme of the apparatus, (b) ionization produced by cosmic rays in various chambers (ions per cm³ per sec. N.T.P.). Circles indicate measurements with foil chamber, Pamir. Triangles are for chamber with 0.4 mm Al walls, Pamir (1944). Squares are for a similar chamber at Mt. Elbrus (1940). The dotted curve is from Street and Young (reference 2). Transition curve of Street and Young and that obtained at Mt. Elbrus are made comparable with Pamir results by equating the intensities of the soft component of the cosmic rays.

# 2. How did I get acquainted with S.N.Vernov?

I was lucky to meet many bright scientists, particularly S.N.Vernov, with whom we stayed in contact since 1968 and almost until his death. Now a little bit about myself.

In 1964 I was a 5th-year student of physical-mechanical faculty of the Leningrad Polytechnical Institute and participated in cosmic ray conference in Apatity, on August 24-29, 1964, together with scientists from Ioffe Physical-Technical institute. It was first time in my life. *This conference headed by S.Vernov.*

In this time I start the work in Ioffe Institute with solar neutrinos. It was a good start. I decided that there is nothing better than neutrinos. Of course, I listened not only invited talks by G.T.Zatsepin and B.M.Pontekorvo about neutrinos physics, but also contributed talks by other scientists about cosmic ray physics. At that time the topic of cosmic ray variability was absolutely not attractive for me. But the life was more complicated.

In the beginning of 1968 G.E.Kocharov asked me to help in preparation of the 5$^{th}$ school on space physics in Apatity. We started our trips to Moscow and met together with S.N.Vernov.

One should emphasize the role of S.Vernov in further development of cosmic ray study and organizing of conferences, meetings, workshops, seminars and schools on cosmic rays. S.Vernov tried to carry out such scientific events not only in Moscow, but also in other cities (Apatity, Irkutsk, Yakutsk, Alma-Ata, Erevan and so on). This not only promoted the development of science in these cities, but also attracted young scientists as well as local government.

Opposite to others, schools had their own main goal – getting of new knowledge by participants in different aspects of cosmic ray physics. Topics of discussion on these schools ranged from neutrinos astrophysics and cosmology until physics of the Sun. S.Vernov paid considerable attention to select topics for lectures and presentations and invited leading scientists in different fields of cosmic ray physics. Of course, these schools required much more time for all topics than conferences and meetings traditional for the Academy of Sciences of the USSR.

# 3. Apatity's (Kola Peninsula) period of the space physics schools (1968-1969)

**Four schools on space physics already took place when I was included in the organizing committee of winter school in Apatity. The idea to carry out such soviet school belonged to the group with L.I.Dorman as a leader.**

**The fifth and sixth (V, 21 March – 5 April 1968 and VI, 18 March – 1 April) winter schools were carried out in Apatity, in Polar Geophysical institute (with Vernov as a chairman).**

***There were 150 participants and 57 presentations in the V (fifth) school, while in the VI – 300 participants and 116 presentations.***

**At that time the Polar Geophysical Institute was well equipped, that allowed for researchers to study ionosphere, auroras, geomagnetic field and cosmic rays.**

**The organizing committee of V school invited leading scientists of the Soviet Union as V.L.Ginzburg, Ya.B.Zeldovich, B.M.Pontekorvo, E.R.Mustel, E.L.Feinberg, L.E.Gurevich, A.Z.Dolginov, G.T.Zatsepin, L.I.Dorman, S.I.Syrovatsky and many others to give lectures.**

## Some problems connected with the organization and holding of schools

1. The accommodation of the participants, especially during VI school (300 participants), was difficult in a small city. S.Vernov has applied to the secretary of local division of the communist party. The secretary asked the local peoples not to settle one part of the new house, which was ready for these peoples, until the end of the school. This house was used for accommodation. Well, the science was considered to be very important at that time!

2. S.N.Vernov emphasized the importance of publications of the proceedings and suggested to do that (earlier the proceedings were not published). It was necessary to publish the proceedings of one school before the beginning of the next school. We started to do that, not foreseeing all the future difficulties. At that, the proceedings of the fifth school have been published in 1968, and the proceedings of the sixth school – 1969.

1969. Apatity. Opening ceremony of the VI school on space physics. (from left to right) Yu.A.Volkov – scientific secretary of the Polar Geophysical institute, S.I.Isaev – director of the Polar Geophysical institute, S.N.Vernov – chairman of the organizing committee, E.K.Kozlov – chairman of the Cola division of the academy of sciences, G.E.Kocharov – vice-chairman of the organizing committee of the school; secretary of the communist party, V.A.Dergachev – scientific secretary of the organizing committee of the school.

To the moment of the beginning of VI school on space physics we became friendly with all scientists in Apatity and discussed regularly many questions together. Thus, the vice-chairman of the Cola division of the Academy of Sciences of the USSR and its scientific secretary substantially helped us in printing of the proceedings. The director of PGI S.I.Isaev and scientific secretary Yu.A.Volkov looked into all details of arising problems, organized a free time.

We visited a number of laboratories, and some families. We highly appreciated the hospitality of Yu.A.Volkov, L.L.Lazutin, I.N.Kapustin and others.

We really became almost relatives and even after tens of years our meetings still were very sincere.

1969. Apatity, PGI. Visit to the laboratory of L.L.Lazutin. From left to the right: S.N.Vernov, G.E.Kocharov, O.B. Khorosheva, T.M.Krupitskaya, L.L.Lazutin.

1969. Apatity, PGI. Visit to the laboratory of I.A.Kuzmin.
From left to the right: L.I.Miroshnichenko,
G.E.Kocharov, S.N.Vernov, I.A.Kuzmin

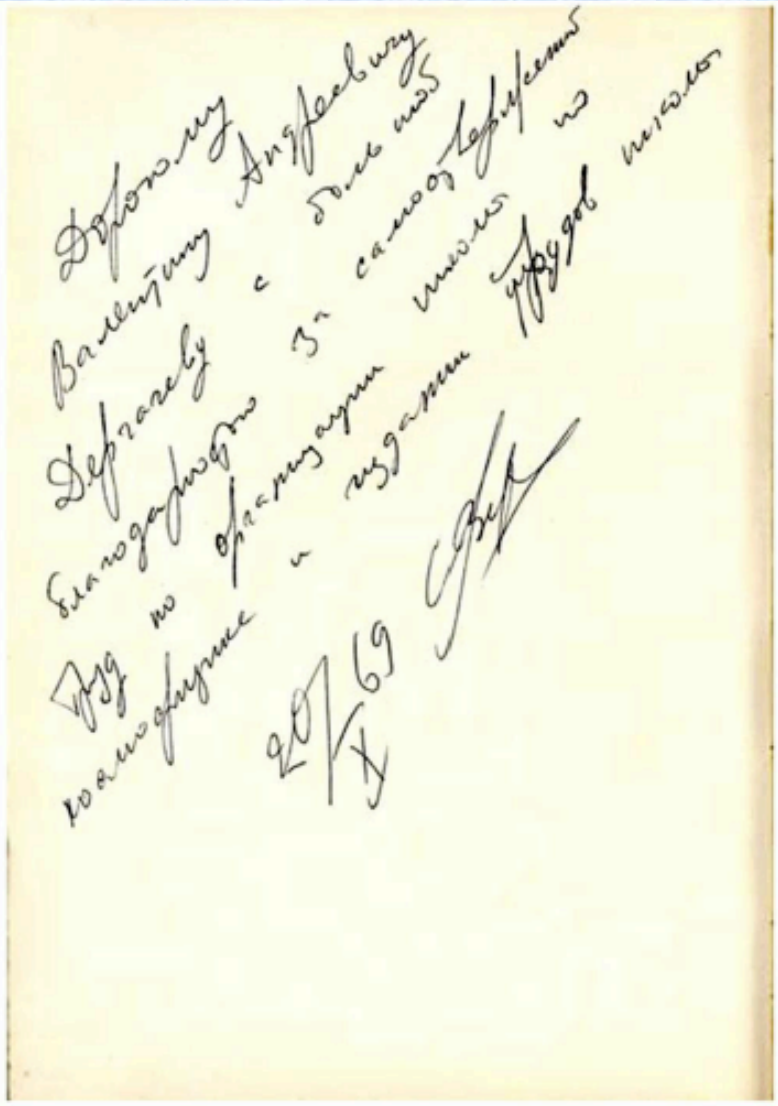
# 1969. Apatity, PGI . During the lecture (in the middle): S.N.Vernov, L.L.Lazutin, A.E.Chudakov

# 1969. Apatity, PGI . During the coffee break. V.A.Dergachev is receiving 'orders' to change the program of the VI school on space physics.

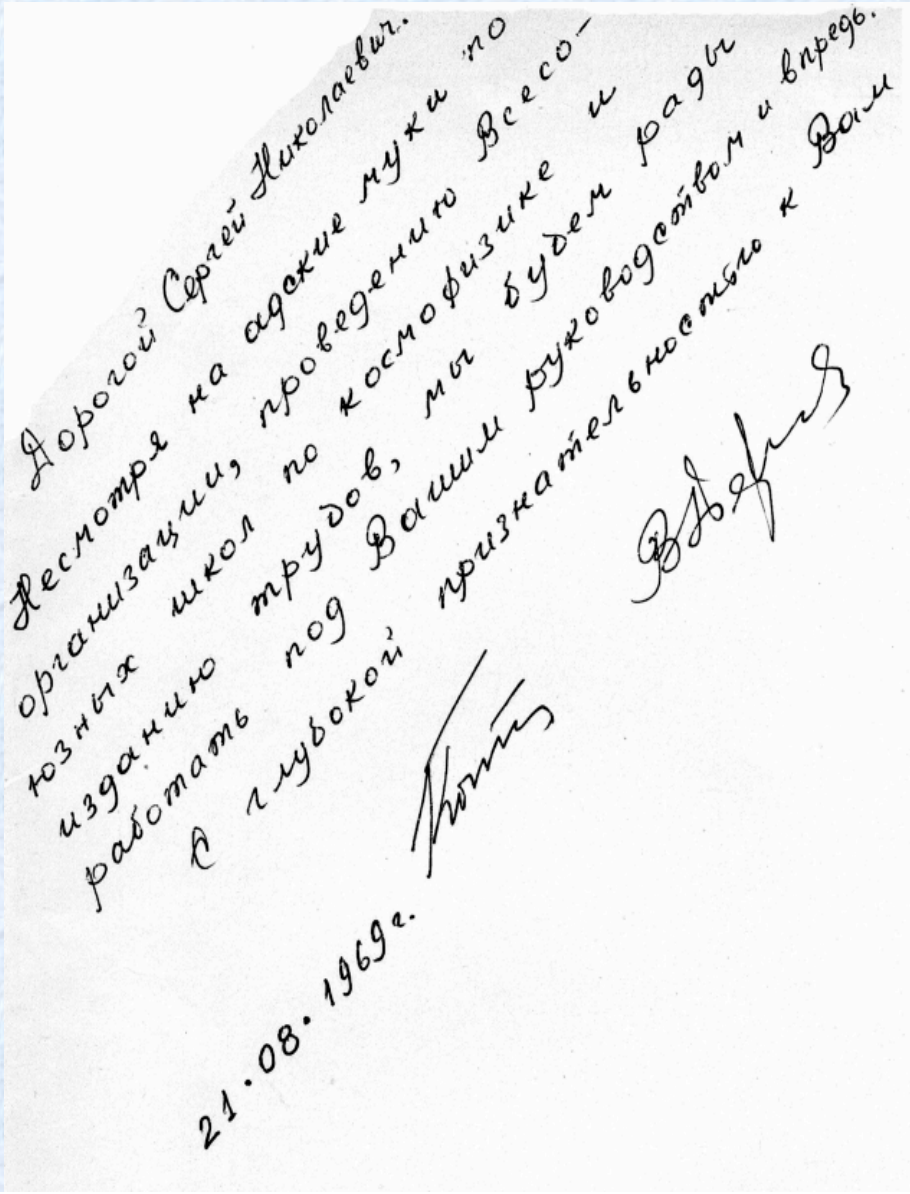
М.И. Панасюк

Лопарская

# Acknowledgement from S.N.Vernov for organizing of the VI school and publication of the proceedings

# Gratitude from G.E.Kocharov and V.A.Dergachev for the appreciation of their work on preparation, organizing and publication of the proceedings of the schools in Apatity




Unfortunately the sequence of further schools has stopped at this stage. The main reason was the difficulty to keep the same scientific level and the speed of publication of the proceedings.

**Nonetheless, the schools were unique and not only reflected, but rather determined the evolution of the space physics society.**

One had to look for other possibilities.

# 4. Leningrad period of space physics: seminars, conferences, COSPAR & ECRS (1969-1982)

- **S.N.Vernov loved Leningrad. This resulted to the organizing of international seminars devoted to different problems of space physics under the guidance of Sergei Nikovaevich. Each year, since 1969, they took place in Leningrad.**
- **The first seminar was in Ioffe Institute during the period of 3-7 June. The director of Ioffe Institute B.P.Konstatntinov (unexpectedly died on 9 July 1969), carried out the opening ceremony. He appreciated the idea of organizing such seminars.**
- **It was naturally to publish the proceedings in the same year. S.Vernov hoped for our help. A prompt publication of the proceedings was considered by S.N.Vernov to be very important.**
- ***He asked G.E.Kocharov to estimate this possibility. Grant Kocharov said, that it depends on V.A.Dergachev. I was not able to refuse to Sergei Vernov. I had this 'noble' duty basically until the last seminar, carried out under the guidance of S.Vernov.***
- **During the period of S.Vernov's life there were 12 Leningrad seminars on different topics of space physics. Many scientists from a number of countries visited these seminars and presented their talks.**

# The first Leningrad International seminar on study of physics of interplanetary space took place in Leningrad, on 3-7 June 1969

**The foreign colleagues participated in this seminar are: H.Alfven (Sweden), D.J.Williams, J.R.Winkler, and S.M.Krimiges (USA), Y.R.Webber (England), A.Somogyi and A.Valash (Hungary), K.G.McCracken (Australia), P.Velinov (Bulgaria), R.Knut (East Germany).**

**American academician S.M. Krimiges, *team leader of several NASA projects and* participant of the 1st Leningrad seminar, visited Russia again in 2007, when 50 years since launch of the first soviet satellite was celebrated. He said: 'I remember very well my first visit in USSR in 1969. I was invited by academician Vernov to take part in the conference in Ioffe Pysical-Technical institute (Leningrad). There were several western scientists (H.Alfven, K.G.McCracken, U.R.Webber, J.R.Winkler, D.J.Williams). We had a number of fruitful discussions and firstly compared the data from satellites of USA and USSR.'**

**There were mostly invited talks, parallel translation and wide discussions on all seminars were organized. The proceedings of all seminars have been published.**

1969. Leningrad. Discussion with academician Vernov near Ioffe Physical-Technical Institute, during the seminar 3-7 June 1969. In the first row from left to right: G.Kocharov, V.Chesnokov, K.Gringaus, J.Winkler, I.Podgorny (ISI), J. Williams, S.N.Vernov, S.M.Krimiges, K.G.McCracken

Besides this seminar the All-Union conference on cosmic ray took place in Leningrad in 1969. The president of Polytechnical Institute K.P.Selesnev present to S.N.Vernov the memorable medal. Sit on the panel (from left to right) the director of Ioffe Institute V.M.Tuchkevich and Prof. N.A.Dobrotin

# The topics of subsequent Leningrad seminars .

Second (II) Leningrad International seminar, devoted to the problem 'Generation of cosmic rays on the Sun', took place 8-12 December 1970.

Third (III) Leningrad International seminar (Leningrad, 13-15 July 1971) had a title. 'Particle' acceleration in space (interplanetary and near-Earth), Galactic and Meta galactic'.

IV Leningrad International seminal 'Particle acceleration on different scales'. Leningrad, 16-18 August 1972.

V Leningrad International seminar 'Solar cosmic rays and their penetration in the Earth magnetosphere', Leningrad, 26-29 June, 1973.

VI Leningrad International seminar 'Particle acceleration and nuclear reactions in space'. Leningrad, 19-21 August 1974.

VII Leningrad International seminar 'Particle fluxes from the Sun and radiation belts of planets: Earth and Jupiter'. Leningrad, 25-28 May, 1975.

20.08.1974. Leningrad. VI International space physics seminar. First row: S.N.Vernov, G.E.Kocharov, A.Somogyi (Hungary), A.Z.Dolginov, V.A.Krat; second row: from left to right: S.I.Syrovatsky, V.A.Dergachev

VIII Leningrad International seminar 'Active processes on the Sun and the problem of solar neutrinos' . Leningrad, 25-27 September 1976.

IX Leningrad International seminar 'Solar cosmic rays: generation and interaction with matter from the source until the Earth'. Leningrad, 23-25 December 1977.

X Leningrad International seminar 'Nuclear space physics'. Leningrad, 6-8 October 1978.

XI Leningrad International seminar 'Interaction of cosmic rays with matter'. Leningrad, 30 November - 2 December 1979.

7-th European cosmic ray symposium. Leningrad, 15-19 September 1980.

XII Leningrad seminar 'Complex study of the Sun'. Leningrad, 6-8 February 1982.

XIII Leningrad seminar 'Cosmic ray intensity and cosmogenic isotopes'. Leningrad, 19-21 November 1982.

The wide spectrum of many problems of space physics!

## On the seminars it was possible to discuss many scientific problems and this attracted soviet and foreign scientists

Let me consider the VIII Leningrad seminar as an example. It took place in Ioffe Physical-Technical institute since 25 until 27 September, 1976, its topic was 'Active processes on the Sun and the problem of solar neutrinos'.

There were speakers from different countries, e.g., from USSR: G.E.Kocharov, G.V.Domogatsky, N.N.Stepanyan, B.V.Somov, B.I.Luchkov, M.I.Pudovkin, V.A.Krat, T.N.Charakhchian, A.Z.Dolginov, A.K.Lavrukhina, L.I.Dorman, I.M.,Podgorny, B.M.Vladimirsky and so on;

from USA: Prof. J.A.Simpson; from *Hungary*: prof. A.Somogyi, Dr. D.Benko, Dr. G.Erdesch; from *Poland:* Dr. Z.Kobylinsky, Prof. Kuchovich; from *Czechoslovakia*: Dr. K.Kudela, Dr. S.Pinter, Prof. P. Povinec; from *Western Germany*; Prof. E.Bagge.

Prof. L.E.Gurevich and academician B.M.Pontekorvo also taken actively part in the discussion.

# 1976. Leningrad. The opening ceremony. The speech of A.Somogyi (Hungary). B.Kuhovich (Poland), S.N.Vernov, G.E.Kocharov, J.Simpsom (USA), V.A.Dergachev, E.Bagge (Germany), P.Povinec (Czechoslovakia)

# 1976. Leningrad. S.N.Vernov with the participants of VIII International seminar during the break interval between sessions

1976. Leningrad. S.N.Vernov together with his wife, I.M. Podgorny together with his wife and G.E.Kocharov, V.A.Dergachev, T.N.Charachchian on the seminar dinner

**The chairmen of the organizing committee academician S.N.Vernov emphasized on the opening ceremonies, that these Leningrad seminars were very useful, especially for space physics.**

**In his introductory speech on 10th seminar S.N.Vernov emphasized that the past seminars comprised many aspects of space physics in space and time. He said: .**

***«We could have connected different sides of these complicated and interfering processes, building a bridge between them. From one seminar to another we expanded the topic, involving more and more institutions and scientists, who become afterwards 'patriots' of our seminars. Science was developing also very successful. We were working and are working in the field where satellites and rockets bring new data. It is naturally that our seminars are always devoted to key questions, which arose recently (very new and very interesting), which require a discussion from different point of view, and prompt solution».***

**Many scientists noticed a good scientific yield of these seminars (prof. A.Wolfendale, prof. J.A.Simpson, prof. E.Bagge and so on).**

**I would like to draw your attention to the understanding by Vernov of the space physics location.**

**Thus, he said:**

***'We are divided in 2 parts. Some are dealing with astronomy and have no relation to nuclear physics, others are vice versa. Nonetheless some of us should be cut, one half will belong to nuclear physics, and another half – to astronomy'.***

***'The question is what we will obtain if divide the physics of cosmic rays into two separate parts – astronomy and nuclear physics. We will get nonsense, dear colleagues.'***

***D.N.Skobeltsyn called the astronomical part of cosmic rays as space-physical. Since that time it is accepted to divide the cosmic ray physics to space-physical and nuclear-physical parts. This division was kept also for the conferences. Such conferences took place in the Leningrad, in 1969 – with S.N.Vernov as a chairman and the 30$^{th}$ one - already without him.***

# 5. S.N.Vernov as a person

I was happy to meet many brilliant scientists, but high lights are: B.P.Konstantinov and S.N.Vernov, whose 100 anniversaries are celebrated this year. They both affected not only my scientific carrier, but, moreover, the purpose to stay as a human being in any situation in my life.

I was working together with Sergei Nikolaevich for more than 12 years as a scientific secretary of seminars, conferences, schools. He was distinguished by his talent of physicist, his artistic features, high capacity for work and many other features.

S.N.Vernov's character was rather soft. He was non-malicious and non-rancorous person. But for science his softness might disappear quickly.

He liked in peoples a good breeding and ability to behave.

His care about his seriously ill wife was very touching.

Until now I remember my elevated mood, which I had during my each visit to S.Vernov, either in Moscow (SINP MSU or nuclear physics department) or in the Leningrad, in the home of his daughter, Lena.

Now, almost 40 years later it is difficult to remember our conversations in all details. Because at that time I was living on Grazhdansky avenue, same as his daughter, S.Vernov called me each time he visited Leningrad and asked about unsolved questions and desired from him assistance. Preliminary and final programs of seminars were discussed as well.

Once, when I visited him on Grazhdasky avenue, he had took a catch. S.Vernov asked for my opinion about a glass of "Zubrovka", which he was taking as a medicine and which was not understood by his relatives. I supported him at that medical question……..

Usually, before I was leaving, S.Vernov would say: 'Let's go together, I will follow you until your house.' I was understanding that S.Vernov needs some walk, and we were walking, first, from the Lena's apartment until my house, and back.

It looked, that Sergei Nikolaevich wanted to share his thoughts about successors, about peoples who will continue his work. For instance, we discussed the candidates for the position of deputy director of SINP MSU, management of the Baikal neutrinos experiment and others.

Saying good buy after each of such walk he would say: *"Well, we have discussed not only scientific, but also political problems".*

The fate gives to everybody his own time, during which person shows all his abilities. S.N.Vernov has showed how much one can do, if he is faithful to the goal of life. S.N.Vernov was a unique person, all his life was dedicated to science.

100 years is an important jubilee, different thoughts are coming. What are these thoughts about? They are about the past, present and future. Everything is connected, northing disappears.

S.N.Vernov left us a long time ago, but today you look with interest over his short life, and it seems to you, that he is close to here, and soon you will meet this really nice in many respects person. You are waiting for his suggestions. We always remember Sergei Nikolaevich Vernov, and will always do this.

Now we are remembering his 70-th anniversary.

**Moscow. 1980. On Vernov's 70th anniversary. From left to right: S.N.Vernov, V.A.Dergachv, director of the SINP MSU department G.B.Christiansen, scientific secretary of the 'Cosmic ray council' G.V.Kulikov, G.E.Kocharov (Ioffe Institute), G.Y.Goryacheva (Moscow Physical Institute)**

# 6. Instead of conclusion

**The period when S.N.Vernov was living, is really grandiose. It is connected with the dream: to jump to the space. This finally had happened. S.N.Vernov was among peoples who have realized this dream. To estimate this period of time more realistic I will cite some words from an article 'Years of great achievements' of Prof. Krimigis in the book *'1957, October, 4. Start of the space era*.'Moscow, 2007.**

'*Thinking about the start of space era, we are struck by the key role of the cold war. It is difficult to imagine, that the powerful rockets, which are able to launch satellites, would be designed without the military competition between two world powers. Probably, such rockets finally would have been created, but later. In this case the beginning of space epoch would be postponed. Thus, space physics have benefited from the cold war, how strange that wouldn't be. No doubts, that space era was an inevitable step in the mankind's evolution and the mankind have benefited from it. We should acknowledge the pioneers of this era:* ***Korolev, von Braun, van Allen, Vernov*** *and all other colleagues, who followed their dream and have fulfilled it by their imagination and skills.'*

**Prof. Krimigis was the participant of the 1st Leningrad International seminar.**

# THANK YOU FOR YOUR ATTENTION!