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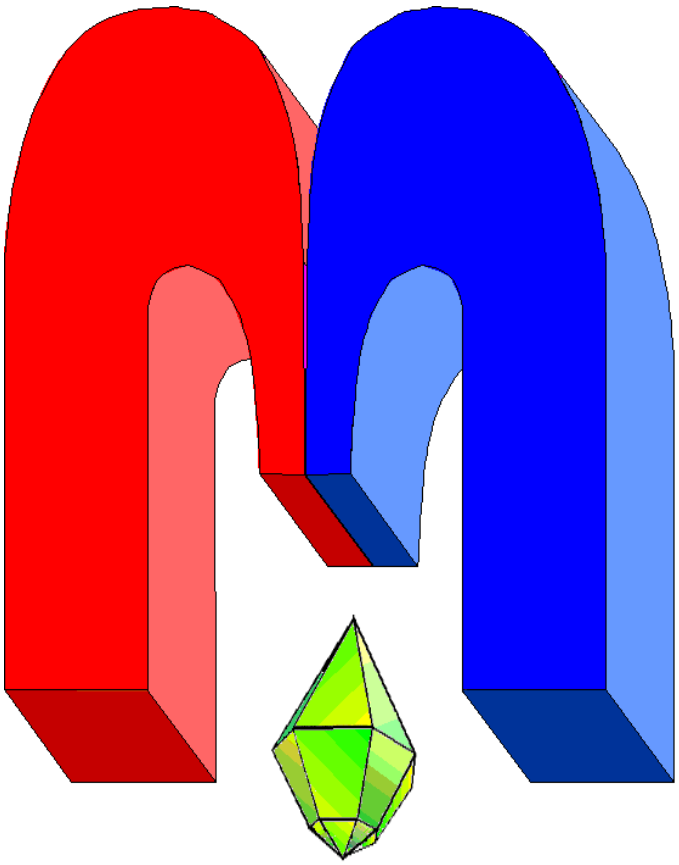

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* In Kazan University the Electron Paramagnetic Resonance (EPR) was discovered by Zavoisky E.K. in 1944.

Vadim Aleksandrovich Atsarkin
(to 80th anniversary)

June 13, 2016 is the 80th anniversary of Vadim Aleksandrovich Atsarkin, Doctor of Science (in physics and mathematics), Professor, talented scientist whose name is world-wide known in Radiospectroscopy. His contribution to the development of the spin thermodynamics in solid electron and nuclear paramagnets is fundamental and is honored with Zavoisky Award 2015. Editor of MRSej.

Vadim A. Atsarkin graduated with excellent diploma from the Semiconductor Physics Department of the Moscow State University; however, his scientific research activities started in Quantum Electronics Laboratory headed by Doctor of Science, Prof. M.E. Zhabotinskii in the Radio Engineering and Electronics Institute of the Academy of Sciences of USSR. Initially, he searched and investigated materials for masers with improved parameters, very important for recently discovered supersensitive quantum amplifiers. The investigation method was Electron Paramagnetic Resonance (EPR) discovered by E.K. Zavoiskii in 1944 in Kazan State University. This method made it possible to investigate efficiently various phenomena related to resonance absorption of electromagnetic waves by electron and nuclear paramagnets, which became the basis of masers' construction. In the field yet unknown for him, V.A. Atsarkin quickly achieved a significant progress, successfully defended his candidate of science (PhD) thesis, and started researches of the spin thermodynamics in solid electron and nuclear paramagnets, that becomes the important branch of physics of condensed matter during 60s and 70s of 20th Century. By that time, B.N. Provotorov already created the two-temperature theory of magnetic resonance saturation and cross-relaxation, which introduced into Physics the concept of a dipole order characterizing mutual orientations of spins in local fields, its experimental confirmation was obtained in NMR. However, some specialists were skeptical with respect to applicability in EPR of this two-temperature conception due to a chaotic distribution of paramagnetic impurities in magnetically diluted paramagnetic crystals and an inhomogeneous broadening of EPR lines. M.I. Rodak, the colleague of V.A. Atsarkin by the laboratory, proved that the two-temperature theory leads to a new effect – an induced irradiation under saturation on the wing of resonance line of spin system. A series of original experiments carried out by V.A. Atsarkin (earliest from them together with the student S.K. Morshnev) confirmed this prediction and turned in a “touchstone” for verifying the applicability of the two-temperature theory to EPR. As a result these pioneering studies of V.A. Atsarkin turned out to be among the earliest experimental confirmations of the Provotorov’s equations in all branches of magnetic resonance.

In further investigations V.A. Atsarkin together with colleagues discovered the direct heat contact between the electron dipole-dipole subsystem and the nuclear Zeeman subsystem, which generated the relaxation of nuclei via the electron dipole reservoir and now is serving as one of the basic mechanisms of Dynamic Nuclear Polarization (DNP). The cross-relaxation method of DNP, which is realized under cross-relaxation between EPR lines and does not require a saturation of forbidden electron-nuclear transitions, was also discovered at the same time. These outstanding results were put into foundation of his doctor of science thesis defended in 1971; later, in 1988, these results were recognized as a discovery. V.A. Atsarkin generalized an extensive cycle of works dedicated to DNP problems actual in those years in his monograph "Dynamic Nuclear Polarization in Solid Dielectrics" (Moscow, "Nauka" Publishers, 1980) which up to now serves as one of fundamental handbooks in this field.

In 1973, V.A. Atsarkin predicted and proved together with O.A. Ryabushkin the effect of enhanced longitudinal susceptibility. The longitudinal susceptibility was measured first by Gorter as far back as in 30s; however, this important technique had a limited application in view of its low sensitivity. V.A. Atsarkin suggested that the investigations should be carried out in the conditions of EPR line's saturation providing strong cooling of the electron dipole reservoir; this enhances the sensitivity by several orders ("Atsarkin effect"). The posterior development of this method by V.A. Atsarkin and his colleague A.E. Mefed led to the direct observation of Nuclear Magnetic Resonance (NMR) in the one-fold and many-fold rotating coordinate systems. Under these conditions, a strong narrowing of NMR line is possible with which ordinary two-particle dipole-dipole interactions of nuclei disappear and the main role passes to significantly more weak multi-spin interactions, while the relaxation measurements can be carried out in small effective fields. This led to the development of a new method for detecting slow (at velocities 10^2–10^4 s^{-1}) molecular movements (V.A. Atsarkin, T.N. Khazanovich, A.E. Mefed).

The new methods developed for EPR spectroscopy were successfully applied by V.A. Atsarkin and his colleagues to solving important problems of Solid State Physics, e.g., the question of the shape of a hole burned out in dipole EPR spectrum, the investigation of regularities of spectral transition in non-ordered paramagnets, direct measurement of the time of spin-lattice relaxation of paramagnetic centers in High-Temperature Superconductors, the analysis of metal-dielectric transition in fullerids, the dipole broadening and exchange narrowing of EPR lines of paramagnetic centers on the solid body surface, use of the electron magnetic resonance methods for investigation of magnetization dynamics at nanoscale in application to the general physics problem of the transition from quantum to classical behavior with growth of a system size and concentration dependences of EPR spectra in manganites.

The outstanding scientific results, encyclopedic knowledge, professionalism, wide scope of interests, benevolence and readiness to discuss scientific problems with any person asking for help – all these virtues conciliated a universal respect to V.A. Atsarkin. For a long time he was the editor of electronic journal "Magnetic Resonance in Solids". He is the member of Program Committees of numerous scientific conferences on Magnetic Resonance and he is always in the focus of discussions of new scientific problems. On conferences, one can usually observe "live queues" of theorists and experimentalists desiring to discuss with V.A. Atsarkin a wide set of problems from various fields of Magnetic Resonance physics. Being the professional experimentalist, V.A. Atsarkin at the same time deeply knows the theory of phenomena under investigation. An evidence to this virtue was provided in particular by the interesting theoretical article concerning quasi-equilibrium state in spin system of solid paramagnet (1985), where he introduced clear physical picture of the process and developed an adequate mathematical approach, and thus solved long disputes among some theorists. A monthly All-Russia seminar on Magnetic Resonance under his supervision, known also as "Atsarkin' Seminar", works already more than 35 years in the Radio Engineering and Electronics Institute of the RAS. The characteristic style of this seminar is a detailed discussion with a reporter of the theme of his/her report before its placement into agenda and always bright, benevolent concluding words with the deep

analysis of the reported work. This seminar became a real scientific school for many future doctors of science. Vadim A. Atsarkin plays a prominent role in the education of a new generation of radio-spectroscopists in Russia. For 20 years, he is the Chairman of the Program Committee and a leading lecturer at the International school of young scientists "Actual Problems of Magnetic Resonance and its Applications", annually held in Kazan, the homeland of the EPR. Many undergraduate and graduate students in various universities in Russia can rightly regard Vadim A. Atsarkin as one of their teachers.

The colleagues, disciples, and friends of Vadim A. Atsarkin use this way to congratulate him with this significant date and wish strong health and new creative successes in all fields.

V.V. Demidov, F.S. Dzheparov, M.V. Eremin, E.B. Feldman, N.P. Fokina, B.I. Kochelaev, E.K. Henner, A.A. Lundin, A.E. Mefed, S.K. Morshnev, N.E. Noginova, Y.N. Proshin, O.A. Ryabushkin, K.M. Salikhov, V.A. Skidanov, M.S. Tagirov, D.A. Tayurskii, V.A. Zhikharev, V.E. Zobov.