

## To the memory of Nikolai Gennadievich Basov

O.N. Krokhin

Almost a year and a half elapsed after the death of Nikolai Gennadievich Basov, but it is still difficult for me and many his disciples to accept the fact that he has gone forever, that the office where he worked is empty, and Nikolai Gennadievich will never come to our scientific councils and seminars. I think this is because the role of Nikolai Gennadievich in our destinies was far beyond the scientific contacts and cooperation only. He was really a great person, a genius, who produced an aura of creative power, obsession, and elevated human relations around him. Such human beings are said to be donors – their influence on others being so strong, as if they donate their inexhaustible energy and grains of their talent to other people. And not only collaborators of Nikolai Gennadievich felt this – I witnessed many times how his reports attracted a very great attention of ‘superiors’.

The contribution of Nikolai Gennadievich to the scientific field to which he devoted his life is immense. I dare to say that, if the rating of Nobel Prizes existed, the Nobel Prize ‘for basic researches in the field of experimental physics, which led to the discovery of the maser and the laser’ awarded to him jointly with A.M. Prokhorov and divided with Ch. Townes (‘for fundamental work in the field of quantum electronics, which has led to the construction of oscillators and amplifiers based on the maser-laser principle’) would take one of the first places. Indeed, the contribution of quantum electronics to modern civilisation is extremely important and is comparable with the discoveries of X-rays, radio, and transistors.

N.G. Basov was an exceptionally purposeful person in science, he was devoted to his occupation and his Institute and was firmly convinced in the necessity of using the results of scientific studies for the welfare of our motherland as fast as possible.

It is in this way that he lived and was engaged in science, and we all knew him as such a man at P.N. Lebedev Physics Institute, which he loved very much and headed from 1973 to 1989, replacing D.V. Skobel'tsyn at the director post.

Quantum radiophysics, or may be, more exactly laser physics attracted permanent interest of Nikolai Gennadievich, and this was known to all his colleagues and

collaborators. Already forty years ago, when lasers just appeared, Nikolai Gennadievich predicted in fact a new revolution in science and technology initiated by this discovery. It seemed to many at that time that this was a great exaggeration. However, it is just now that lasers are extensively used in modern technology, being employed in a variety of applications, from endoscopic and eye operations to transcontinental communication systems, and from very precise measurements to compact discs and laser printers. It is obvious that such a long period of 35–40 years, which was required for the beginning of rapid practical applications of this fundamental discovery, can be explained by the unusualness of the discovery, which gave to the mankind a device whose potentialities could be realised only after the development of a new technological basis by reconsidering the accepted technological concepts. We can only wonder at an amazing intuition of Nikolai Gennadievich – and these are not just fine words, because I myself remember well a sceptical attitude of others to his prediction of the development and applications of lasers. By the way, I would like to mention here that Dmitrii Vladimirovich Skobel'tsyn always supported Nikolai Gennadievich, and Petr Leonidovich Kapitsa was one of the members of the Presidium of the Academy of Sciences of USSR who was always interested in the reports of Nikolai Gennadievich in this field.

It seems to me that a typical feature of the scientific creative power of Nikolai Gennadievich was his interest in the real things that can be created, i.e., he always attempted to obtain an effect rather than to be a simple observer. Therefore, I risk to say (understanding that this is open to argument) that Nikolai Gennadievich was never in fact engaged in observational physics during his entire scientific activity.

I would like to note also another feature of Nikolai Gennadievich – a remarkable logic of his mentality, which was developed, as it seems to me, not in a simplest way, from the foundations of physics described in textbooks to more complicated concepts. It seemed sometimes that Nikolai Gennadievich followed an exactly opposite way – from a final result. There is a well-known story that I heard from colleagues of Nikolai Gennadievich, who worked with him in the mid-1950s. He himself told me a few words about it. The story concerns the question about the linewidth of a maser. Nikolai Gennadievich believed that the maser linewidth observed upon stimulated amplification of radiation could be narrower than the natural width of a transition due to regeneration of radiation in a resonator. The logic of his reasoning was simple – we knew that a maser is a self-oscillating system. It is said that L.D. Landau, with whom

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O.N. Krokhin P.N. Lebedev Physics Institute, Russian Academy of Sciences, Leninskii prosp. 53, 119991 Moscow, Russia

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Nikolai Gennadievich discussed this problem, considered first that this is impossible because it would contradict to the uncertainty relation. However, later this phenomenon was explained taking into account the fact that molecules flying into a resonator and leaving it in a certain quantum state are indistinguishable.

It seems that Nikolai Gennadievich always constructed the model of a phenomenon in his own specific way, his concepts often being different from and probably more complicated than those proposed by his colleagues. I think that for this reason, it was difficult for us, his disciples, to understand sometimes at once his new ideas during discussions with him because he assumed probably that we already passed in our thoughts the same part of the road that he himself had gone.

I am sure that it is this professional quality of Nikolai Gennadievich that was the main reason for the remarkable bright ideas that he put forward during his life. If at least one of the ten ideas or proposals is realised, it is considered as a great success. The coefficient of realisation of ideas of N.G. Basov was much higher.

Having decided to devote a December issue of Quantum Electronics to the 80th anniversary of N.G. Basov's birth and to publish in this issue the papers related to his scientific interests, which reflect the main studies that were performed under his direct supervision or were initiated by him, we faced great problems, because even after a very restrict se-

lection of the most important topics, the scope of the remaining articles substantially exceeded the volume of one issue. For this reason, first, the papers will be published not in one but in three successive issues of Quantum Electronics, and second, we decided not to include the studies in the fields that were considered in detail in reviews devoted to the 75th anniversary of N.G. Basov's birth (laser frequency standards, foundations of laser fusion, and iodine photodissociation lasers) [*Quantum Electron.*, **24** (12) (1997)].

The December issue of Quantum Electronics contains only invited papers. The January and February issues in 2003 will present approximately ten such papers each.

The contribution of N.G. Basov and his scientific school to modern science is tremendous and diversified. The papers selected for publishing in three issues of Quantum Electronics devoted to the 80th anniversary of Nikolai Gennadievich birth outline but do not exhaust a great scope of his scientific ideas and results: from laser physics to lunar laser ranging, from fundamental problems of coherence to laser cathode tubes and autonomous mobile laser units.

Nikolai Gennadievich created a large scientific collective and his scientific school. Of course, it is now difficult for all us to work without him, but I am sure that a creative potential that N.G. Basov gave to his disciples and followers will stimulate the realisation of his ideas and will lead to new scientific results.



Academicians D.V. Skobel'tsyn, A.M. Prokhorov, B.M. Vul and N.G. Basov. Moscow, Kremlin, 1969.