

## **Brief Historic Outlook on Medical and Biological Physics Teaching at the National Medical University, Kiev, Ukraine: Part I, 1841-1952**

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Medical Faculty of Kiev University named after Saint Vladimir (at that time, at present - Kiev National University named after Taras Shevchenko ) was created in September, 1841. During next 80 years, from 1841 till April 1920, the separate department for medical physics teaching did not exist at the university. Then the Kiev Institute of Health Care was created on the base of the university's Medical Faculty and shortly, in December, 1920, it was transformed into Kiev State Medical Academy. After one year it was renamed into Kiev Medical Institute, that at present is called National Medical University named after O.O.Bohomolets.

Nowadays, about 1500 students of the first-year of study are beginning their training in medical and biological physics in National Medical University each academic year. Students receive knowledge in medical applications of basic physical laws concerning ionizing radiation and dosimetry, medical electronic equipment in diagnostics and therapy, haemodynamics and rheology, optical and quantum-mechanical methods, etc. as well as in biophysics (physical properties of membranes, ion transport through membrane structures, rest and action potentials). The course "Medical and Biological Physics" has associated laboratories which provide students additional practical training in medical and biological physics, including diagnostic and physiotherapeutic electronic equipment, equipment for radiation dosimetry control, viscosimetric and optical methods in medicine. Unfortunately, physics education is not very deep in Ukrainian medical universities because students typically have a lack of mathematical knowledge. Nevertheless, it gives a necessary introduction to the most modern achievements of physics in medicine such as magnetic resonance, thermography, laser physics, electrical bioimpedance and other methods. The Department of Medical and Biological Physics of NMU seeks to teach future physicians to apply medical physics and biomedical engineering to the treatment and diagnostics. These efforts focus on the areas of basic sciences and disciplines in which students of the 2nd and higher years of study receive training (physiology, cardiology, X-ray therapy, hygiene and others).

**170-years history** of teaching physics for medical students at the National Medical University encourage all 23 present members of the Department of Medical and Biological Physics to do the best they can to enforce the experience and traditions which were accumulated by predecessors.

The first lecturer, who gave the course of physics for medical students at the Kiev University, was **V.P.Chehovich**. He held a position of professor on the department of general physics up to 1846 year. Prof. V.P.Chehovich, geologist by education, delivered lectures on physics in that volume in which it was taught in religious education establishments, and did not go beyond secondary school course.

Teaching of physics became some better after arrival in the Kiev University the professor **E.A.Knorr** (head of physics department 1846-1858) and his successor - professor **M.I.Talysin**, who was the head of department of physics from 1858 to 1865. On initiative of professor E.A.Knorr in 1856 at the university was built the Meteorological Observatory which exists even now in the center of Kiev, on the corner of Vorovskogo street and Observatorna street.



Beginning of serious scientific researches on the department of physics of the Kiev University, including researches on the medical faculty, associated to the famous scientist and teacher, founder of the first physical school in Ukraine, professor **M.P.Avenarius** (7.09.1835 - 4.09.1895), which headed the department of physics almost 25 years, in a period from 1865 till 1890. Professor M.P.Avenarius was a fundamentally well-educated man. By the tireless pedagogical activity and wonderful scientific researches he made a great impact in development of physical science.

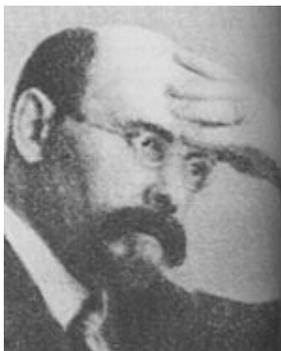
During 1873-1877 professor M.P.Avenarius and his students conducted experimental research and received exact values of critical parameters for many substances. Those values were included in the general physical data-base and longtime remained unchanged.

Although professor M.P.Avenarius was not engaged directly in scientific researches in the field of medical physics, on his initiative in 1873 at the Kiev University the first special **Laboratory of Medical Physics** was created. Doctor of medicine **A.S.Shklyarevskiy** was appointed the head of laboratory. A.S.Shklyarevskiy specialized mainly in the field of pathophysiology and pathoanatomy. In 1881-1882 he has published "Lectures on Medical Physics". Coming from the analysis of medicine development, he actively promoted the necessity of teaching of physics for future doctors. The title of his doctor dissertation was "About passing of white bloods corpuscles through colloid shells". His main scientific activity was devoted to the problems of inflammation, permeability of vascular walls and physiology of capillaries. He was the first who applied an experimental method for the study of mechanism of extravasation and migrations of leucocytes.

The successor of professor M.P.Avenarius on the position of head of department during next 13 years (1890-1903) was professor **N.N.Shiller** (13.03.1848 - 23.11.1910). He was the specialist in the field of thermodynamics and electrodynamics. N.N.Shiller graduated from the Moscow University in 1868. In 1871-1874 he worked in the Berlin University under supervision of great German physician and physicist professor Hermann von Helmholtz (1821-1894). Professor M.M.Shiller led the first department of theoretical physics on the territory of the present Ukraine and wrote near 90 scientific papers. The advanced studies of professor N.N.Shiller dedicated to many fields of physics: mechanics, thermodynamics, optics, molecular physics and other. N.N.Shiller's scientific researches devoted to experimental confirmation of main predictions of one of the most prominent scientific achievements of XIX age – Maxwell's electrodynamics and the results achieved large popularity.



In 1896 at the Kiev University the **Physical-Medical Society** was the founded with the purpose of rapprochement of medicine and other branches of natural sciences and wider application of fundamental research results in medical practice. The Head of Skin Diseases Department professor **M.I.Stukovenko** was the Chairman of the Society. Physical-Medical Society activities successfully lasted approximately 20 years until revolution distortions in Kiev. The activities of the Society were restarted almost after 100 years from foundation in the present National Medical University named after O.O.Bohomolets



Academician **J.J.Kosonogov** (31.03.1866 - 22.03.1922) headed the department of physics of Kiev University from 1903 till 1920. He graduated from the Kiev University in 1889 and was a student of professor M.P.Avenarius. His scientific activities were devoted to research of the electric and optical phenomena. In 1902 J.J.Kosonogov discovered optical resonance in the region of visible rays and explained by this phenomenon the bright colours of bodies with

heterogeneous structure. He first applied ultramicroscope for the study of electrolysis. He was a talented experimenter and executed the row of valuable researches devoted to physics of dielectrics, to physical optics and some other question. Academician J.J.Kosonogov spared large attention to the improvement of physics teaching methods both in high and in secondary school. He has published the number of physics textbooks, including guidances in physics for the university students.

The first Head of **Physics Department of the Kiev Medical Institute** from 1920 till 1922 was professor **B.M.Yankowich**. He was the student of J.J.Kosonogov. B.M.Yankowich have founded in 1914 the first Cabinet for Röntgen-diagnostics (X-ray) in Kiev at the Faculty Surgical Clinic of professor N.M.Volkowich. B.M.Yankowich was a Chairman of Junior Lecturers Union of higher educational establishments of Kiev. Scientific work was devoted to theoretical mechanics. Since that time, the general direction of teaching of physics for the medical students did not change essentially up to beginning of 50th.

The successors of the professor B.M.Yankowich on the position of the Head of Physics Department of the Kiev Medical Institute were: professor **G.S.Rudenko** (in the period 1922-1925 and later in 1929-1941 and more in the period 1943-1948), academician **A.H.Goldman** (in the period 1925-1929) and associate professor **D.M.Trubchenko** (in the period 1941-1943 and 1948-1952).

Professor **A.H.Goldman** (3.11.1884 - 30.12.1971) graduated from Leipzig University (1908) and Kiev University (1909). He was the first director of the one of the most known scientific physical establishment in Ukraine - Institute of Physics, National Academy of Science of Ukraine.

Professors A.H.Goldman and D.M.Trubchenko dedicated the main attention to adjusting of pedagogical process and creation of educational laboratories. The only major task of the department consisted in preparation of future doctors to use specialized medical equipment.

There were number of reasons which broke alteration of medical physics course in the Kiev Medical Institute at that time. It is worth to mention, foremost, the very weak material equipment of the department, the lack of high-quality physical apparatus, especially during period after organization of the institute in 1921. This situation little changed in the first years after the end of World War II. Only at the beginning of 50th the strong necessity of deep modernization of physics teaching for medical students became absolutely obvious.



*To be continued.*