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## Importance of International Scientific Contacts in Tomsk Scientific Community as the Factor of Physics Research Development in the 1970-1980-ies

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### Abstract

The article is devoted to historical reconstruction of the international contacts and communications of Tomsk scientific community in the 1970-1980s. Siberian Physical-Technical Institute (SPhTI) was a large center of basic and applied research development in the field of solid state physics, cybernetics, radio electronics and scientific staff training in the USSR. The author analyses the main forms of cooperation between SPhTI and foreign scientific research institutes and higher education institutions, the mechanism of foreign training organization, the forms of the state control on international scientific and educational contacts. The value of SPhTI's international scientific contacts in developing research on physics is emphasized. SPhTI scientists' participation in foreign trips resulted in establishing personal acquaintances and close communicative connections on the basis of which later correspondence was initiated and technical information exchange was regularly carried out. All that, eventually, favorably influenced the quality of research work, gave new impetus for organization of large scientific conferences with participation of the leading scientists. The historical reconstruction of one of the largest USSR's research institutes' international relations and contacts raises the issue of the relationship between science and power and feature of science development in the Soviet Union in the 1970-1980s. The article is intended for those interested in Russian history, history of higher education and science.

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## 1. Introduction

The years of 1970-1985 became the period of the Siberian Physical-Technical Institute after the academician V.D. Kuznetsov (SPhTI)'s highest development. During that period SPhTI managed not only to get stronger after a series of crucial changes. First, the leading researchers had left the institute for the institutions organized on the basis of SPTI – the academic one (Institute of atmospheric optics Siberian division of the USSR Academy of Sciences), the branch one (Scientific research institute of semiconductor devices) and the high school institute (Scientific research institute of applied mathematics and mechanics), but also to develop large-scale research on the prospective areas of science and technology. During that period, the new schools of thought along with the traditional ones in the field of cybernetics, solid state physics and radio electronics were formed (Sorokin, 2014; Fominykh & Sorokin, 2103). Those researches made a significant contribution to the development of physical science and scientific capacity of the country. The management of SPhTI paid considerable attention to an issue of scientific research. In the 1970-1980s the institute actively developed the international scientific relations with foreign higher education institutions and scientific research institutes.

## 2. Objectives, methodology and research design

The required materials can be found in both published sources and archive funds. The main historical sources for writing are materials of the Siberian Physical-Technical Institute Archive, the State Archives of the Tomsk region (GATO). There are reports, documents of the activities of Tomsk universities and research institutes, the minutes of meetings of scientists and engineers, the memoranda, the appeals to scientists, research topics, etc.

In this paper we used the comparative-historical method which allows to reveal the essence of the phenomena studied and the similarity and difference of their intrinsic properties. In determining the various quantitative and qualitative characteristics of research, we used widely statistical method, historical and sociological analysis.

## 3. Discussion of the research outcomes

### 3.1. *The process and forms of state regulation of university's international scientific and educational contacts in the USSR*

The impulse was given by the USSR Ministry of Higher and Secondary Education. The main legislative documents were processed. Those documents regulated wide circle of issues connected with foreign trips for scientists and professors, graduate and undergraduate university students as well as for the employees of research institutes that reported to the Ministry of Higher Education Institutions (Petrov, 2004). By the order of the Minister of Higher and Secondary Education # 932 passed on November 22 1974, a new instruction about foreign trips was introduced. According to that instruction, foreign trips were to contribute to the development of international scientific and educational ties, their main objectives were to strengthen and develop friendship and cooperation with the communist states, to study the achievements of foreign science and technology, to participate actively in the work of the international organizations dealing with issues of science and education, etc. (Siberian Physical-Technical Institute archive). The main forms of international relations in scientific and educational spheres were bilateral cooperation of the USSR with communist, capitalist and developing countries; the USSR membership in the scientific and technical commissions, committees and UN institutions, other international organizations; the scientific and technological events held in the USSR with participation of foreign experts. One can consider logical the fact that in the conditions of the Cold War proceeding at that time, the main foreign partners of SPhTI in particular as well as the higher education institutions and country scientific research institute on the whole were educational and scientific institutions of Eastern European and Asian countries entering the group of socialist states. However, quite often the staff of institute took, or planned to take training in the capitalist countries (England, the USA, Germany, etc.).

Soviet republics' Ministries of education regularly sent instructive letters to the heads of higher education institutions and scientific research institutes. According to those instructions, each educational and scientific establishments of the country was to make the list of the employees recommended for long and short-term business

trips to foreign higher education institutions and scientific research institutes with the indication with the concrete options of prospective countries and institutions in which training was supposed. Thus, the priority of selecting candidates for training and business trips was given to young research associates and teachers no senior than 35 years by the time of trip with an academic degree of doctor, and then candidate of science. Financing of business trips and training, behind an exception, so-called, scientific tourism, was provided with the relevant ministry. On the basis of the lists, justifications of needs for a foreign trip and other documents sent from the universities and institutes to the USSR Ministry of Higher and Secondary Education they made the general list of applicants for training which was included into the annual comprehensive plan of international scientific and technical activities. That plan was approved by the USSR State Committee of Council of Ministers of Science and Technology. On finishing training, within a month those who had taken a trip had to submit 3 copies of the report approved by their university academic the State Committee on Science and Technology (GKNT). The reports were considered by various scientific and technical commissions of GKNT. The State Committee members issued the conclusion about the expediency of a trip abroad. Thus, the trips abroad and training of young scientists were in sight of the organizations of various levels, and control on them was exercised at the highest state level.

### *3.2. Regulation of international scientific and educational activity in Tomsk State University (TSU)*

TSU international contacts strengthened in the 1970s required the clear mechanisms of foreign trips organization (Petrov, 2004). The university order passed on March 9 1979 the forms and methods of candidate selection, specialists' preparation for traveling abroad and participating in international congresses, conferences, symposiums and professional trainings were defined. In 1978 in order to select and study the recommended candidates by the rector's order the application commission was created in university. The commission members were the vice rector on scientific work (M.P. Kortusov), the vice rector on educational work (A.N. Kudinov), the vice rector on regime (V.M. Miklin), the secretary of TSU Communist Party committee (V.D. Filimonov), the head of educational unit (V.V. Losinsky), the head of human resources department (A.A. Ivanova), the vice-directors on scientific and research work at SPhTI (V.A. Filonenko), of Scientific research institute of applied mathematics and mechanics (I.B. Bogoryad), Scientific research institute of biology and biophysics (A.N. Gundrizer) and the head of Foreign languages Chair (G.N. Tsivanyuk) (Sorokin, 2014). The commission headed by the vice rector on scientific work M.P. Kortusov was responsible for planning trips abroad, the quality of candidates selection for long-term work in foreign universities and scientific research institutes and reporting to the RSFSR Ministry of Higher Education Institutions. Later by TSU rector's order # 152 of March 9 1979 the post of senior inspector on cooperation with foreign universities and scientific research institutes was established. The post was first held by E.A. Paraev (Siberian Physical-Technical Institute archive).

The heads of departments and SPhTI management regularly applied to Tomsk university administration the proposals for trips abroad for their leading researchers. Thus, in 1982-1983 SPhTI suggested to send the senior research associate A.G. Kolesnik for work on the issues of ionosphere solar and terrestrial physics, ionospheric and magnetic communications mathematical model to scientific institutions in the USA, Sweden, or the UK. Except A.G. Kolesnik, it was supposed to send Y.R. Kolobov, P.A. Monasevich, Y.I. Chumlyakov abroad to visit various establishments in GDR, Belgium, ChSSR, the UK. For 1980-1981 SPhTI offered to send 12 institute research associates to various scientific and educational institutions in GDR, Hungary, Poland, Holland, the UK, the USA, Sweden and Japan. SPhTI management quite often sent to the university administration proposals for institute staff participation in the international conferences, symposiums and other scientific activities. Thus, in 1979. the institute recommended professor V. E. Panin, senior research associate V. N. Hachin and scientific secretary of SPhTI A.I. Lotkova for participation in the II international conference on the martensite transformations that was held in the USA (Siberian Physical-Technical Institute archive).

Nevertheless, the majority of SPhTI proposals were denied. It can be explained by the fact that on the whole a rather significant number of proposals from all university divisions were not supported. Moreover, when it came to short-term trainings abroad (from 2 weeks to 3 months) the university administration placed the priority on the professors and employees of Foreign languages department who had never had language practice abroad before. Despite SPhTI administration's efforts, only insignificant number of institute employees could take part in

international conferences (Work reference of the Siberian Red Banner of Labor Physical-Technical Research Institute named after VD Kuznetsov, 1981).

### *3.3. International scientific, research and educational activity in SPhTI*

In the 1970-1980s the Siberian Physicotechnical Institute at Tomsk State University became the center of formation and development of research on the field of cybernetics in the eastern part of the country. SPHTI created in 1928, became the first large research center in the eastern part of the country which conducted research on both fundamental and applied science. Since 1932 SPhTI has been a division of Tomsk State University and its first high school scientific research institute in the east of the country. Along with the fundamental research on physics, mathematics, mechanics, cybernetics, radio electronics the practical problems, within modernization of the national economy were also solved in SPhTI.

SPhTI professor V. E. Panin took an active part in the international scientific conferences in the 1970s. In 1973 V. E. Panin as a part of the Soviet scientists delegation took part in the international conference on atoms and alloys unrandomization, held in Germany. At that conference he made the survey report Electronic structure and unrandomization processes in alloys of transitional elements. Besides, in 1971 he took part in the international colloquium on sintering in Yugoslavia, in 1972 – in the II national conference on metal ceramics in Yugoslavia, in 1975 he visited the UK as a part of scientific exchange initiative. V. E. Panin's trip to the UK was important. During the trip he made several survey reports on the results of the researches carrying out in the field of physics of metals at SPhTI (Siberian Physical-Technical Institute archive). The achievements of SPhTI in the field of the theory of alloys, thermal stability of composite materials were highly appreciated by the leading scientists and specialists of the UK universities. Also V. E. Panin examined the organization of educational process, the results of researches on physics of metals which were developed at the leading UK universities (Siberian Physical-Technical Institute: Institute of History in Documents and Materials (1941-1978 yrs.), 2006). Besides, he received a number of printing works, information materials on different issues from the theory of alloys, creations of composite materials from the scientists of various countries. Those materials were distributed among the specialists of SPhTI physics of metals department and were used in the analysis of the performed works and updating the working plans for next years (Siberian Physical-Technical Institute: Institute of History in Documents and Materials (1941-1978 yrs.), 2006). As a result, V.E. Panin prepared and delivered the report at the SPhTI academic council. The report contained the practical recommendations about the organization and coordination of scientific topics at SPhTI, the positive experience of educational process organization at the UK universities to be implemented by scientific departments of university (Siberian Physical-Technical Institute: Institute of History in Documents and Materials (1941-1978 yrs.), 2006).

In 1974-1975 the senior research associate of SPhTI V.P. Shulepin took a scientific training in the Institute of information theory and automation (Czechoslovak Academy of Sciences, Prague) (Siberian Physical-Technical Institute archive). V.P. Shulepin examined modern approaches and techniques to study the properties of stable algorithms for parameters estimation with heterogeneous data under the scientific supervision of Ilvec, professor of the institute. Also V.P. Shulepin examined the educational program on probability theory and mathematical statistics, the textbooks of the chair of mathematical statistics in Charles University (Prague, Czechoslovakia).

In 1972 V.N. Nikitin, senior research associate of the SPhTI department of physics of metals took a monthly training in the Academy of Mining and Metallurgy in Krakow (Siberian Physical-Technical Institute archive). As a result of that training, V.N. Nikitin examined the scope of scientific researches and techniques for carrying out experiments in various institutes of the Academy of Mining and Metallurgy (Krakow), Institute of Metallurgical Science of the Polish Academy of Sciences (Krakow), Foundry Research Institute (Krakow), Materials science Institute at Polytechnical Institute (Warsaw). Also she took part in carrying out a number of physical experiments in the Academy of Mining and Metallurgy (Siberian Physical-Technical Institute archive).

Besides the training abroad taken by SPhTI employees in the 1970s, during the stated period foreign European experts visited the Institute. For instance, in 1978 the specialists of the European Organization for Nuclear Research (CERN, Switzerland) visited SPhTI for the purpose of delivering a training in working operations with CAMAC EUR 6100 system for the Institute employees. Also the SPhTI director initiated a correspondence with the specialists of CERN of nuclear research department. That correspondence resulted in obtaining important and

unique materials on CAMAC system from CERN. Due to the personal contacts and correspondence, many research associates had opportunity to publish their articles in scientific journals of France, Germany, Czechoslovakia, etc. The staff members of the physics of metals department M.B. Makogon, M.A. Bolshanina, S.F. Tyumentseva, M.K. Yeliseyeva, A.D. Bratchikov, N.I. Afanasyev, Y.A. Dvinskikh, published in 1978 the joint article “The investigation of possible decrease of thickness in lead cable sheaths” in *Annales des telecommunications magazine* (France) due to acquaintance with professor P. Mornet and his active personal participation. The professors of TSU Physics department G.N. Sotiriadi and B.S. Perkalkis actively exchanged scientific literature, the results of experiments on television demonstrations for lecture classes with their French and Hungarian colleagues (Materials on outward secondments, Siberian Physical-Technical Institute archive).

SPhTI developments were widely demonstrated in all national and international conferences on the research topics relevant to SPhTI work. Annually about 300-350 reports were presented in conferences, up to 500 scientific articles were published in periodical Soviet and foreign scientific press. In the central publishing houses and in Tomsk University publishing house monographs by SPhTI employees were systematically published (Report at the ceremonial meeting of the collective dedicated to the fiftieth anniversary of the Siberian Physical-Technical Institute).

The SPhTI scientists took an active part in international programs on ionosphere research. For instance, the employees of SPhTI ionosphere actively participated in conduction international research of International Geophysical Year, International Year of Cooperation, International Year of The Quiet Sun (IYQS), International Year of The Active Sun (IYAS), International patrol of sun and geophysical activity project. In 1976-1978 the Ionosphere Laboratory took part in the international program International Magnetosphere Studies which was aimed at obtaining comprehensive information about the dynamic processes in the near-Earth SPhTI archive (Siberian Physical-Technical Institute archive. Fond. M.A. Krivov. Archival affairs № 53).

The participation of ionosphere station scientists in the majority of international ionosphere research programs bears the evidence for world recognition of the research in that field conducted in SPhTI.

#### 4. Conclusion

Thus, the participation of SPhTI staff in various international scientific activities, acquaintance with the advanced and relevant scientific issues of that period developed by the leading scientific centers and universities of the world, the methods and results of their solution contributed to enrichment and enhancement of SPhTI scientists' qualification. SPhTI scientists' participation in trips abroad resulted in establishing personal contacts and communication ties. That became the basis for the regular correspondence and exchange of scientific and technical information. All that, eventually, favorably influenced the quality of research work, gave new impetus for organization of large scientific conferences with participation of the leading scientists.

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