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MILESTONES IN THE DEVELOPMENT OF PHYSICS IN THE SOFIA UNIVERSITY (1889 - 1945)

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The creation and development of physics between the opening the Faculty of Physics and Mathematics and swarming the chairs of physics outside the University of Sofia is an important stage in the history of physics in Bulgaria. Four milestones in the development of our physics are identified and discussed in this paper. This milestones are the creation of the Institute of Physics at the Sofia University, the separations of physics and mathematics as university subjects and scientific branches, and the defending of the first doctor in physical sciences thesises at the University.

INTRODUCTION

The history of physics in Bulgaria starts in the Middle Ages and in the National Revival. Physics is introduced in the Bulgarian non-clerical schools from E. Vaskidovich [1], I. Seliminski, N. Gerov, Y. Gruev and I. Gyuzelev in 19-th century. [2] The higher education in physics is a new stage in the history of physics in Bulgaria. [3] It is established at the University of Sofia in 1889. G. Nadjakoff identifies two main periods in the history of the Sofia University: 1889-1918 and 1918-1945. [4] This periodization is too general. We think it is not full. The aim of this paper is to point out four more precise milestones in the development of physics teaching and research in the Sofia University. [5]

1. THE INSTITUTE OF PHYSICS AT THE SOFIA UNIVERSITY (1889-1897)

The first milestone in the development of physics in the Sofia University is the creation of the "Institute of Physics". The mathematician E. Ivanow is the first who read lectures in "physics" during 1889/90. From the next year on the general course in physics, called "experimental physics", is read by the physicists P. Bachmetjew (1890/91-1905/6), G. Markowski (1891/2), and M. Batchevarow (1892/3-1897/8). A lecture course in "astronomy" is created by M. Batchevarow (1892-1926). "Analytical mechanics" is read by the mathematicians M. Momtchilow (1891-1893) and S. Ganew (1893-1910). Three university subjects are created in the Faculty of Physics and Mathematics: "mathematics and physics", "mathematics and descriptive geometry" and "chemistry". The exams are after each university term. Special exams for the subject "mathematics and physics" are experimental "physics and analytical mechanics". The general examinations for the subjects "mathematics and physics", and "mathematics and descriptive geometry" are "spherical astronomy, algebraic analysis, differential and integral calculus, analytical and descriptive geometry". Chairs in

"experimental physics", "astronomy" and "analytical mechanics" are established by P. Bachmetjew (1895), M. Batchevarow (1895) and S. Ganew (1897).

In 1889 the first collection of instruments in physics is transferred to the University from the First Sofia Man Secondary School. Later on "amperemeter", "calorimeter", "electrodynamometer", "electrofore", "galvanometers", "magnetic theodolite", "photometer", "reflectometer", "spectrometer", "sonometer", "telescopes" are imported. Physics laboratory, library, dark room for spectral analysis and photometry and magnetic station are opened. Two assistants in physics J. Vajarow and P. Pentchew are appointed. Experimental exercises in physics are initiated for the students since 1890/91. Secondary activities (soldering, filing, thick glass-pipe cutting, making a hole on a glass-bottle and s.o.) are mastered. About a hundred of apparatus (as "apparatus for electric waves", "apparatus for ozone", "accumulator", "areometer", "battery", "bolometer", "electrometer", "electroscope" "electric induction machine", "electrostatic and electromagnetic motor", "electric bells", "condenser", "magnetic balance", "reochord", "soil of Ruhmkorff") are made by students of P. Bachmetjew. Some of them are original. The Institute of Physics at the Sofia University is established in 1897.

2. CREATION OF AN INDEPENDENT SUBJECT OF PHYSICS (1897-1921)

The second period in the development of physics in the Sofia University is characterized by an expansion of the branch "mathematics and physics". Since 1896/7 the education at the University is four years. Twelve hours per week at least are obligatory for students according to the Law of the University from 1904. A branch "mathematics and physics" is created from the sciences "mathematics", "physics" and "astronomy". In 1909 the chairs in mathematics are: "differential and integral calculus", "higher algebra", "theory of functions", "analytic, differential, projection and descriptive geometry". The chairs in physics are: "experimental physics and meteorology", "mathematical physics", and "analytic mechanics". The only astronomy chair is the chair in "astronomy and geodesy". A new meteorological station and astronomical observatory are created at the Physical Institute in the beginning of the second period. Practical exercises in astronomy (1897/8) and meteorology (1898/9) are started. In 1910 the astronomical observatory is separated as independent "Institute of Astronomy". An "Institute of Physics II" is founded for students of the related faculties in 1918. A. Christoff (1909-1837) and I. Tzenoff (1914) are elected heads of the chairs in experimental physics and meteorology and in analytical mechanics. At the end of the second period, new lecturers in physics are elected: P. Pentchew in special physics (1919-1938), R. Rainoff in meteorology (1920), and G. Maneff (1921-1944) in theoretical physics. G. Maneff became head of the new

established chair in "theoretical physics". New courses in "theoretical physics" (G. Maneff) and "electrical phenomena in gases and radioactivity" (P. Penchew) are created. A short course in "experimental physics" for related faculties starts at the same time. In 1921 physics and mathematics are separated as subjects in the Sofia University. The new program in physics for the first university exam is: "experimental physics", "meteorology", "analytical geometry", "differential and integral calculus", a "new foreign language" (French, German, or English), and for the second university exam: "theoretical physics", "analytical mechanics", "astronomy or physical chemistry".

3. INDEPENDENT BRANCH IN PHYSICS (1921-1933)

The next milestone in the development of physics in the Sofia University can be associated with the creation of an independent branch in "physics". The chair in analytical mechanics is moved to the branch of mathematics in 1924. Chair in physical-chemistry is created in the branch of chemistry by I. N. Stranski in 1925. N. Boneff is elected head of the chair in astronomy (1928) and G. Nadjakoff is elected new lecturer in the chair in experimental physics and meteorology (1927). Some new lecture courses in: "meteorology (atmospheric dynamics, optics, acoustics and electricity)", "geophysics", "meteorological and climatic conditions in Bulgaria", "vector calculus" and "geodesy" are introduced. Courses in "meteorology with climatology" and "geodesy" are read for the related faculties. At the end of the period the academic staff in physics consists of one full professor and five extraordinary professors. The curricula of branches in physics and mathematics separated in 1933. Doctor (or academic) exam in physics is introduced in 1928. Two semesters special labour working with a director of studies, doctorate thesis writing, discussioning and public examination are demanded. The first who registered for the academic examination in physics is E. Djakow.

4. SYSTEMATIC RESEARCH IN PHYSICS (1933-1945)

The fourth period in the development of physics in the Sofia University is characterized by broadening the systematic investigations in physics under the direction of the lecturers in physical sciences. Systematic experimental research in physics is carried out at the physical institutes at that time. The first dissertation in physics "Precipitation of ionic crystals one on the top of the other" is defended by L. Krastanow in 1938. It is worked out under the direction of I. N. Stranski in the Institute of Physical Chemistry at the Sofia University. The second thesis in physics "Origin of the electromotive forces of the photovoltaic effects" is defended by R. Andreichin under the direction of G. Nadjakoff in 1940. The last thesis "Investigation of quadruple's and non-diagram's lines in the spectrum of Tantalus, Tungsten, and Platinum" is defended by V. Vranski in 1941. It is worked out under the direction of V. Doleishek in the

University of Prague. Nine candidates for academic examination in physics are registered by the end of the World War II. G. Nadjakoff is elected head of the chair in experimental physics in 1937. E. Djakow and E. Kara-Michailova are elected lecturers in "special physics" in the same chair in 1939. Colloquiums in "physical chemistry" headed by I. N. Stranski, "meteorology and geophysics" headed by R. Rainoff (1934/5-1943/4) and "physics" with E. Djakow and E. Kara-Michailova and under the direction of G. Nadjakoff (1941/2-1943/4) are organized. Laboratories for special exercises in nuclear physics and electrical engineering are equipped. The assistants of physics reach the number of 16 at the end of this fourth period.

CONCLUSIONS

The development of university education and research in physics in Bulgaria starts in 1889. Several chairs and institutes in physics at the Sofia University are created during the next years. The branch in physics becomes independent with the Program for the university examinations in physics in 1921, Regulations of academic examination in physics in 1928, and Curriculum in physics in 1933. Systematic experimental research is organized in the physical institutes of the Sofia University.

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