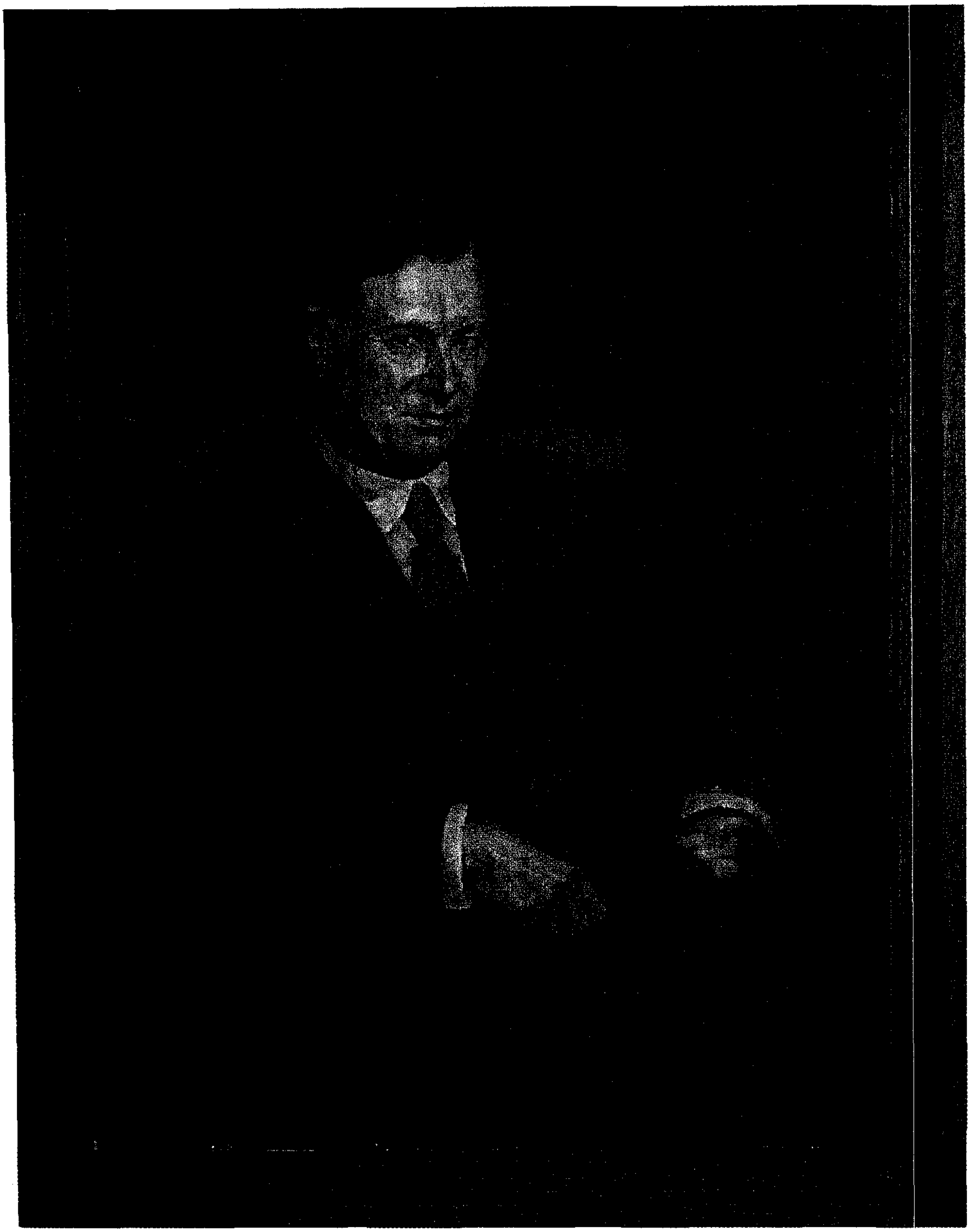

ALEKSANDER JABŁOŃSKI

(painting of Edmund Wadowski)

ALEKSANDER JABŁOŃSKI (1898–1980)

Professor Aleksander Jabłoński, the founder of physical researches at Nicholas Copernicus University at Toruń, was born on February 26th, 1898 in Voskresenovka, Ukraine, which at that time was a part of Russia. In 1916 he entered the University of Kharkov to study physics. His study at Kharkov was interrupted by his military service first in Russia and later, during World War I in the newly organized Polish Army.

At the end of 1918, when Poland was re-created after more than 120 years of occupation by neighbouring powers, Jabłoński left Kharkov and arrived in Warsaw, where he entered Warsaw University to continue his study of physics. His study at Warsaw was again interrupted in 1920 by his military service during the Polish-Bolshevik war.

As enthusiastic musician, Jabłoński played the first violin at the Warsaw Opera from 1921 to 1926, in parallel with his studies at the University under Stefan Pieńkowski for his doctorate, which he received in 1930 with a thesis *On the influence of the wavelength of excitation light on the fluorescence spectra.* Although Jabłoński left Opera in 1926 and devoted himself entirely to scientific work, music remained his great passion until the last days of his life.

After receiving his doctorate, Jabłoński spent two years (1930–1931) as a fellow of the Rockefeller Foundation in Germany working first with Peter Pringsheim in Berlin at the Physikalisches Institut der Universität and later with Otto Stern in Hamburg. In 1934 he acquired his habilitation from Warsaw University with the thesis *On the influence of intermolecular interactions on the absorption and emission of light.*

Throughout the 1920s and 30s the Department of Experimental Physics at Warsaw University was an active centre for studies on luminescence, under S. Pieńkowski. During most of this period Jabłoński worked both theoretically and experimentally on fundamental problems of photoluminescence of liquid solutions as well as on the pressure effects on atomic spectral lines in gases.

His early work at Warsaw included measurements of absorption spectra of liquid solutions and the experimental proof that in typical cases in the fluorescence spectra the intensity distribution is independent of the wavelength of the exciting light. He introduced then the concept of a *luminescent centre*, i.e., the system composed of the excited molecule and its closest neighbourhood. Using the Franck–Condon principle generalized to such centres, Jabłoński explained the main features of the fluorescence phenomena in liquid solutions. In 1933 he suggested the famous diagram, commonly known under his name, which makes it possible to explain both the kinetics and the spectra of fluorescence, phosphorescence, and delayed fluorescence. In this diagram, which now serves as the starting point of all modern textbooks on photochemistry, a very essential role is played by a metastable state later identified as the triplet state by G.N. Lewis and M. Kasha and independently by A.N. Terenin. This identification was finally shown to be correct in experiments done by C.A. Hutchison, B.W. Mangun, J.H. Van der Waals, and M.S. de Groot in the late 1950s who used the electron paramagnetic resonance techniques.

The problem that intrigued Jabłoński for many years was the polarization of photoluminescence of solutions. To explain the experimental facts he distinguished the transition moments in absorption and in emission and analyzed various factors responsible for the depolarization of luminescence. In 1934 Jabłoński proposed a method for the orientation of molecules in anisotropic matrices which serves now as an important tool in studies of linear dichroism and polarization caused by oriented molecules. In particular, this method is now widely applied in biophysical investigations.

In 1931 Jabłoński started to work in his second main field of research, namely the collisional broadening and shift of atomic spectral lines. In that year as the very first person he recognised the analogy between the pressure broadening phenomena and the production of molecular spectra. This analogy was the starting point of the quantum-mechanical pressure broadening theory developed by him in the late 1930s and early 1940s. The Jabłoński theory is based on two assumptions: (1) the validity of the Born–Oppenheimer approximation for the wave functions of the *quasimolecule* formed by the radiating and perturbing atoms during a collision, and (2) the Franck–Condon principle in its quantum-mechanical formulation. Starting from these two assumptions Jabłoński has derived from quantum mechanics the *quasistatic* expression for the intensity distribution in far wings of spectral lines derived earlier on classical ground by H. Holtsmark, H.G. Kuhn and H. Margenau.

In April 1938 Jabłoński accepted a faculty appointment at the Stefan Batory University at Wilno (Vilnius), where he developed experimental studies of pressure broadening of atomic spectral lines. In particular, he initiated there the pioneering investigations of the temperature dependence of widths of pressure broadened spectral lines. These studies, whose first results were published by him and H. Horodniczy in two communications in *Nature*, were interrupted by the outbreak of World War II on September 1st, 1939 when Poland became attacked from the West and the North by the Nazi Germany. Being again in the military service Jabłoński went through the Polish-German September campaign. On September 17, 1939 when due to the Ribbentrop–Molotov agreement Poland was attacked from the East by the Soviet Army, Jabłoński with his military unit crossed the Polish-Lithuanian border and was sent by Lithuanian authorities to an internment camp. At the end of 1939 he was released from the camp and came back to Vilnius. In the meantime Lithuania became occupied by the Soviet Union and in July 1940 Jabłoński was arrested by the Soviet authorities and sent to Kozielsk, a camp in which a few months earlier several thousands of Polish Army officers were confined until April 1940 when they were all murdered by the Soviets in a nearby Katyń forest. In June 1941 after the attack of the Nazi Germany against the Soviet Union Jabłoński was conveyed from Kozielsk to another internment camp in Griazowiec from where he was eventually released to join the Polish Army organized by the Polish government in exile in the Soviet territory. Together with the Polish Army he left the Soviet Union and then through the Middle East he finally arrived in the summer of 1943 in Great Britain. Being on leave from the army he became a lecturer of physics at the Polish School of Medicine at Edinburgh in Scotland until the end of the war.

In Scotland he returned to the scientific work and devoted his attention to the further extension of his earlier theory of pressure broadening of spectral lines. The most general form of this theory developed at Edinburgh was published in his well-known paper in *Physical Review* in 1945. In Scotland Jabłoński met Max Born and attended Born's Physical Colloquia at the University of Edinburgh where he delivered seminars on the theory of spectral line shapes.

After the war in November 1945 Jabłoński returned to Poland and started to work again at the Department of Physics of Warsaw University under Prof. Stefan Pieńkowski. Soon, however, he moved to Toruń, where in the fall of 1945 a new University bearing the name of Nicholas Copernicus, who had been born in that town, was established by the professors of the former Stefan Batory University who had to leave Vilnius. For many years it was the only university in Northern Poland. On January 1st, 1946 Jabłoński was nominated as the full professor of Copernicus University and his first historic lecture for students of science at Toruń took place on February 17th, 1946. This date is considered at Toruń as the beginning of physics at Copernicus University. Despite all post-war difficulties Jabłoński with great energy started to organize at Toruń a scientific centre for studies in atomic and molecular physics. First of all, he started to design a building for the Physics Department, which was finally set up at the Grudziądzka street in 1951. Since that year the experimental studies in physics at Toruń could be performed.

As the chairman of Physics Department from its very beginning in 1946 to his retirement in 1968 Jabłoński created a modern laboratory at Toruń in which he developed his own field of research in atomic and molecular optics as well as he helped to initiate researches in other fields such as those in solid state physics, in particular magnetic resonance studies of carbon materials.

In 1950s Jabłoński developed the theory of concentration quenching and depolarization of photoluminescence. This theory was used as a basis for the interpretation of many experiments performed at Toruń by his co-workers in the late 1950s and early 1960s. At that time Jabłoński introduced instead of the degree of polarization another quantity, called by him *emission anisotropy* which is now generally preferred and recommended. Even after his retirement Jabłoński continued his work and gave inspiration to all his co-workers and pupils at Copernicus University. In 1972 he generalized his earlier theory of the concentrational depolarization of fluorescence of dye solutions caused by the energy migration between luminescent molecules.

Professor Aleksander Jabłoński died on September 9th, 1980. The stimulus he has provided and is still providing also now after his death to all his co-workers and pupils can hardly be overestimated. For all of them and for many atomic and molecular physicists and photochemists in Poland and around the world Professor Aleksander Jabłoński holds a special place. His papers, his enthusiasm, and strength of character have led many of them to do more by following his example. Many of his former students in Toruń and in other scientific centres continue and extend his work in the field of luminescence, photophysics and photochemistry, biophysics, chemical physics, and atomic and molecular spectroscopy.

Józef Szudy