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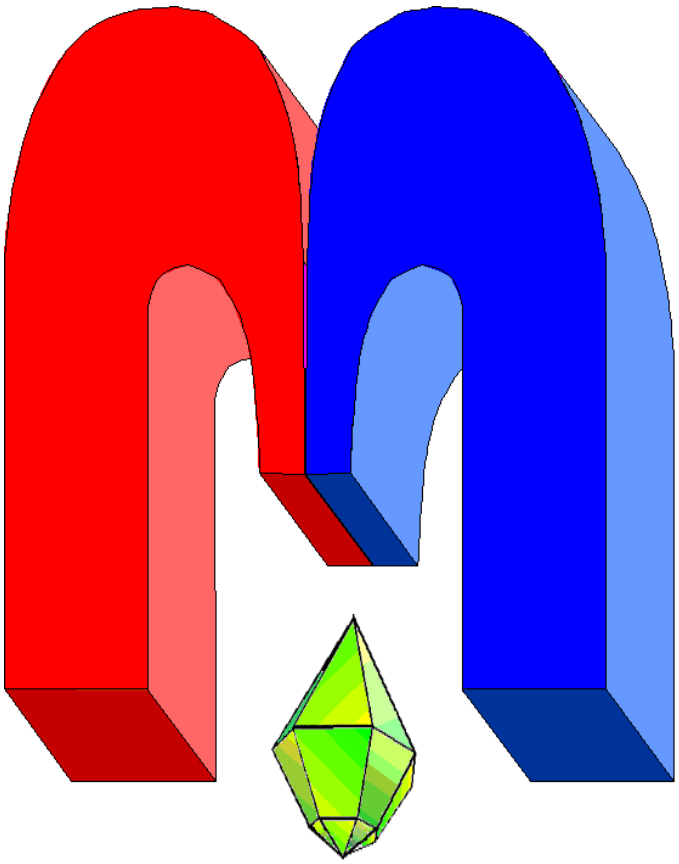

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* Address: "Magnetic Resonance in Solids. Electronic Journal", Kazan Federal University; Kremlevskaya str., 18; Kazan 420008, Russia

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

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Professor Dmitrii Albertovich Tayurskii†

S. Abe[1], A.V. Aganov[2], A.D. Akchurin[2], R.G. Batulin[2], A.V. Belushkin[2,3], I.F. Bikmaev[2], N.V. Boltakova[2], M.V. Eremin[2], R.M. Eremina[2,4], A.I. Fishman[2], M.R. Gafurov[2], I.I. Gumarova[2], A.A. Kalachev[2,4], S.S. Kharintsev[2], A.G. Kiiamov[2], V.V. Klochkov[2], B.I. Kochelaev[2], K. Kono[5], Yu. Lysogorskiy[6], K. Matsumoto[1], A.V. Mokshin[2], O.V. Nedopekin[2], S.I. Nikitin[2], M.N. Ovchinnikov[2], Yu.N. Proshin[2], I.V. Romanova[2], M.Kh. Salakhov[2,7], O.N. Sherstyukov[2], V.D. Skirda[2], S.V. Sushkov[2], H. Suzuki[1], L.R. Tagirov[2,4], M.S. Tagirov[7], A.N. Turanov[2], K.S. Usachev[2], N.Kh. Useinov[2], F.G. Vagizov[2], E.A. Voronina[2], R.V. Yusupov[2], Y.A. Zakharov[2]

[1]Kanazawa University, Kanazawa 920-1192, Japan

[2]Kazan Federal University, Kazan 420008, Russia

[3]The Frank Laboratory of Neutron Physics, JINR, Dubna 141980, Russia

[4]Federal Research Center "Kazan Scientific Center of Russian Academy of Sciences", Kazan 420111, Russia

[5]National Yang Ming Chiao Tung University, Hsinchu 300093, Taiwan

[6]Ruhr-University, Bochum 44801, Germany

[7]Academy of Sciences of the Republic of Tatarstan, Kazan 420013, Russia

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On November 23, 2023, we celebrated the 60th anniversary of Dmitrii Albertovich Tayurskii, First Vice-Rector – Vice-Rector for Research of the Kazan Federal University (KFU), Head of the Chair of General Physics, Doctor of Physical and Mathematical Sciences, Professor, laureate of the State Prize of the Republic of Tatarstan (RT) in the field science and technology, honorary worker of higher professional education of the Russian Federation (RF).

Dmitrii Tayurskii was born in Kazan in 1963. His parents, Albert Georgievich Tayurskii (physicist) and Galina Vasilievna Tayurskaya (radiophysicist), were Associate Professors at the Kazan State University. As a result, he had no problems with choosing his profession: Dmitrii started his research while still studying at the Physics Department of the Kazan State University in the period from 1980 to 1985. After completing his postgraduate studies in 1989, he successfully defended his PhD thesis in Theoretical Physics (under the scientific supervision of Professor B.I. Kochelaev). He authored publications on the study of spin kinetics in paramagnetic crystals at low temperatures, when the Zeeman energy of spins in

†This note is dedicated to Professor D.A. Tayurskii on the occasion of his 60th birthday

an external magnetic field is comparable to or greater than the thermal energy. His theoretical works devoted to the problems of thermodynamics of electron and nuclear spin systems under such conditions and the establishment of the laws of relaxation processes were recognized in the Russian Federation and abroad. Their significance is evidenced by the fact that as of today, the corresponding review chapter (in the monograph "Thermodynamics – Systems in Equilibrium and Non-Equilibrium", InTech Open, 2011) has about 3000 downloads. Dmitrii Tayurskii was awarded the first Zavoisky Award for Young Scientists, Kazan, for a series of works in this field in 1998.

After defending his PhD thesis, Dmitrii Tayurskii started research of magnetic coupling between quantum liquids and solid substrates. In collaboration with a group of experimenters of the Laboratory of Magnetic Radiospectroscopy of the Kazan State University (headed first by Professor M.A. Teplov and later by Professor M.S. Tagirov), a new method for the dynamic polarization of nuclear spins of liquid helium-3 using mesoscopic powders of dielectric Van Vleck paramagnets was proposed. Currently, the results of Dmitrii Tayurskii's research have been applied to studying various pore spaces, also as sources of hydrocarbon raw materials. In late 1990s, Dmitrii A. Tayurskii developed a theory of the magnetic properties of dielectric Van Vleck paramagnets in strong magnetic fields, when the levels of the Stark structure of the ground multiplet begin to depend on the magnetic field, and an experimental opportunity arises to study the resonant absorption of the electromagnetic field by Van Vleck ions. He proposed a mechanism for the relaxation of nuclear spins of liquid helium-3 in the pores of meso- and nanoscopic powders formed the basis for the corresponding method of cryoporometry using gaseous and liquid helium-3. Having received his Habilitaion of Physical and Mathematical Sciences degree when specializing in Physics of Magnetic Phenomena (2001), he was awarded the State Prize of the Republic of Tatarstan in the field of science and technology for this series of works in 2006.

Since the beginning of the 2000s, physics of complex systems became the main field of scientific interests of Dmitrii A. Tayurskii. He founded this scientific field of research at the KFU and headed it. The violation of the additivity principle in systems with strong correlations, such as systems of strongly correlated electrons in solids, low-dimensional systems of electrons of quantum gases and liquids under conditions of limited geometry, etc., leads to the need to develop completely new methods for describing the properties of complex systems and theoretical explanations of the observed experimental properties. Together with his students and graduate students, Dmitrii A. Tayurskii derived a theory of superfluid hydrodynamics of quantum liquids in the fractal geometry of nanoscopic pores based on the concept of the fractal Schrödinger equation. His works on non-extensive thermostatistics made it possible to explain a number of experimental data and regularities that did not find proper understanding within the traditional quantum-statistical considerations.

In 2008-2012, D.A. Tayurskii held the position of Deputy Dean for Education of the Faculty of Physics of the KFU, and in 2010–2012, he was Deputy Director for Education of the Institute of Physics of the KFU. Since 2012, he holds the position of the Head of the Chair of General Physics at the Institute of Physics. In 2011, Dmitrii A. Tayurskii participated in the establishment of the Center for Quantum Technologies of the KFU, and up to now he is its scientific director. In 2012, the first joint KFU–RIKEN research laboratory in the field of physics of strongly correlated electronic systems was established at the KFU under his initiative. As part of the work of the Quantum Center, together with colleagues from the Institute of Physical and Chemical Research, RIKEN (Japan), theoretical and experimental studies of electrons on the surface of liquid helium were carried out. Record correlation times for electron spins in such systems, which are a very

important result for the creation of quantum computers, were obtained. The study of the dynamics of melting of a Wigner crystal of two-dimensional electrons on the surface of quantum liquids makes it possible to create prototypes of quantum simulators based on them in the future. The KFU research program of 2016 was noted in a special issue of the Bulletin of the Cabinet of Ministers of Japan as the most successful scientific project within the Russia–Japan cooperation. Dmitrii A. Tayurskii established the first laboratory in the Russian Federation for the computer design of new materials and headed it. This laboratory performs numerical experiments on simulating and predicting new properties of low-dimensional electronic systems. On the basis of ab initio calculations, Dmitrii A. Tayurskii and his colleagues predicted the appearance of local high-temperature superconductivity at the grain boundaries of pyrolytic graphite (under the conditions of the appearance of the so-called flat zones).

Since 2002 Dmitrii A. Tayurskii is a Visiting Scientist (Professor) at the laboratory of Low Temperature Physics at the Institute of Physical and Chemical Research, RIKEN (Japan). In the period from 2004 to 2015, he worked at the University of Kanazawa (Japan) (as a Visiting Professor, Visiting Researcher in the Low Temperature laboratory), and since 2015 he continues as a Consulting Professor. In 2009, Professor Tayurskii initiated the development and implementation of a joint graduate program in the field of physics of complex systems with the RIKEN Institute. In 2014 and 2015, joint KFU–RIKEN laboratories in the field of biomolecular chemistry and genomic medicine were established under his active participation and support. In 2015, Dmitrii A. Tayurskii became Vice-Rector for Education of the KFU. In October 2015, he directly participated in the establishment of a simulation class in biomedicine at Juntendo University, Tokyo (Japan). Starting in 2016, an academic unit of the KFU at RIKEN has been successfully operating at the campus of the RIKEN Institute in Yokohama (Japan). Currently, the graduate program in the field of physics of complex systems jointly with the RIKEN Institute is global in its scope and covers diverse fields of physical, chemical and biomedical sciences.

In 2021, D.A. Tayurskii became Vice-Rector for Scientific Activities of the KFU, while in the period from December 2021 to September 2022 he served as Rector of the KFU. Currently he is the first Vice-Rector – Vice-Rector for Research of the Kazan Federal University.

Dmitrii A. Tayurskii has established own scientific school. Ten of his disciples obtained PhD degrees; he also provided scientific consultation in the preparation of several dissertations for Doctoral (Habilitation) degrees. He has more than 250 publications in peer-reviewed journals worldwide, four monographs, five textbooks, and ten educational and methodological works.

In 2019, Dmitrii A. Tayurskii was awarded the honorary title “Honored Scientist of the Republic of Tatarstan” for many years of fruitful research activity and significant contribution to the training of highly qualified specialists. In 2023, he was awarded the medal “For Valiant Labor”.

Dmitrii A. Tayurskii is Chairman of the specialized Dissertation Council for specialties “Medical Physics” and “Biophysics” at the KFU, a member of the specialized Dissertation Council for specialties “Theoretical Physics” and “Condensed Matter Physics” at the KFU, Chairman of the Academic Council of the Institute of Physics, Deputy Chairman of the Academic Council at the KFU, Chairman of the Academic Commission of the Academic Council (KFU), and Deputy Chairman of the Competition and Certification Commission of the Academic Council (KFU). He is a member of the Editorial Boards of the Journal of Low Temperature Physics (Springer/Nature) and Magnetic Resonance in Solids (Kazan University).

From 2006 to 2011, Dmitrii A.Tayurskii was the Principal Investigator of the Grant of the President of the Russian Federation for state support of leading scientific schools, and he was

the scientific Director of the Research and Educational Center on nanotechnology. He headed the scientific direction "Physics and Engineering of Advanced Materials" at the KFU within the Federal program "5–100" (2013-2020). Currently he supervises the KFU strategic project "Digital Genomics of Materials" within the Federal program of strategic academic leadership "Priority 2030".

In addition to his research, Professor Tayurskii is actively involved in educational activities. He gives lectures on General Physics courses for students at the Institute of Physics of the KFU, lectures on special courses in Theoretical Physics, lectures for Masters studying in the fields of Quantum Devices and Radio Photonics, and Physics of Advanced Materials, and lectures on the course "Concepts of Modern Natural Sciences". He supervises the scientific work of students, undergraduates and graduate students of the Institute of Physics. Under his direct supervision, a bachelor's training profile "Physics of Quantum Systems and Quantum Technologies" was opened, which he directs up to now. Under his leadership, the Institute of Physics opened new bachelor's and master's degrees in Innovation, which are of great interest among applicants, and graduates are in demand by employers. He is a co-author of the book "Physics Around Us", which was reprinted several times and translated into several languages, also under the auspices of the Ministry of General and Professional Education of Russia and the Ministry of Education of the Republic of Tatarstan. Professor Tayurskii is an active member of the Federal Educational and Methodological Association in Physics and Astronomy. He took part in the development of Federal State educational standards of higher education in the fields of Physics and Fundamental and Applied Physics.

Dmitrii Albertovich, you are a worthy heir to your "family": your parents-physicists and the Kazan University School of Magnetic Resonance. A high-energy scientific field is always created around you, although you are primarily concerned with ultra low temperatures. Your organizational talent is manifested at all administrative levels of the university management. With you in charge, our university is not afraid of any accreditation, inspections and monitoring; thanks to you, new bold initiatives and tasks are being implemented. We wish you fruitful work, health, and the implementation of large-scale scientific projects in collaboration with like-minded colleagues, for the benefit of our alma mater, Kazan University, one of the oldest and most modern universities in the Russian Federation.

Happy birthday to you, Dmitrii Albertovich!