

To the memory of A.M. Prokhorov

E.M. Dianov

Russia has always been famous for its scientists. The magnificent galaxy of such names will certainly be incomplete without the great citizen of Russia, Academician Aleksandr Mikhailovich Prokhorov, a leading physicist and laureate of the Nobel Prize, Lenin and State awards, and twice Hero of Socialist Labour.

The life of Aleksandr Mikhailovich Prokhorov is astonishing and remarkable. His father, a professional revolutionary, was exiled for life to Siberia in 1911. Together with his wife, he escaped from exile to Far East in 1912, and onwards to Australia from there. Aleksandr Mikhailovich was born in the city of Atherton on July 11, 1916. The Prokhorovs repatriated to Russia in 1923.

In 1939, Aleksandr Mikhailovich graduated from the Department of Physics of the Leningrad University and was invited by the Lebedev Physics Institute (FIAN) of the Academy of Sciences of the USSR to appear in the examinations for a research scholarship. The examination board in those days included such leading scientists as I.E. Tamm, G.S. Landsberg, and N.D. Papaleksi. Aleksandr Mikhailovich passed the examinations and entered the premises of FIAN for the first time in September 1939. However, his scientific career was interrupted by the break-out of the Second World War. In July 1941, Aleksandr Mikhailovich joined active service and was despatched to the war front. He remained in the army until the beginning of 1944. After being wounded for the second time, he was discharged from the army as a disabled veteran and returned to FIAN where he spent more than 40 years of his life and made many of his outstanding discoveries.

The results of the research activity of Aleksandr Mikhailovich are well known to the scientific community of Russia and the world, so there is no need to describe them in detail in this tribute. It should only be mentioned that he was not only the founder and developer of quantum electronics, but also the author of a large number of world class scientific achievements in various branches of modern physics, such as the interaction of laser radiation with matter, solid state physics, fibre and integrated optics, surface physics, etc., and in laser medicine. The diversity of his scientific interests is remarkable and it is not a



Figure 1. A.M. Prokhorov (1941; photo from document).

coincidence that he was the Editor-in-chief of the Great Soviet Encyclopaedia for many years.

In 1983, Aleksandr Mikhailovich founded the General Physics Institute of the Academy of Sciences of the USSR. The institute acquired worldwide recognition in a very short time and is presently named after him.

As Academician-Secretary of the General Physics and Astronomy Division of the USSR Academy of Sciences for 18 years, Aleksandr Mikhailovich supervised the basic research in physics in the Academy.

Fully cognizant of the role of science in the modern society, Aleksandr Mikhailovich spared no efforts to bring the results of basic research to their practical application in industry. He had a firm conviction that a practical realisation of the results of scientific investigations requires collaboration between scientists working in industry and those from the academic institutions engaged in fundamental research. Only this union could lead to an effective creation of new technologies and production.

The best example of such an approach is the development of laser technology in the Soviet Union. For the scientists working in the industry, laser technology was an entirely new trend, and scientists from the Academy of

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Figure 2. In the working cabinet of Aleksandr Mikhailovich after one of the earliest meetings to discuss the creation of a museum of lasers (year 2000): from left to right: V.Ya. Panchenko, Corresponding Member of the Russian Academy of Sciences, Academician N.G. Basov, Academician A.M. Prokhorov, Academician E.M. Dianov (photo: K.A. Prokhorov).

Sciences organised All-Union conferences and seminars, as well as joint projects aimed at developing various laser systems. I vividly recall the lively atmosphere prevailing at a seminar organised by Aleksandr Mikhailovich. The participation in this seminar was not confined to Moscow alone, and scientists from all over the USSR came to attend it. This was a real school of laser physics, and it made it possible for the Soviet Union to become a laser power in the world.

Aleksandr Mikhailovich was always involved in solving important problems of basic and applied research. He was engaged in tackling simultaneously several problems. While browsing through the scientific publications (he received and studied a large number of Soviet and foreign research journals) or in the course of his discussions with colleagues (he spent practically all of his time at the institute on this activity), Aleksandr Mikhailovich persistently sought the solution of various aspects of the problems that occupied his mind at that time. He did not like to attend meetings and considered most of them a waste of time. Instead, he preferred to stay in the institute and be engaged in active research work.

Aleksandr Mikhailovich had a peculiar and effective approach towards the solution of scientific problems. At first he endeavoured to grasp the problem himself and to look for the most effective way towards its solution. This quest involved numerous discussions of the problem, and Aleksandr Mikhailovich entrusted a colleague the task of solving the problem only after he was convinced that the person concerned had indeed a profound interest in this particular work. This is how the practical realisation of a project began. He would 'prompt' his ideas unobtrusively, realising in all fairness that the project would be more successful if a scientist tried to put into practice his own ideas. This approach was used, for example, in the development of glass fibres with low optical losses. One can simply marvel at the gift of scientific foresight with which Aleksandr Mikhailovich was endowed.

Among the problems that attracted the attention of

Aleksandr Mikhailovich in the latter years of his life, the following are worth mentioning: the technology of industrial production of high-purity silicon, the organisation of the production of optical fibres in Russia, the synthesis of monoisotopic compounds, ecology and laser surgery. He never abandoned a problem even in the face of serious obstacles, whether technological or organisational, and always sought ways of overcoming these obstacles.

During the last years of his life, Aleksandr Mikhailovich came upon the idea of establishing a laser museum and discussed the possibility of realising such a project with Nikolai Gennadievich Basov. Both of them considered this task to be quite important and started looking for a suitable candidate who could organise such a museum. Unfortunately, this idea was not realised in practice.

Another remarkable aspect of Aleksandr Mikhailovich was his kindness and an exceptionally responsive nature. He never denied help to any employee (even from other institutions). Be it the problem of obtaining registration in the city of Moscow, or the purchase of an automobile, a foreign trip (in Soviet times), or a betterment of living conditions, medical or employment problems (to mention just a few), Aleksandr Mikhailovich rendered all possible help in their solution. His motto was: 'If you can help a person, necessarily do so'.

The July issue of 'Quantum Electronics' is dedicated to the memory of Aleksandr Mikhailovich Prokhorov. The topics covered in the papers and review articles published in this issue are quite diverse and include investigations of various types of lasers, research on the interaction of laser radiation with matter, optical materials including nanostructures, as well as on fibre optics, high-temperature superconductivity, femto- and attosecond optoelectronics, and laser separation of isotopes. The selected papers cover a wide range of problems of modern physics and reflect the scientific interests of Aleksandr Mikhailovich and of the large fraternity of research workers from the world-famous Prokhorov school.