
SERHII MYKHAILOVYCH RYABCHENKO (to the 70-th anniversary of his birthday)



On October 22, 2010, the outstanding Ukrainian scientist, a Corresponding member of the National Academy of Sciences of Ukraine Serhii Mykhailovych Ryabchenko will be 70 years of age. He is known by his remarkable scientific works in radiospectroscopy, physics of magnetic phenomena, magneto-optics, high-temperature superconductivity, and nanophysics.

Serhii Mykhailovych Ryabchenko was born in Dnipropetrovsk. There, he finished the secondary school and graduated from the Faculty of Physics of the Dnipropetrovsk State University. In 1963, Serhii Mykhailovych became a postgraduate student at the Institute of Physics of the NAS of Ukraine. The scientific adviser of S.M. Ryabchenko was Academi-

cian A.F. Prikhotko. She made a significant contribution to the formation of the young scientist as a high-level researcher. A considerable influence upon S.M. Ryabchenko at that time was exerted by his close relations with a Corresponding member of the AS of Ukraine M.F. Deigen, whom Serhii Mykhailovych considers as one of his scientific mentors, as well as with other leading scientists who created the scientific climate at the Institute that supports now the creative youth.

The first works of Serhii Mykhailovych Ryabchenko are devoted to radiospectroscopy, in particular, the study of the electron paramagnetic resonance. Already at the beginning of S.M. Ryabchenko's scientific activity, his unordinary talent of physicist-experimentator, his deep understanding of physical theories and the essence of physical phenomena, and his ability to generate new ideas brightly revealed themselves. Those qualities got stronger in time, and S.M. Ryabchenko got, as a scientist, the authority and the recognition among a wide range of experts all over the world. In 1967, he defended his Ph.D. and, in 1977, doctoral dissertations. The both were devoted to the study of the magnetic resonance in crystals, in particular, two-dimensional ones.

The specific features in the behavior of low-dimension systems, their phonon spectra, and a magnetic ordering in them were one of the "hot spots" of solid state physics at that time. Those issues were points of interest for researchers at many scientific centers over the world. The results obtained by Serhii Mykhailovych Ryabchenko occupied a worthy place in the general stream of researches, having their own unique character. In particular, he revealed the peculiarities in the temperature dependences of intracrystalline field parameters and the spin-lattice relaxation time which, being related to flexural and low-frequency optical oscillations inherent to layered crystals, are observed in the spectra of electron paramagnetic resonance and nuclear quadrupole resonance. S.M. Ryabchenko took participation in the studies which established the specific features of the critical broaden-

ing of lines in the electron paramagnetic resonance spectra of quasi-two-dimensional magnets in a vicinity of the magnetic ordering temperature and clarified variations in a character of the nuclear magnetic resonance spectrum in the internal hyperfine field of layered antiferromagnets with easy-plane anisotropy, when the degree of magnetic quasi-two-dimensionality was changed by intercalating those layered antiferromagnets with graphite up to the complete magnetic two-dimensionality. The peculiarities of the electrofield effect in nuclear magnetic resonance spectra in the internal field of layered antiferromagnets and in the nuclear quadrupole resonance spectra of layered nonmagnetic crystals were examined. The manifestations of spontaneous magnetostriction in the antiferromagnetic resonance spectra of layered antiferromagnetic halides of the iron group metals with easy-plane anisotropy were discovered. In addition, the magnetoelastic nature of antiferromagnetic domains in easy-plane layered antiferromagnets was established, and it was found how the transformations of this domain structure reveal themselves in magnetostriction and magnetization.

Later, in the late 1980s, a considerable part of those results was included into a cycle of works, for which Serhii Mykhailovych together with his colleagues was awarded, in 1991, the State Prize of Ukraine in science and engineering for “the discovery and research of new types of magnetic resonances, magnetic structures, and magnetoelastic anomalies in low-dimension antiferromagnets”.

Serhii Mykhailovych Ryabchenko was a co-discover of a new, earlier unknown phenomenon of the giant spin splitting in excitonic spectra of magnetically mixed semiconductors, when the system of localized spin moments is polarized by an external field. This phenomenon was explained adequately by attracting the idea of carrier-ion exchange interaction, which promoted the introduction of magnetically mixed semiconductors into a list of newly created materials. The experimental discovery of the giant spin splitting of electron and exciton bands in magnetically diluted semiconductors and its explanation as a manifestation of the carrier-ion exchange interaction was made by S.M. Ryabchenko as early as in 1976-1977. The researches of other phenomena related to the carrier-ion interaction and the giant spin splitting of bands have been continued, with modifications, till now.

In 1979, S.M. Ryabchenko and E.A. Pashitskyi theoretically predicted the phenomenon of ferromagnetic ordering in magnetically diluted semiconductors, provided that the concentration of charge carriers in them attains a certain (considerable) value. In cooperation with Yu.G. Semenov, the idea of the role of spin correlations

in the generation of magnetic polarons was elaborated. In the recent years, manifestations of the carrier-ion interaction and the spin splitting in quantum-size structures fabricated on the basis of semimagnetic semiconductors have been studied intensively.

Important results were achieved by S.M. Ryabchenko in his researches of the physical bases of high-temperature superconductivity. Qualitatively new results for the temperature and magnetic-field dependences of the critical current density and the magnetic flux creep in high-temperature superconductor films were obtained. The explanation was given for an increase of the critical current density by two to three orders of magnitude in superconductor films with a mosaic structure of blocks separated by low-angle boundaries in comparison with that in massive specimens.

It is worth noting the theoretical work “Rotational invariance and magnetoflexural oscillations of ferromagnetic plates and rods” by V.G. Bar’yakhtar, V.M. Loktev, and S.M. Ryabchenko (*Zh. Èksp. Teor. Fiz.* **88**, 1752 (1985); English translation: *JETP* **61**, 1040 (1985)), where the contribution of flexural oscillations to the magneto-elastic interaction was considered for the first time. Later, this activity was continued in the works of theorists from other institutes.

Recently, the urgency of the studies of such objects as nanofilms and nanopowders has increased; the phenomena of “giant” and, later, “colossal” magnetoresistance in some structures and materials were discovered. These phenomena and structures comprise the content of new physics, which is a development of the available ideas on a new level. All this resulted in the appearance of new directions in S.M. Ryabchenko’s activity in the late 1990s and at the beginning of the 2000s. He started a research of magnetic nanoobjects and structures with giant and colossal magnetoresistance, as well as manifestations of the magnetoelectric interaction in magnetic specimens and structures. A number of interesting results have already been obtained; in particular, such phenomena as manifestations of the colossal magnetoresistance in sub-micron manganite films, the specific features in the magnetization of substituted-manganite nanopowders, and the formation of superferromagnetic and superspin-glass states in nanogranular films were discovered.

S.M. Ryabchenko takes an active part in the public and state activities. In 1989, Serhii Mykhailovych was elected People’s Deputy of the USSR. He was a member of the Supreme Soviet of the USSR and a member of the well-known Interregional Group; he held the position of the vice-chairman of the Committee of Supreme Soviet of the USSR in science, culture, and education

(later, the Committee of Supreme Soviet of the USSR in science and technologies). In 1991, S.M. Ryabchenko was appointed the Head of the Committee of the Cabinet of Ministers of Ukraine for scientific and technical progress which, in due course, was transformed into the State Committee of Ukraine in science and technology. Working in this position, Serhii Mykhailovych was the initiator and executor of a number of actions aimed at creating a modern base of the development of science in Ukraine. Some basic laws, which regulated the state policy in scientific and technological issues, were written and passed through the Supreme Council of Ukraine; the market-based principles of creation and use of the intellectual property were developed; a goal-oriented competitive scheme to support fundamental and applied scientific researches was created; a scheme for monitoring the organization and the performance of competitions, as well as for the control over the execution of awarded projects by the scientific community, was created. The first steps towards the establishment of a scientific cooperation of Ukraine with international scientific institutions (CERN, JINR, and so forth), states (the USA, Germany, China, France, India, Israel, and so forth), and interstate unions (CIS, EU, NATO) were made.

S.M. Ryabchenko was one of the organizers of the “Ukrainian Physical Society” and the President in 1998–2001.

S.M. Ryabchenko was a supervisor of a number of Ph.D. and doctoral theses. He is lecturing at the Kyiv National University. In 1987, he was awarded the academic rank of Professor. In 1992, S.M. Ryabchenko was elected a Corresponding member of the NAS of Ukraine

in the speciality “Physics of magnetic phenomena”. His fruitful scientific, managerial, and pedagogical activity was marked in 1997 by awarding him the title “Honored Science and Engineering Worker of Ukraine”.

The colleagues of Serhii Mykhailovych at the Institute of Physics and other scientific institutions of Ukraine, as well as in the near and far abroad, know and respect him as a man of principle and a honest scientist, a person with strong convictions and the active social position. Such an image of S.M. Ryabchenko has been formed within the whole period of his work at the Institute of Physics of the NAS of Ukraine, at the scientific councils of the AS of the USSR, organizing committees of scientific congresses and conferences, and editorial boards of scientific journals. Probably, his personal participation in the reduction of consequences of the Chernobyl accident in the tragic year 1986 can be regarded as a natural consequence of his social position.

Congratulating Serhii Mykhailovych with his anniversary, the Editorial Board of the Ukrainian Journal of Physics, his colleagues from the Institute of Physics, and the workers of the Department of Physics of Magnetic Phenomena wish him a sound health, happiness, and success in his work.

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