

SCIENTIST ION GERU IS A WILLING LIFELONG CAPTIVE OF THE MIRACULOUS WORLD OF CONDENSED MATTER



Having involved in the world of modern physics for over 50 years, associate member of the Academy of Sciences of Moldova, professor Ion Geru can be rightfully considered to be one of the first descendants of the "golden generation" of physics in Moldova, which is represented by academicians Moskalenko, Ghitu, Radautan, Andries, and others. He has grown and formed with them and in other research laboratories in Russia, Ukraine, and other countries. Creatively assimilating the new areas of condensed matter physics, which was developed in the 1960s and 1970s, he seeks for his own paths of research, which later would become full-fledged highways. A convincing example is radiospectroscopy of excitons and biexcitons, a pioneer research in which was conducted by professor Ion Geru. Another direction which is promoted for the first time in the world by his participation is related to semimagnetic semiconductors. Extensive research in these two domains has led to results of an incontestable value. They include: the development of a method for narrowing the exciton absorption lines and high-density exciton recombination radiation; the theoretical prediction of a double radio-optical resonance in the Wannier-Mott exciton system, which was subsequently confirmed in experiments; the theoretical interpretation of the giant spin splitting of exciton states that leads to giant magneto-optical effects in semimagnetic semiconductors; the excitonic Knight shift of NMR lines and its sudden increase in the exciton transition to a Bose-Einstein condensed state (a new method for verifying the existence of the Bose-Einstein condensation of excitons). The list can be extended, and bare listing would fill dozens of book pages.

It is well known that the paradigm of modern physics in general and condensed matter physics in particular is based on the symmetry principles and their violation is the driver of new

phases and phenomena. Professor Ion Geru, being a consummate researcher, in his basic investigations could not but try to promote his own concepts of this fine and profound field of condensed matter physics. In this context, we should mention his generalizations about magnetic symmetry groups and time reversal symmetry. In fact, the "magnetic line" runs like a scarlet thread through most of the studies that he carried out guided by the "magic compass" of his research talent. In this field of studies, his activities are as follows: he demonstrates that the magnetic properties of clusters with half-integer spin must be described using four-color magnetic point groups, unlike the conventional concept according to which all point groups of magnetic symmetry are two-color symmetry groups; he identifies the structural distortions in magnetic clusters with half-integer spin that are caused by the existence of time-reversal symmetry, which were experimentally confirmed for a large number of coordination compounds of transition metal ions; he develops a general method for transforming the ferromagnetic ordering to the antiferromagnetic one and vice versa in magnetic dimers with the determination of the ground state type for all possible magnetic dimers based on iron group ions and rare earth group ions; he reveals a new type of degeneration of quasi-energy levels and bands caused by the noncommutation of the time-reversal operator and time translation operators. This brief listing makes it possible to classify these results as new directions in addition to those mentioned above.

Scientific research of Prof. I. Geru is well known worldwide. His significant ingenious contribution to the development of modern condensed state physics and its applications to multiple devices and electronic components has been appreciated and recognized. He touched the fine aspects of the miraculous world of condensed matter that had been inaccessible for his predecessors. He was invited as a "visiting professor" to prestigious foreign universities, such as Catholic University, Leuven, Belgium; Florida State University, USA; Kazan Physico-Technical Institute, Russia; University of Cluj, Romania, and many others.

Having implemented a valuable research and having reached the age of maturity, he continues to be optimistic about the life as a teenager. He has reasonable grounds for this, because he is only 75 years old. Fanciful ideas still make him restless; he is captivated by the toils of paradox in physics. He is constantly on the go trying on the ideas of time travel, which appeared simultaneously with Albert Einstein's theory of relativity, according to which the passage of time is relative and depends on the velocity of the object. As far as researchers are concerned, we would like to add that it also depends on the speed of processing the new ideas and concepts. Prof. I. Geru accelerates his thinking and processing and thus makes his own time pass more slowly and catches new facets of physics. Unfortunately, this method works only for travels to the past. No matter how fast you move, the time will never flow backwards. However, the effect of time reversal can be advantageously used as a concept in analyzing the phenomena as evidenced by many studies of the celebrated scientist.

Riding a wave of time reversal in our retrospective discussions about our native land, i.e., his Cotiujeii Mari (Big Cotiujeii) and my Zahorna Mica (Small Zahorna) in Soldanesti district, every time he comes with thoughts of gratitude for the sacrifice of his parents to whom he is indebted for his ascension to the light of books, being conscious that the values we share here have their vigorous roots at home.

By writing this essay, we render homage to three-quarters of a century of life and more than 50 years of creative work; we wish our Physicist with capital letter an Everest of health, a flow of happiness as wide as the Nile or at least the Dniester, a cartful of new significant achievements and sincere traditional HAPPY BIRTHDAY!

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