

Georgi Nadjakov's Appel to Bulgarian Scientists and our Society

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Abstract. We share some little known facts about multiple activities of our remarkable scientist Georgi Nadjakov during the last 30 years of his life. His unconventional style and depth in teaching of the fundamental physics are in the focus. He motivated the best of his students to become researchers. In the same time in 1946, G. Nadjakov founded the Institute of Physics at the Bulgarian Academy of Sciences. There, he gradually attracted many scientists from faculties other than the Faculty of Physics. To reach the big science he built a net of specialized institutes and laboratories with unique scientific instruments, engineers and support staff. Excessive administration and planning in the science makes injury to free scientific search. Therefore, aside from “planned” tasks every scientist is required “to explore new topics for new ideas”. Comparing of deeds and tips given us by Georgi Nadjakov makes that we can say that they are valid today yet. These are also the modern developments in science leading to major discoveries and innovations. Comparing the actions and advice of Georgi Nadjakov, we can say that they are valid today too. These are the current trends in science, leading to major discoveries and innovations.

Keywords: Georgi Nadjakov, Quadrant electrometer, Contact potential difference.

Bulgarian scientific community lost the most authoritative member – the popular physicist Georgi Nadjakov thirty years ago [1]. As his student, I had the rare possibility to see and learn his style and method of work closely. This fact give me the occasion to share some little known facts about his multilateral activity during his last 30 years.

We were the first-year students (1950 – 1951) when his fascinating lectures captured us. Everything said in his lecture looked at a whole new light, and it was memorable. Later, I had a possibility to see how attentively he prepared every lecture. Moving with measurable steps from the window to the door of his laboratory (with a sheet from his Experimental physics textbook), he intensively repeated more important moments of his next lecture and wrote formulae using a piece of chalk on a little blackboard. I felt that he gradually engage oneself not only verbally but also emotionally. I was quite surprised when one day his assistants came in a lecture. He was ordered his assistants to attend his lecture to hear how he taught and to feel the spirit of the messages he make. His asistants had to bear some of that spirit. They leaded our practical exercises in the laboratory and our attendance in the circle at the Experimental Physics Department. Despite his large scientific, pedagogical and public engagement, Georgi Nadjakov often participated in our meetings of the circle and put his personal research topics related to a new type of quadrant electrometers developed by him.

During the third and fourth years of my study, Professor Georgi Nadjakov assigned to me and to other three members of our circle different research tasks about a new asymmetric quadrant electrometer. My task was changes in a secretory work of thin metal plates after mechanical treatment of the surface to be assessed. In that reason, I measured the contact potential difference between passivated gold surface and the respective metal. The sensitivity and applicability of the new measuring device for practical applications was determined. My first research task became, naturally, a base for my diploma work under the leadership of Georgi Nadjakov. This first scientific study caught my interest for long time and determined the line of my research in the section of Georgi Nadjakov at the Institute of

Physics, where I was appointed after my graduation. It was direction of most my colleagues from the circles. One of the main appel of Georgi Nadjakov was “*We must teach students deeply and with inspiration, to attract the best of them for researchers*”. Intensive development of the sciences – physics, chemistry, biology, geology, etc. led to emergence the profession of scientist in the middle of the 19th century. The scientist was a man engaged with scientific investigations only. Received new knowledge contributed essentially to the progress of industry, medicine and other very important areas for community development. On the other hand, however, development created scientific societies, centers and regional or national academies. University teachers, wishing to make science were included in these societies gradually. An example is a “*Max Planck*” society established in Germany with more than 80 scientific institutes.

National Center for Scientific Investigations in France has the same funktions. In Russia it was Academic town close to Novosibirsk with more than 30 institutes. Such societies and endowments connected with them (financed mainly by the government) also exist in a little European countries like Austria and Holland. In our country Bulgarian Literary Society founded in 1869, which in 1911 grew up into the Bulgarian Academy of Sciences has the same functions. After the World War Second, the number of institutes and especially the number of scientists, coming mainly from the Sofia University “*St. Kliment Ohridsky*” increased. Our Institute of Physics at the Bulgarian Academy of Sciences was founded on the same principle from Georgi Nadjakov in 1946. During the following years he succeeded to attract many physicists from the Faculty of Physics and Mathematics and from related organizations and industry. On this base, he formed single sections in the Institute of Physics, developed today into stable academic institutes. These are, for example, the sections on physical chemistry, geophysics and meteorology etc. On this principle a faster development of main areas of physics was achieved forming necessary potential for scientific groups on this base. But to reach considerable successes, it is necessary non-university research laboratories to be supplied with unique scientific instruments and engineering and technical staff. Today, we can say without hesitation that this way on physics development in Bulgaria has been chosen correctly and a credit belongs to Georgi Nadjakov. Beginning from the seventies of the twentieth century, Georgi Nadjakov gradually formed and managed new section on “*Scientific apparatus and special problems*”. He attracted in it several new laboratories on electron microscopy with leader Nikolay Pashov, electrophotography (Vladimir Kusev), Roentgen structural analysis (Ivan Vasilev), gas-discharge plasma (Gr. Staynov and Alexander Malinovsky) and surface electronic properties in semiconductors (Stefan Balabanov). All laboratories in our section worked together unther leadership of Georgi Nadjakov. We had joint seminars where we reported our research results, new ideas and collaborations. Georgi Nadjakov took alive interest in all developed topics in our section. He asked questions and made recommendations but never interfered in the topics of research groups, where each of us was obliged to seek his own new research ideas.

Georgi Nadjakov led directly only his personal laboratory in cooperation with his daughter – Dr. Elka Nikolova, former associate professor at the Technical University in

Sofia. New versions of the quadrant electrometers and such of principle new construction we elaborated there. Two masters with high qualification were assigned to construction of new devices under the daily control of the “*Academician*” who sometimes changed some technical solutions. Other instruments for measurements of the curvature of thin quartz plates were constructed in the optical laboratory. Finally, I would like to add that Georgi Nadjakov investigated independantlly some kind of hydro-dynamical effect in liquids. Entire installation of glass and metal pipes, valves and water pumps was built in his laboratory for this purpose. He had begun to install a He-Ne laser in the last year of his life for investigation interesting him effect. The firts problem we recorded was his new idea, for which he did not want to share anything “*until a clear result appear*”, as he said. Considering the projects of our Section in 1971, all heads of the laboratories in our section reported problems on which they would work in future. The second problem was “*new type of torsion electrostatic electrometers and voltmeters*” investigations with collaboration of Georgi Nadjakov and colleagues. Before the end of the meeting he said, that we missed something very important, which must have in mind for every research. He wrote it as a third problem: “*Search new ideas on topics involving Georgi Nadjakov and all scientific and technical staff*”. A few minutes later, he added “*and the entire Institute*”. Reading these notes written 40 years ago, I instinctively asked myself about their validity today for the scientific investigations “*on the front of science*” – as he said sometimes. Somebody will make objection that it is an old-fashioned view based on curiosity of the scientist and better results can be achieved through “tight management” of research. Most important is the investigation in the fundamental researches and attraction of the best minds. The solid investments in the education of scientific specialists and creation of fundamental base for scientific investigations will bring potential for making the scientific discoveries and innovations. The innovations will form the future of developing countries [2]. When we announce about the development of the separate branches of industry in our country during the following years, we often adds the beautiful words “*and development of innovations*”. Yes but for a sufficient supply of economics by innovations it is necessary at least 2/3 of the production to base on our new technologies. To our regret, they both can not come by old ways and new high roads. The sole exit from this difficult problem is the acceptance of a principal priority just now an effective development of the education and fundamental scientific investigations. This will give the possibility to receive high educated specialists. On the other hand, the seriously financed fundamental researches will create the necessary potential for making of scientific discoveries and innovations. The upper conclusions lead us again towards recommendations which Georgi Nadjakov made in the leding by him section. Regarding their validity for the Institute or Academy, out leaders probably would say diplomatically “*it is not a time yet*”. But today the time over!

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References

1. Акад. Г. Наджаков, *Юбилеен сборник*, научна дейност, БАН, София (1959).
2. A. **Zewail**, *Nature*, **468**, p. 347 (18 November 2010).