HISTORY OF THE INSTITUTE OF ATMOSPHERIC OPTICS OF THE SIBERIAN BRANCH OF THE RUSSIAN ACADEMY OF SCIENCES AND MAIN STAGES OF ITS ACTIVITY FOR 25 YEARS (1969–1994)

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PREHISTORY OF THE INSTITUTE

The decree of the Central Committee of the CPSU on the establishment of the Institute was enacted on August 5 of 1968, and the resolution of the Presidium of the Siberian Branch of the Academy of Sciences of the USSR on its opening, adopted on September 5 of 1969, appointed me, Professor and Doctor of Physical and Mathematical Sciences at that time, as the Organizing Director of the Institute. Soon I was elected as the Director of the Institute in accordance with the Rules of the Academy of Sciences of the USSR and its Siberian Branch.

The Institute was established on the basis of the large Laboratory of Infrared Radiation of the Siberian Physical–Technical Institute (SPTI) at the Tomsk State University, which was founded in December of 1955, that is, about 14 years before the opening of the Institute of Atmospheric Optics. The Soviet Government decreed that Siberian Physical–Technical Institute should implement the Scientific Research Program on the efficiency of operation of thermal direction finders under various atmospheric conditions. Professor Nataliya Aleksandrovna Prilezhaeva, the Head of the Laboratory of Spectroscopy of the SPTI and the Chair of Optics and Spectroscopy of the Physical Faculty of the Tomsk State University at that time, was appointed as the Scientific Manager of this Program, and I, who graduated from the Physical Faculty of the Tomsk State University in 1951 and defended Candidate's Dissertation in 1954, was entrusted with a duty of the Principal Investigator.

My Candidate's Dissertation was devoted to the investigation of intermolecular interaction in a quinone–phenol system with the use of electronic absorption spectra of these complex organic molecules classified as benzene derivatives. It is clear that my Dissertation was unrelated to atmospheric optics, since the efficiency of operation of thermal direction finders was primarily determined by atmospheric transmission in the IR–range. In its turn, this parameter depended on the absorption of the IR radiation by atmospheric gases and on the aerosol scattering. Thus, the necessity of considering the principles of atmospheric optics promptly stemmed from appropriate professional level of implementation of governmental program.

In September of 1955, I was charged to deliver a four–semester course of lectures on physics for students of the Physical Faculty of the Tomsk State University. Based upon the results of the first examination in this course, taken in January of 1956, I had chosen four talanted students, organized a scientific circle, and conducted seminars once a week over the years of their study at the University. After graduating from the University, three students were recommended at the post–graduate course, and the fourth student moved to Moscow. The first three students defended their Candidate's Dissertations in time in 1962 and formed the research staff centered at the problems of atmospheric optics. They all became Heads of Laboratories of the Institute of Atmospheric Optics and defended their Doctoral Theses in 1972–1973. One of them, Ph. D. S. S. Khmelevtsov, moved to the Institute of Experimental Meteorology located in Obninsk. Now he is a well–known expert in laser sounding of the atmosphere. Two others, M.V. Kabanov and S.D. Tvorogov, continued their work at the Institute of Atmospheric Optics. They were elected as Corresponding Members of the Russian Academy of Sciences.

An analysis of the governmental Program, which was successfully completed in 1958 on the basis of the measured total transmission of the surface layer of the atmosphere to thermal radiation of bodies heated to the temperatures varying from 100 to 500°C has shown that the results obtained have limited application to the assessment of the efficiency of operation of thermal direction finders. It became clear that it was high time to set up an integrated problem on optical wave propagation through the atmosphere, namely, to develop the combination of theoretical and experimental methods for quantitative estimation of the effect of the atmosphere on a change in the parameters of optical wave for given realistic physical models of the atmosphere, geometry of radiation propagation, parameters of radiation, as well as the characteristics of receiving systems.

Setting up this problem, dramatic by itself, involves an integrated approach to the solution of the problem on optical wave propagation through the atmosphere. This approach was first proposed in the Laboratory of Infrared Radiation of the SPTI and used by M.V. Kabanov, S.S. Khmelevtsov, and S.D. Tvorogov in their Candidate's Dissertations, two of which were basically experimental while the third was theoretical but its results were used in the above–mentioned Dissertations. In my Doctoral Thesis, defended in 1964, I developed this approach further.

The above–indicated integrated approach was successfully developed due to golden opportunity to choose young specialists one by one from the best students of the Tomsk State University and the Tomsk Polytechnical Institute. The former was established in 1880 and the latter – in 1895. These two institutions of higher education were unique in the vast territory of tsarist Russia beyond Ural. The method of one–by–one selection, whose undisputable author was the founder of the Siberian Branch of the Academy of Sciences of the USSR, well–known mathematician, Academician Mikhail Alekseevich Lavrent'ev, played a dominant role in the development of atmospheric optics in Tomsk.

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By the time of establishment of the Institute of Atmospheric Optics, a research staff of scientists, engineers, and technicians had been organized in the Laboratory of Infrared Radiation of the SPTI, in which such principal subfields in atmospheric optics as absorption of optical waves by atmospheric gases, scattering of optical waves by ensembles of aerosol particles of haze, cloud, fog, and precipitation, and amplitude and phase fluctuations of waves engendered by atmospheric turbulence were successfully developed. The three subfields may be combined into a field called *Investigation of the Effect of the Atmosphere on Optical Wave Propagation* or *Direct Problems of Atmospheric Optics*. Theoretical and experimental investigations were carried out simultaneously and were accompanied by the development of appropriate instrumentation.

FUNDAMENTAL RESULTS OF THE ACTIVITY OF THE INSTITUTE OF ATMOSPHERIC OPTICS FOR 25 YEARS

The opening of the Institute of Atmospheric Optics on the basis of the Laboratory of Infrared Radiation of the SPTI has created not only radically new possibilities for the development of principal subfields in atmospheric optics, whose principles had already been laid for the preceded 14 years at the SPTI, but principally new leads for research have arisen, of which a lead concerning the solution of inverse problems of atmospheric optics and laser sensing of the atmosphere and ocean surface should be mentioned first of all. Particular attention has been given to the creation of the material basis of science, including the opening of Workshops and Design Office.

Within two years after opening of the Institute, the Special Design Office "Optika" was established, whose prime objective was the development of sophisticated high technology to support fundamental investigations into all the subfields in atmospheric optics. Rather powerful computer center, equipped with domestic computers, was organized. The main building, buildings for model installations, workshops, polygon, and other objects occupying 20000 m^2 of floor space were built.

Below we consider the fundamental results of the activity of the Institute in various subfields.

1. Spectroscopy of atmospheric gases

1.1. Theoretical investigations

In the Laboratory of Theoretical Molecular Spectroscopy, founded by Yu.S. Makushkin, the theory of fine structure of vibrational–rotational spectra of molecules started to develop. The method of effective Hamiltonian, developed by Yu.S. Makushkin, and the results obtained were the subject of his Doctoral Thesis. After his transfer to the Tomsk State University as the Rector, this work was continued by V.G. Tyuterev, who defended his Candidate's Dissertation and Doctoral Thesis at the Institute a long time ago (at present he is the world–recognized leader in theoretical molecular spectroscopy). He has developed mathematical models to the modern level, on which it has been possible to synthesize theoretically vibrational–rotational spectra of different atmospheric gases to the highest accuracy, namely, to an accuracy of the best experimental data obtained with the help of unique Fourier spectrometers ($10^{-4} - 10^{-5}$ cm^{-1} for the position of line centers). The Tyuterev theory was developed further in the Doctoral Thesis of his scholar V.I. Starikov. It should be noted that Professor Yu.S. Makushkin had been the Rector of the Tomsk State University for 10 years. He was elected as Academician of the Russian Academy of Education. His scholar O.N. Ulenikov has developed original methods of identification of fine structure of rotational–vibrational molecular spectra. These methods formed the basis of his Doctoral Thesis.

S.D. Tvorogov has elaborated original theory of continuum absorption based on the first laws of physics, which gave an insight into the reasons of contradiction among the experimental data obtained by various authors. He as the founder of the Laboratory of Statistical Optics of the Institute and the Head of this Laboratory for 25 years, has made a decisive contribution to the development of theoretical programs of the whole Institute.

Principles of application of the Tvorogov theory were thoroughly developed in the Doctoral Thesis of his scholar V.V. Fomin.

Semiclassical formulation of the problems in quantum optics, whose importance goes far beyond the scope of spectroscopy, was developed by S.D. Tvorogov in cooperation with his scholar E.P. Gordov. Undoubtedly, this semiclassical formulation should be considered as a significant contribution made by S.D. Tvorogov in science. Noteworthy also are Doctoral Theses by A.D. Bykov and V.P. Kachanov devoted to the currently central problems in theoretical molecular spectroscopy. The first Thesis dealed with construction and implementation of algorithms for quantitative interpretation of experimental data on vibrational–rotational spectra of absorption of different types of molecules of atmospheric gases. A wide variety of problems in nonlinear spectroscopy of spectral line profiles has been found its modern–day solution in the second Thesis.

1.2. Experimental investigations

Within 25 years after the establishment of the Institute, V.P. Lopasov is the Head of the Laboratory of Laser Spectroscopy. He pioneered in the creation of a laser spectrometer on the basis of a ruby laser and a multipass cell 5 m long. He developed this new subfield, defended his Candidate's Dissertation and Doctoral Thesis, and prepared a large group of followers.

The most extensive results of investigation of the absorption spectra of atmospheric gases were obtained by L.N. Sinitsa with the help of a large number of superhigh sensitive laser spectrometers created by him. These spectrometers were capable of recording many thousands of absorption lines and several tens of vibrational–rotational bands of a large number of atmospheric gases and their isotops, that provided the basis for his Candidate's Dissertation and Doctoral Thesis defended at the Institute.

Yu.N. Ponomarev defended his Candidate's Dissertation and Doctoral Thesis devoted to the development of opto–acoustic laser spectroscopy with the use of two unique multipass cells, 30 m and 110 m in length, that were mounted in the building for model installations. He succeeded in obtaining a record length of a laser beam under controllable laboratory conditions up to 10–12 km and in investigating fine effects accompanying a change in the position of absorption line centers of different gases due to the change in the pressure and temperature. The results obtained provided the basis for a corresponding database.

2. Optics of the atmospheric aerosol

2.1. Theoretical investigations

A.G. Borovoi, the scholar of S.D. Tvorogov, developed the original theory of multiple scattering of optical radiation in an aerosol medium, which provided quantitative estimation of the fluctuations in the wave parameters engendered by spatial aerosol inhomogeneities and considered the fluctuations due to atmospheric turbulence. This work provided the basis for his Doctoral Thesis.

G.M. Krekov after his postgraduate course at the Computer Center of the Siberian Branch of the Academy of Sciences of the USSR in the laboratory headed by G.A. Mikhailov, the scholar of G.I. Marchuk, in Novosibirsk, developed the Monte Carlo algorithms adapted for solution of the problems on laser beam propagation through aerosol medium and on their basis defended his Candidate's Dissertation, when he worked in the Laboratory of Infrared Radiation of the SPTI, and his Doctoral Thesis at the Institute of Atmospheric Optics. Various important problems have been solved by these algorithms, including the limits of applicability of Bouguer's law.

The theory yielding the quantitative data on a four–dimensional field of scattered solar radiation in the atmosphere under conditions of statistically inhomogeneous broken clouds has been developed by G.A. Titov in his Doctoral Thesis. The participation of our Institute in the national program of the USA on measurements of atmospheric radiation, namely, in its part developed by G.A. Titov, provided a convincing proof of originality of this theory.

V.V. Belov has developed the theory of optical signal transfer providing a qualitative estimation of distorting effect of the aerosol on the quality of images recorded through the real atmosphere, which provided a basis for his Doctoral Thesis. Using this theory, he proposed some methods for improved quality of vision of objects through aerosol media.

1.2. Experimental investigations

After small and large aerosol chambers had been put into operation in the building for model installations, investigations of image contrast transfer, started in the Laboratory of Infrared Radiation of the SPTI, were continued with the help of laser beams in various model aerosol media. The overall dimensions of the chambers (small chamber 4 m in diameter and 4 m in length and large chamber 10 m in diameter and 27 m in length) and various methods of aerosol generation allowed us to conduct investigations for a wide range of optical thicknesses exceeding 100, that is, in the depth regime. The results of these investigations provided the basis for the Doctoral Thesis of V.A. Krutikov. Now he is the Head of the Presidium of the Tomsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences.

Another important subfield of experimental investigations of aerosols centers around the OPTIK–E aircraft–laboratory developed at the Institute and equipped with a variety of instruments intended to investigate the aerosols with the use of direct measurements performed with nephelometers and lidars. Numerous flight missions performed by the Institute in more than 100 towns of the former USSR have yielded exceptionally rich information which was generalized by the leaders in this subfield B.D. Belan and M.V. Panchenko in their Doctoral Theses. Here we point out merely the result of monitoring of the atmosphere over Lake Baykal. The case in point is circulation of air masses, including aerosol, over this lake independently of the direction of air transport outside of water area.

3. Laser beam propagation through the turbulent atmosphere

3.1. Theoretical investigations

The main result of theoretical investigations in this subfield can be considered to be elaboration of the theory based on the Huygens–Fresnel principle, which provides for qualitative estimations of the effect of turbulent atmosphere on the parameters of laser beams propagating along direct and ranging paths. The founders of this theory, V.L. Mironov and V.A. Banakh, defended successfully their Doctoral Theses. Since 1986 V.L. Mironov is the Rector of the Altai University. In 1991 he was elected as a Corresponding Member of the Russian Academy of Sciences.

3.2. Experimental investigations

Experimental investigations performed at the Institute and aimed at full coverage of atmospheric conditions and schemes of propagation of optical radiation, as well as high performance characteristics of developed instruments, allowed investigations to be made of probability density of strong and saturated intensity fluctuations including regularities in their spatiotemporal structure and phase of the laser radiation propagating along direct and ranging paths for a wide range of variation of the parameters of the turbulent atmosphere.

The Doctoral Theses of V.V. Pokasov and G.Ya. Patrushev devoted to this subfield should be mentioned here.

4. Laser sounding of the atmosphere

This subfield goes back to the opening of the Institute and is now the leading one. It gave impetus to the integrated approach to a solution of current problems in atmospheric optics and supplemented this approach by a solution of inverse problems that yielded quantitative information on the atmosphere.

4.1. Theoretical investigations

Soon after the opening of the Institute, we have started theoretical investigations in two subfields: 1) solution of the inverse problems of laser sounding and 2) numerical simulation of the results of sounding for different lidar performance characteristics and atmospheric models. The leader of the first subfield, I.E. Naats, has developed algorithms for inverse problem solution with different lidar configurations and physical parameters of the atmosphere. These results were of fundamental importance and provided the basis for his Doctoral Thesis.

The second Doctoral Thesis in this subfield was successfully defended by A.A. Mitsel. It was devoted to the development of algorithms for reconstruction of humidity profiles and other atmospheric parameters from the data of laser sounding.

The leader of the second subfield, G.N. Glasov, has simulated numerically the results of laser sounding considering all principal effects of interaction between laser sounding pulses and the atmosphere and has analyzed signal transfer through a sophisticated lidar's optical train. The results obtained provided a basis for his Doctoral Thesis.

4.2. Experimental investigations

Problems in laser sounding of aerosols, including development of lidars of several generations and processing and interpretation of the results of sounding, were discussed in the Doctoral Thesis of I.V. Samokhvalov. Principles of laser sounding of wind velocity with the use of correlation analysis of lidar return signals have been developed and implemented by G.O. Zadde and G.G. Matvienko. They pioneered in the development of corresponding lidars. Their advances provided the basis for their Doctoral Theses that were successfully defended.

The Doctoral Thesis of V.V. Zuev was devoted to the important problem of interaction of ozone molecules with aerosol particles. Unique multichannel lidar station has been developed, which is capable of synchronous measurements of ozone profiles in the stratosphere, where ozone concentration reaches its maximum, and of microphysical parameters of aerosols (concentration and particle size spectrum). Ozone holes over Tomsk caused by ozone interaction with volcanic aerosol particles, erupted into the atmosphere by powerful Pinatubo volcano in Philippine in mid–June of 1991, were repeatedly recorded in the experiments.

5. Nonlinear and adaptive atmospheric optics

This new subfield in atmospheric optics stems from the advent and development of lasers that have unique properties causing nonlinear interactions with the atmosphere considered as a medium through which the radiation propagates. Among these properties, extremely high radiant power and energy densities as well as ultrashort pulse lengths that can be obtained for lasers should be mentioned above all. This subfield had been started in the Laboratory of Infrared Radiation several years before the opening of the Institute of Atmospheric Optics.

5.1. Theoretical investigations

At the Institute, pioneer theoretical work on the exposure of high–power laser radiation to aerosols was continued by A.V. Kusikovskii in the laboratory headed by S.S. Khmelevtsov. A.V. Kusikovskii has developed the theory of evaporation and explosion of individual particles and ensembles of particles upon exposure to intense laser pulses or continuous radiation. This work was continued further by Yu.D. Kopytin and A.A. Zemlyanov in their Doctoral Theses encompassing the other nonlinear effects, with thresholds of these effects having been determined and dynamics of their evolution having been studied.

Investigations in the subfield of adaptive optics were initiated first of all by the necessity to eliminate or to reduce the distorting effect of the atmosphere on the parameters of optical radiation, including laser beam, during its propagation through the atmosphere. The leader of this subfield is V.P. Lukin, the founder of the corresponding Laboratory. He defended his Candidate's Dissertation and Doctoral Thesis at our Institute.

5.2. Experimental investigations

Quantitative data were obtained for all the investigated nonlinear effects concerning their dynamics. In so doing original procedures for measuring fast processes were developed that allowed us to elucidate their mechanisms. Main results of these sophisticated original experimental studies were generalized in the Doctoral Thesis of leading experimenter V.A. Pogodaev.

6. Metal vapor lasers

This subfield started its development still in the Laboratory of Infrared Radiation of the SPTI. It was pioneered by P.A. Bochan, the first Head of the Laboratory of Coherent Radiation Sources of the Institute of Atmospheric Optics. He performed a large body of research before he moved to Novosibirsk where he defended his Doctoral Thesis, mostly prepared at our Institute. The results of this work were largely published when P.A. Bochan worked at our Institute.

Soon after the establishment of the Special Design Office "Optika", the laboratory was organized aimed at practical implementation of fundamental results, obtained in the laboratory of our Institute, in the form of experimental models of corresponding lasers.

Over the entire period of the existence of the two laboratories, fundamental investigations on the physics of metal vapor and chemical compound lasers, on the frequency conversion of emitted radiation, and on the development of new methods for excitation of active media have been pursued. A large variety of metal vapor lasers generating in a wide wavelength range which includes the near–IR, visible, and UV ranges, has been developed as well. A series of modifications to copper vapor lasers that differed from each other first of all by the parameters of radiation (radiant power that varied from a fraction of a watt to a formerly achieved record of 83 W, pulse energy, and pulse repetition rate). Some modifications have been put on small–lot production while the others are used in lidars and laser navigation systems developed at the Institute in collaboration with the SDO "Optika".

Main results obtained in this subfield were generalized in the Doctoral Thesis of G.S. Evtushenko, the Head of the Laboratory of the Institute and the former Head of the Laboratory of the SDO "Optika".

7. Information systems. Databases

An integrated approach to the solution of current problems in atmospheric optics calls for the development of corresponding information systems designed to support numerical experiments that yield new information.

The most developed geoinformation system, whose principles were laid in the Doctoral Thesis of V.S. Komarov, should be mentioned among information systems first of all.

ON THE ACTIVITY OF THE SDO "OPTIKA"

As has been mentioned above, the SDO "Optika" was established to produce any hardware needed for fundamental investigations pursued at the Institute. To do this, we needed all the necessary stages of technological process of developing and manufacturing of hardware. For example, for lidar manufacturing we needed special lidar optical parts, turntables, electronics, automatics, receiving systems, filters, and so on. In addition, all test stands were required, as for any production. Exactly such approach was realized.

In addition to the provision of the Institute with corresponding sophisticated instruments, setups, and measuring systems, the problem of developing new pilot prototypes of unique hardware and its small–lot production was also faced the SDO.

Several interesting lasers should be mentioned here that were discussed above and were introduced in practice.

The idea of developing laser navigation means for aircraft landing and ship blind steering was put forward on the basis of the results of fundamental investigations of direct laser radiation brightness transfer through a dense scattering medium (cloud, fog, industrial haze). The results of integrated examination of this idea provided a basis for Doctoral Thesis of V.Ya. Fadeev, who took a decisive part in implementation of this idea. A system for aircraft landing developed by us was successfully tested. Unfortunately, we failed to produce it commercially because of the lack of interest of industrial enterprises to innovations.

After that a system for ship steering was developed and repetedly tested in the sea ports of Odessa, Ventspils, and Kerch. After one year of operation it was not placed in active commercial operation by the same reason.

An airborne polarization fish–detection lidar was developed at the Institute in collaboration with the SDO. It was successfully tested. Two commercial lidars have been operating for 7 and 5 years in Murmansk and Vladivostok, respectively.

The results of fundamental elaborations performed at the SDO "Optika" were generalized by N.P. Soldatkin in his Doctoral Thesis.

In conclusion, lidars that were developed at the Institute and manufactured at the SDO and were used or will be used to obtain unique results in laser sensing of the atmosphere are listed. They are:

1) three multifrequency stationary lidar complexes;

2) airborne lidars for sensing of the atmospheric aerosols;

3) fluorescent shipboard lidars for sensing of ocean and sea surface layers;

4) mobile multipurpose lidar for sensing of aerosols, slant visibility range in airports, lower boundary of cloudiness, and so on;

5) mobile spectrochemical lidar for identification of atomic composition of aerosols, including salts of base metals in the cases of sensing of water and probing of minerals;

6) mobile Raman lidar for sensing of temperature, humidity, and aerosol profiles;

7) mobile laser system for determining the concentration of 20 gaseous pollutants of the atmosphere;

8) lidar for sensing of water vapor concentration (humidity) profiles;

9) lidar for sensing of wind velocity;

10) the first Soviet spaceborne lidar BALKAN–1, which was ready for mounting at the Scientific–Production Association "Energiya" five years ago but has not yet been launched into space, although the launching was planned for late 1992 or early 1993. It should be noted that the first NASA lidar was launched on September 9 of 1994 (orbited 9 days).

GENERAL RESULTS OF THE ACTIVITY OF THE INSTITUTE FOR 25 YEARS

Quantitative results of the scientific activity of the Institute are presented in Table I, and main publications are listed in References.

TABLE I. Quantitative results of the activity of the IAO of the SB of the RAS in 1969–1994.

Published articles	4500
Reports presented at Conferences	5300
Published monographs	120
Conferences and Symposia organized by the Institute	60
Doctoral Thesis defended at the Institute	40
Candidate's Dissertations defended at the Institute	170
Author's Certificates and Patents obtained by the Institute	475

CURRENT STATE OF THE INSTITUTE

Up to 1988, the Institute had financing enough to create unique material basis of scientific investigations, to perform fundamental researches in the above–indicated subfields, first of all by contracts with regular investors and leading firms of corresponding Ministries. The financial budget of the Institute in the last preconversion year 1988 was 4 million rubles, and 21 million rubles were obtained by contracts. In early 1989, financial resources decreased sixfold. Hence the rich Institute converted to the poor one, in a literal sense, in a few days. The problem of survival aimed primarily at preservation of elite personnel was put on the agenda.

The struggle for survival lasted four years (1989–1992), with all possible methods of worthy search for alternative sources of financing in addition to the state budget (grants from the state scientific–technical programs and bipartite international programs and from official participation of the Institute in the EUROTRACK Project and EUREKA Program, grants from the Russian Fund for Fundamental Researches, and so on) having been used.

However, survival policy was primarily oriented toward the search for western investors.

The Anticrisis Commission has been working at the Institute in these years. It elaborates and takes measures to save energy resources, to improve management, and to increase the efficiency of activity of all subdivisions of the Institute. For four years payment has been made under contracts. An important role is played by the Director's Fund.

While on the subject of leading direction of the survival policy, it should be emphasized that disregarding the journal "Atmospheric Optics" ("Atmospheric and Oceanic Optics" since January of 1992) published in English, its first fruits were born after 3–4 years of continuous purposeful work. The Institute was officially accepted as the only foreign participant of the USA Program on Atmospheric Radiation Measurements. At the end of the first quarter of 1993, 6 contracts were signed with the Livermore Laboratory, in the middle of 1993, we started to execute the contract with the Korean Institute of Modern Science and High Technology. This activity ensured an amount of currency several times more than the rest additional sources of financing altogether in 1993. In particular, we were able to buy new equipment, first of all personal computers, for a total of 100,000 US $.

It should be emphasized that the Institute, without announcement on staff reduction, has reduced its staff by 40% in the past five years and has essentially increased the efficiency of the activity of the reminder of personnel. For example, the relative contribution of the Institute to fundamental scientific results was about 50%, whereas it incorporated only 30% of the total number of scientists of the Tomsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences. Seven Doctoral Theses were defended at the Institute in 1992–1993. In 1994 seven more Doctoral Theses were defended

Every year the Institute sends a large number of scientists in abroad to take part in different Conferences and to work for a period up to one year at the expense of a receiving party. Nevertheless, no one scientist emigrated.

In conclusion I would like to note that the most difficult period of survival of the Institute completed in late 1992. Thereafter, a start has been made on a new stage of its development associated with its increasing financing in excess of the budget. The directorate, the scientific council, and the staff are viewing the future with optimism and hope.

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