Andreĭ Stanislavovich Borovik-Romanov (on his sixtieth birthday)

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The noted Soviet experimental physicist Andreĭ Stanislavovich Borovik-Romanov observed his sixtieth birthday on 18 March 1980.

Borivik-Romanov began his scientific work early and on his own initiative while he was still a third-year student in the Moscow University Physics Department. In 1940 he was involved in projects of the optical laboratory, which was then working intensively on applications of emission spectral analysis in metallurgy.

Borovik-Romanov is now one of the most brilliant figures in the contemporary physics of magnetic phenomena. His work has opened up new trends in a variety of areas—antiferromagnetism, magnetic resonance, and magnetooptics.

His studies of weak ferromagnetism, which were made in the 1950's, led to significant changes in our conceptions of magnetism. Use of an experimental technique of high measurement accuracy and a fortunate choice of his object of study enabled him to get to the bottom of this unusual phenomenon. Before Borovik-Romanov, weak ferromagnetism had been observed only in naturally occurring and, therefore, rather heavily contaminated hematite crystals. Therefore the entire phenomenon could be attributed with a clear conscience to impurities. Borovik-Romanov detected weak ferromagnetism in other substances—manganese and cobalt carbonates. The experiments were performed on rather pure synthetic crystals, and the conclusion was drawn that the observed magnetism is a pure physical phenomenon not related to contamination of the specimens. To explain the effect, Borovik-Romanov advanced an idea that was most unusual for its time: that the spins are not exactly collinear in these antiferromagnetics. It was later established that this noncollinearity is caused by a new type of interaction. Hundreds of substances of this type are now known.

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At about the same time, Borovik-Romanov performed yet another of the studies for which he is renowned. He discovered piezomagnetism, the very possibility of whose existence had long been doubted. His success was made possible by the use of an original pressure-transmitting system and a sensitive balance.

Borovik-Romanov's next cycle of studies was devoted to magnetic resonance in weak ferromagnetics. In these studies, he emerged not only as a brilliant experimentalist, but also as a theoretician. He made the first theoretical determination of the antiferromagnetic-resonance spectrum of a weak ferromagnetic in an external magnetic field and then proceeded with an experimental verification of the theory, which fully confirmed his formulas.

Many of Borovik-Romanov's papers are cemented together by his continuing interest in a fundamental problem of magnetism–spin waves. Throughout almost his entire scientific career he has been developing and successfully applying various methods for experimental observation of these waves. He began with the classical methods, which are based on measurements of heat capacity and magnetic moment. Comparing the results of measurements with theory, he showed that spin waves in antiferromagnetics do indeed exhibit a linear dispersion law and determined their velocity. His prediction of the existence of two branches in the spectrum was also confirmed.

The next step was to apply high-frequency methods for excitation of spin waves and direct observation of their propagation. Following this line of research he discovered parametric generation of spin waves in antiferromagnetics, which is now a powerful tool for studying the spectra of spin waves and their lifetimes. Eventually, this method made it possible to observe a spin wave as a direct process of propagation of excitation from one end of the specimen to the other.

In recent years, Borovik-Romanov became interested in yet another method of investigating spin waves—the magnetooptical method. He first observed that magnetic ordering results in a strong change in the birefringence of transparent antiferromagnetics. Study of this effect

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enabled him to determine the temperature dependence of sublattice magnetization. Borovik-Romanov is now engaged in a study of the Mandel'shtam-Brillouin scattering of light by spin waves. The observation of scattering by parametrically excited spin waves and phonons was a particularly striking achievement.

Borovik-Romanov's unflagging interest in the methodological side of experimentation has revealed itself in his work on low-temperature metrology. He built an original high-precision gas thermometer and graduated a set of platinum thermometers, which became the national standard of the practical temperature scale. This standard has been included in a draft plan for an International Temperature scale. Borovik-Romanov's style of work as a master of the subtle and thoroughly deliberated experiment was formed during the course of this activity, which had been started by his teacher, P. G. Strelkov.

Characteristic of Borovik-Romanov's scientific style is the large number of students around him. This is explained primarily by the fact that he consistently does his own work in their presence, although his kindliness and tact in his relations with scientific youth are no less important. Nor did this friendly disposition toward people forsake him during his many years of difficult administrative work as Deputy Director of the Institute of Physics Problems of the Academy of Sciences of the USSR.

Borovik-Romanov has much to his credit as the organizer and continuing editor of the first Soviet "scientific newspaper"—the "Letters to JETP," which has the world's shortest lead time in the publication of scientific papers.

We congratulate Andreĭ Stanislavovich Borovik-Romanov on his sixtieth birthday and wish him health, new scientific achievements, and new students.

Translated by R. W. Bowers