

CONFERENCES AND SYMPOSIA

PACS numbers: 01.10.Fv, **01.60.+q**, **01.65.+g**, 03.75.Hh, 67.30.er, 75.30.Ds, **75.40.–s**, **75.45.+j**, 75.50.Ee, **75.50.–y**, **76.60.–k**, **75.70.–i**

90th anniversary of the birth of A S Borovik-Romanov (Scientific session of the Physical Sciences Division of the Russian Academy of Sciences, 24 March 2010)

DOI: 10.3367/UFNe.0180.201008j.0879

The scientific session of the Physical Sciences Division of the Russian Academy of Sciences (RAS) took place on 24 March 2010 in the Conference Hall of the P L Kapitza Institute for Physical Problems, RAS.

The following reports were put on the session agenda posted on the website www.gpad.ac.ru of the Physical Sciences Division, RAS:

1. **Andreev A F** (P L Kapitza Institute for Physical Problems, RAS) "Opening address";
2. **Smirnov A I, Svistov L E, Prozorova L A** (P L Kapitza Institute for Physical Problems, RAS), **Petrenko O A** (University of Warwick, UK), **Hagiwara M** (Osaka University, Japan) "Quasi-two-dimensional antiferromagnet on a triangular lattice";
3. **Bunkov Yu M** (Institut Néel, Grenoble, France) "Bose–Einstein condensation of magnons in superfluid ^{3}He";
4. **Demokritov S O** (The University of Münster, Germany) "Kinetics and Bose–Einstein condensation of magnons at room temperature."

The articles written on the basis of these reports are published below.

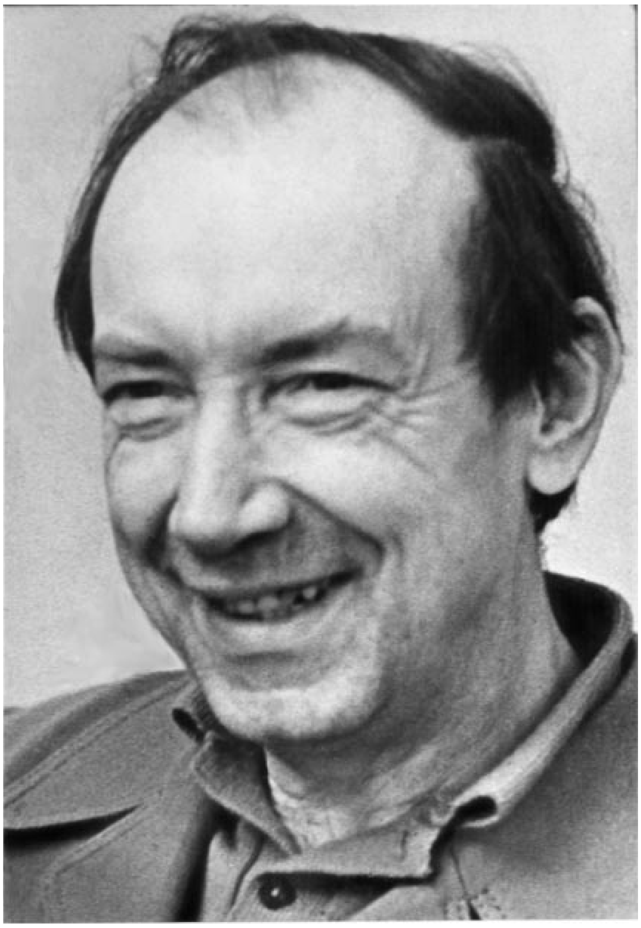
PACS numbers: **01.60.+q**, **01.65.+g**, **75.50.–y**
DOI: 10.3367/UFNe.0180.201008k.0879

Opening address

A F Andreev

We are delighted to have here with us these visiting participants, so pleasant and so close to us in many ways. It is the 90th anniversary of the birth of one of our most prominent physicists — Andrei Stanislavovich Borovik-Romanov. His life story was dazzling and extraordinary, both in human and in scientific terms, and it was also very dramatic. A life full of complications.

A S Borovik-Romanov was born in 1920; he was a student when the Great Patriotic war started, and he volunteered to go to the front, to the home guard troops. Very soon he was a prisoner of war (POW). He had to go through a great deal, but as Andrei Stanislavovich used to say, he was a 'lucky devil'. When he was released from captivity in Germany — by Russian soldiers — he again became a soldier in the Soviet army. This saved his life because he came back home, not as a released former POW, but as a soldier on active duty. He told



Andrei Stanislavovich Borovik-Romanov
(18.03.1920 – 31.07.1997)

me that after release from captivity, an NKVD officer told him: "You were twice lucky: the Germans did not shoot you, and now our guys have not shot you, either." And A S (abbreviated Andrei Stanislavovich) was indeed convinced that he was very lucky in his life, that he did draw a lucky ticket. Andrei Stanislavovich was, in fact, immensely optimistic. The year he demobilized, he resumed his university studies and graduated successfully.

Uspekhi Fizicheskikh Nauk **180** (8) 879 – 894 (2010)
DOI: 10.3367/UFNr.0180.201008j.0879
Translated by V I Kisin, S N Gorin, S O Demokritov; edited by A Radzig

A F Andreev P L Kapitza Institute for Physical Problems, Russian Academy of Sciences, Russian Federation
E-mail: andreev@kapiza.ras.ru

Uspekhi Fizicheskikh Nauk **180** (8) 879 – 880 (2010)
DOI: 10.3367/UFNr.0180.201008k.0879
Translated by V I Kisin; edited by A Radzig

A S Borovik-Romanov started working under the guidance of Petr Georgievich Strelkov, and soon grew to be one of the leaders among researchers in the physics of magnetic phenomena. For many years the 'official' head of the 'magnetic diaspora' here was Sergei Vasil'evich Vonsovskii, but after him Andrei Stanislavovich undoubtedly became the leader in researching magnetic phenomena.

A S first gained fame when, together with M P Orlova, he discovered weak ferromagnetism in antiferromagnets. In principle, this phenomenon had already been observed, but at that time it was assumed that it was caused by the presence of uncontrolled impurities producing incomplete compensation of the magnetic moments of two sublattices, and this resulted in a nonzero ferromagnetic moment. What A S and M P Orlova achieved was a demonstration that this phenomenon had no connection to impurities and reflected, so to speak, the nature of things.

Here again, Andrei Stanislavovich was immensely lucky — a close creative contact appeared in the person of theorist Igor Ekhiel'evich Dzyaloshinskii who also worked at our institute (IPP RAS). This collaboration generated numerous very interesting results, both theoretical and experimental. Petr Leonidovich Kapitza always pointed to it as an example of the fruitful cooperation of theory and experiment. The most important result born of it was the prediction and discovery of piezomagnetism. Many books advanced an opinion at the time that piezomagnetism was impossible because strain does not change in response to a reversal of the sign of time, while it reverses the sign of the magnetic moment. This is not true, however, if one is dealing with a state not invariant under time reversal, and any antiferromagnetic state belongs to this class. That was it: Andrei Stanislavovich discovered piezomagnetism in antiferromagnets.

Many outstanding results followed, obtained in collaboration with his students — Lyudmila Andreevna Prozorova, Natalya Mikhailovna Kreinis, and many others, for instance, Aleksandr Ivanovich Smirnov. On the whole, a fairly numerous group of brilliant people working on magnetism grew up in our institute, and they continue working on it.

Now, of course, magnetism is a far cry from what it was in the time of Borovik-Romanov — a great deal of water has flowed under the bridge — but his scientific school continues to occupy a very high level on a global scale, and what it does is precisely modern magnetism. I remember very well Andrei Stanislavovich's reaction to the discovery of the superfluidity of helium-3. That was in 1972. He was very much impressed by this discovery, especially after he realized that, in terms of magnetism, superfluid helium-3 constitutes antiferromagnet. A S then formulated the task of researching superfluid helium-3 precisely as an antiferromagnet. It is worth emphasizing at this point that even as we speak there is still not a single group within the confines of the former Warsaw Pact block which has successfully worked with superfluid helium-3. Note that Borovik-Romanov launched this research in the mid-1980s. He had built up a very creative team of young researchers: Yu M Bunkov, V V Dmitriev, Yu M Mukharskii, D A Sergatskov. Also in this team was Anita de Waard from The Netherlands and other visiting scientists. They succeeded in building a facility which is still unique and capable of achieving temperatures down to a tenth of a millikelvin.

Of high importance was Borovik-Romanov's foresight that the especially interesting features of superfluid helium-3 are not those which made superfluid helium-4 exciting (i.e., superfluidity), but precisely its magnetic properties. As a result, Andrei Stanislavovich's team discovered a novel phenomenon now known as magnetic superfluidity. A theorist also working at our institute, Igor Akindinovich Fomin, played a significant role in the discovery of this phenomenon, as well. The authors called it "homogeneously precessing domain." Nowadays, it is more fashionable to talk about Bose condensates. In these terms, this is a nonstationary Bose condensate, such that the system is in a state of coherent precession in time, while being homogeneous in space.

Andrei Stanislavovich simply loved traveling. I remember how A S and his wife at a Conference in Odessa were carefully studying the map of Odessa's environs and were enthusiastically tracing walks for independent excursions. For A S this passion proved fatal. His wish to attend the International Conference on Magnetism in Australia in July 1997 overpowered the resistance of his doctors, who were adamant that this long flight would be critically dangerous for Andrei Stanislavovich's health. However, A S insisted that he should go; alas, it was his last trip... .

A S's death was totally unexpected for everyone around him: his thoughts were about his beloved science, and he was full of plans and new ideas; alas, it was his colleagues and disciples who had to implement these plans — without Andrei Stanislavovich. The science that A S was doing continues to unfold, both at IPP RAS and in many other laboratories in various countries, as will be discussed today in subsequent research reports during this session.

PACS numbers: **75.40.–s**, 75.50.Ee, **75.70.–i**
DOI: 10.3367/UFNe.0180.201008l.0880

Triangular lattice antiferromagnet $RbFe(MoO_4)_2$

A I Smirnov, L E Svistov, L A Prozorova, O A Petrenko, M Hagiwara

The investigation of the magnetic ordering of spins on a two-dimensional triangular lattice led to the discovery of unordinary phase transitions caused by the frustration of the antiferromagnetic exchange interaction and by the effect of fluctuations. The antiparallel ordering of spins corresponding to the minimum energy of pairwise interactions cannot be realized for a triangular lattice: given the antiparallel orientation of the first and second spins on a triangle, the third spin cannot be directed strictly opposite to both the first and second ones. The minimum of the exchange energy for classical spins ($S \gg 1$) can be realized in a three-sublattice configuration in which on each triangle the spin directions make an angle of 120° with one another [1, 2]. Anderson [3]

A I Smirnov, L E Svistov, L A Prozorova P L Kapitza Institute for Physical Problems, Russian Academy of Sciences, Russian Federation
O A Petrenko University of Warwick, UK
M Hagiwara Osaka University, Japan
E-mail: prozorova@kapitza.ras.ru

Uspekhi Fizicheskikh Nauk **180** (8) 880 – 884 (2010)
DOI: 10.3367/UFNr.0180.201008l.0880
Translated by S N Gorin; edited by A Radzig