

**INSTITUTE OF MATHEMATICS AND INFORMATICS**

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## FORTY YEARS HISTORY OF THE INSTITUTE OF MATHEMATICS AND INFORMATICS

**Year 1952: Mathematics at the Lithuanian Academy of Sciences.** An intensive scientific research in mathematics was commenced in Lithuania only after the 2nd world war, after the maturity of a new mathematical generation.

As early as 1941 the Academy of Sciences was established in Lithuania which embraced the Institute of Technical Sciences into its system, too. In 1952 this institute was reorganized into the Physical and Technical Institute, consisting of two sectors: Physics, Mathematics and Astronomy, and Technical Physics.

At that time, after his postgraduate courses supervised by prof. Yu. Linnik at St. Petersburg J. Kubilius began working at the Vilnius University, having successfully maintained a candidate thesis. Along with teaching and marked scientific work he also undertook a very important task-organization of the olympiad in mathematics of all Lithuanian pupils. Later on the olympiad became annual. That was a very significant event for the development of mathematics in Lithuania which facilitated to spot not a single talent in mathematics.

In 1952 a first mathematician, a scientist of great erudition J. Kubilius began working at the sector of Physics, Mathematics and Astronomy (headed by A. Jucys) of the Physical and Technical Institute (director prof. A. Žukauskas). That is why 1952 can be regarded as the beginning of emergence of mathematics in the Lithuanian Academy of Sciences.

Now it was necessary to decide which branches of mathematics to develop further in Lithuania. It was not so simple to organize scientific research work in Lithuania, since some of the opponents of older generation understood the significance of mathematics in a rather utilitarian way. There were quite a few possibilities of choice of areas, however, it was venturesome to scatter not so abundant forces among many fields. Prof. J. Kubilius thought it was reasonable to develop the probability theory in Lithuania as well as the theory of differential equations in future. He also understood well the importance of work in the field of electronic computing machines, therefore he paid attention to the development of mathematical logic. There was a possibility to prepare some of the staff here in Lithuania,

sending others to other scientific centers.

In 1954, a gifted graduate from the Vilnius University V. Statulevičius is enrolled into the postgraduate courses in the probability theory supervised by prof. Yu. Linnik. After successful postgraduate courses, V. Statulevičius, incited by J. Kubilius, related his further scientific and organization activities with the present Institute of Mathematics and Informatics. Working hard and efficiently soon he became one of the most outstanding worldrenowned specialists in limit theorems of the probability theory, who educated a numerous school of scientists: 36 doctors of science, 10 of which became doctors habilius or professors.

In 1955, a first postgraduate student in mathematics R. Uždavinyš entered postgraduate courses of the institute, who worked later as an associate professor at the Vilnius University.

In 1954, a brilliant olympiad winner in school mathematics B. Grigelionis enters the Vilnius University, and J. Kubilius works with him personally. After his university studies B. Grigelionis was sent to postgraduate studies at Kiev and Moscow, supervised by prof. B. Gnedenko. After these studies, upon return to Lithuania B. Grigelionis pursued a very successful scientific work and set up a strong school in the theory of stochastic processes. At present academician B. Grigelionis heads the Mathematical Statistics department of the institute.

**Year 1956: The outset of the history of Institute of Mathematics and Informatics.** On October 1, 1956, the Physical and Technical Institute was reorganized into three others. On the basis of the former Physical sectors the Institute of Physics and Mathematics was founded. Excellent organizers of scientific work and outstanding physicists prof. A. Jucys and prof. P. Brazdžiūnas as well as prof. J. Kubilius were the initiators. There were three scientific subdivisions in the new institute: Theoretical Physics sector (headed by A. Jucys), Semiconductor laboratory (head P. Brazdžiūnas), and Mathematical sector (head J. Kubilius). A. Jucys was nominated director of the institute which at first included 14 research associates, only 6 of them with scientific degrees. The premises of the institute were situated on T. Kosciuškos st. 30 and comprised 143.89 m<sup>2</sup>. The main research were: probabilistic number areas theory, theoretical and experimental physics, and astronomy.

At first there were 3 mathematicians at the Mathematical sector: J. Kubilius, postgraduate student R. Uždavinyš, and laboratory assistant R. Merkytė.

In 1957 V. Statulevičius and K. Bulota returned after their postgraduate studies, V. Matulis graduated from the Vilnius University. Despite that V. Matulis' graduation work was in the probability theory, he was sent to postgraduate courses at St. Petersburg to study mathematical logic under the supervision of prof. N. Shanin.

After the studies at the Vilnius University, in 1958 E. Vilkas, L. Vilkauskas, and E. Budreika (deceased still young) were employed at the institute. Soon E. Vilkas was directed to postgraduate studies in the game theory supervised by prof. V. Vorobyov.

The institute was extending, annually supplemented with young capable mathematicians. In 1957, J. Kubilius maintained his doctoral thesis (in present terms-habilitation) at the Moscow V. Steklov Mathematical Institute, on the basis of which he created a new branch in mathematics a probabilistic number theory. It is presented in J. Kubilius' monograph "Probabilistic Methods in Number Theory" published in 1959, in 1962 in Russian, and in 1964, 1968, 1978, and 1988 in English. In 1958 he becomes rector of the Vilnius University, simultaneously heading the Mathematical sector of the institute. After maintaining a thesis in 1959 V. Statulevičius becomes head of the sector. At the same time, a new trend of mathematical science – limit theorems of the probability theory – starts developing at the institute. From the very beginning of his scientific organization activities V. Statulevičius paid the greatest attention to the development of mathematical sciences in Lithuania, to strengthening and tending of the institute. He was director of the institute from 1967 to 1995, and since 1995 up till now he is the chairman of the Senate of our institute, being head of the Probability theory department all this time as well.

Apart from the traditional scientific trends prof. A. Jucys took care of implementation of electronic computer technology which was the pledge of a rapid scientific advance. By the efforts and care of A. Jucys the first Computer Centre in Lithuania has been built, and in 1961 a Laboratory of Electronic Computers was set up (headed by K. Žukauskas). A year later, the first electronic computer BESM-2M was put into operation, a Computational Mathematics sector was set up headed by V. Matulis. The establishment of this sector was the beginning of a qualitative jump in scientific research of the Lithuanian academy of sciences.

On July 1, 1963, prof. J. Požėla was elected director of the Institute of Physics and Mathematics. About 200 researchers worked at the institute at that time. Scientific research was extending, new trends came into being. Therefore some former departments were reorganized, new ones established.

On October 1, 1965, a Recognition Processes department was established (headed by prof. L. Telksnys then and up till now), in which systematic research of cybernetics problems was started. In this manner, along with scientific research in physics and mathematics a new scientific trend – cybernetics – emerges at the institute.

After an extensive development of research in semiconductor physics, in 1967 the Institute of Physics and Mathematics, having grown both qualitatively and quantitatively, is split into two institutes: Physics and Mathematics, and Semiconductor Physics. Since that time prof. V. Statulevičius has been heading the Institute of Physics and Mathematics.

The institute has been constantly and rapidly growing. On January 1, 1967, the Computational Methods sector was set up, the head of which is M. Sapagovas after his postgraduate studies, supervised by prof. V. Shamanski at Kiev. Later on the Programming and Problem Solving sector was established, headed by B. Kvedaras after graduation from his postgraduate courses supervised by prof. S. Krein at Voronezh (later on this sector developed into

the present Differential Equations department), as well as Operations Research sector (head E. Vilkas). In 1969, a Software sector (head P. Rumšas) was set up as well as an Optimal Solution Theory sector (headed by prof. J. Mockus, by the way, he worked earlier at the Technical institute before its reorganization). In 1970, a Mathematical Statistics department (head B. Grigelionis) and in 1976, an Information and Patents sector (head J. Masiulis) were established.

The Computer Center was equipped with new computers: in 1968 BESM-4M began functioning, in 1971 BESM-6, and in 1976 one more BESM-6.

At the end of 1974 the institute totaled up to 625 persons. The extension of the pursued scientific research trends preconditioned one more great reorganization. On January 1, 1977, the Institute of Physics and Mathematics was divided into the Institute of Physics and the Institute of Mathematics and Cybernetics (IMC). prof. V. Statulevičius became director of IMC. Two major scientific research trends were distinguished: probability theory and its application in control problems, and computer application in research. Subdivisions were reorganized correspondingly, i.e., in 1977 a knowledge based systems sector (head), an Experimental Manufacturing department (head L. Bulotas), and a Laboratory for Computer Application in Research (head V. Černiauskas) were set up, in 1978 a Laboratory for Control of Technological Processes (head C. Paulauskas) was established. In 1980, subdivisions under the status of sectors became departments while smaller subdivisions within them became sectors. In 1981, a System Programming sector (head G. Grigas) was set up later turning into the Programming Methodology department, as well as a Data Analysis department (headed by prof. Š. Raudys). The Probability Theory and Mathematical Statistics departments having been extended and strengthened, administration of the institute took care of the development of applied research in the statistics. Thus an Applied Statistics department was set up in 1988 under the <sup>d</sup>quittance of prof. R. Bentkus, who later on left for work at the Vytautas Magnus University. Now this department, whose scientists are successfully collaborating with the state Department of Statistics of Lithuania, is headed by prof. R. Rudzkis.

The Computer Center is strengthened further (headed by B. Binkauskas). In 1983 a computer ES-1045, in 1985 – ELBRUS, in 1990 – ES-1066 are acquired.

In 1990 the Institute of Mathematics and Cybernetics was renamed the Institute of Mathematics and Informatics. At that time it enlisted 424 people. In 1993 the Mathematical Logic and Algorithms department, headed by V. Matulis for a long time, was split into two departments: Mathematical Logic (head R. Pliuškevičius), and Software Engineering (head A. Čaplinskas).

A rapid advance in computer technology touched Lithuania, too. Huge computers (ESM) requiring much power and maintenance had to be closed, the specialists attending them left for other work. In addition, after the restitution of independence in Lithuania in 1990 and with the beginning of scientific system reform, quite a few scientific researchers left the institute as

well. At the end of 1996, there were 245 persons in the institute, including 131 researchers, 99 of them with scientific degrees (24 doctors habilius and 75 doctors). In response to the proposals of Norway Research Council experts a structural reorganization of the institute was performed in 1996, after which the institute consisted only of 12 scientific subdivisions: Probability Theory, Mathematical Statistics, Applied Statistics, Differential Equations, Numerical Analysis, Mathematical Logic, Recognition Processes, Optimization, Data Analysis, Programming Methodology, Software Engineering departments, and the Laboratory of Computer Application in Research. prof. M. Sapagovas was elected director of the institute since 1995.

**The present of the Institute of Mathematics and Informatics.** The institute has the status of a scientific state institution and organizes its activities basing on the Statute approved by Government of Lithuania on January 28, 1992. The institute is associated with the Vytautas Magnus University.

At present the scientific research activities of the institute are focused on the three key trends:

- probability theory and mathematical statistics, integro-differential equations and their numerical solution methods, and the problems of mathematical logic and algorithm theory;
- research of recognition processes, multiextremal optimization problems, and large-scale systems and their control;
- development of software and data bases for computers and computer-aided systems.

Apart from scientific research the institute takes an active part in the education of scientists. Since the beginning of 1992 Government of Lithuania granted the institute the admission to doctoral studies and the right of conferring scientific degrees (jointly with Lithuanian universities) in the trends of mathematics, statistics, informatics, and system analysis. 19 doctoral students are studying now and pursuing research at the institute. In addition, Government granted the right to the institute to confer doctor's habilius degrees in the trends of informatics (jointly with Vytautas Magnus University) and mathematics.

The institute issues two scientific journals: "Lietuvos matematikos rinkinys" ("Lithuanian Mathematical Journal") (jointly with Vilnius University) and "Informatica". The former is translated into English in the USA.

About 50 scientists of the institute are delivering lectures, especially special courses, in the bachelor and master studies in Lithuania and foreign universities (Canada, USA, Brazil, Germany, Italy, etc.).

Since 1973 it has already become a tradition that the institute (in conjunction with the Vilnius University) is the organizer of the international conference on Probability Theory and Mathematical Statistics, known in the world as the Vilnius conference. The 7th in turn conference will be held in 1998.

In the lapse of 40 years of the institute's lifetime (1956 – 1996) our scientists:

- have presented over 140 invited papers at international conferences and scientific world congresses;
- have written 42 monographs, the majority of which are translated abroad.
- have published over 2500 scientific articles;
- have written 13 textbooks for higher and secondary schools;
- have written over 70 science popularization books;
- have prepared 216 doctors of sciences, 24 of which have maintained habilitation;
- have organized 19 international conferences;
- have carried out 12 scientific projects of international research programmes;
- have prepared 18 software packages and about 200 programmes;
- have made about 200 inventions.

Scientific secretary

S. Rutkauskas