

CURRENT STATUS:

Principal Scientist, Head of the Laboratory for the Physics of Complex Quantum Systems,
Moscow Institute of Physics and Technology, Dolgoprudny, Moscow region, Russia

COMMUNICATION:

Address : Moscow Institute of Physics and Technology
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EDUCATION:

1994, M.S., Department of General and Applied Physics, [Moscow Institute of Physics and Technology](#).

2000, Ph.D., [Department of Physics, University of Illinois at Urbana-Champaign](#),
Ph.D. thesis title: "Theory of high-temperature spin dynamics."
Advisor: [A. J. Leggett](#)

2013, Habilitation, [Department of Physics and Astronomy, University of Heidelberg](#).

EMPLOYMENT:

May 2020 – present

Principal Scientist, Head of the [Laboratory for the Physics of Complex Quantum Systems](#),
Moscow Institute of Physics and Technology

July 2014 – July 2020

Associate Professor, [Center for Photonics and Quantum Materials](#), Skolkovo Institute of
Science and Technology

Aug. 2013 – June 2014

Professor, [Department of Physics](#), School of Science and Technology, Nazarbayev University

Jan. 2008 – Aug. 2013

Leader of Young Investigators Group: Quantum Dynamics and Complex Quantum Systems
[Institute for Theoretical Physics](#) and [Graduate School of Fundamental Physics, Department of Physics and Astronomy, University of Heidelberg](#)

Dec. 2004 - Jan. 2008,

Postdoctoral research associate [Physics Department, University of Tennessee, Knoxville](#) / [Oak Ridge National Laboratory](#).

2003-2004, Dresden, Germany

Postdoctoral research associate at [Max Plank Institute for the Physics of Complex Systems](#).

2000-2002, Utrecht, Netherlands,

Postdoctoral research associate at [Spinoza Institute, Utrecht University](#).

1995-2000, Urbana, USA,

Alternatingly teaching or research assistant in the [Physics Department, University of Illinois at Urbana-Champaign](#).

1992-1994, Moscow,

I organized and was the director of *PhysTech-College*, the center for extra-curricular studies of mathematics, physics and English for high school students. In the Spring of 1994, more than hundred students attended PhysTech-College . The courses were taught by two professors and ten teaching assistants. PhysTech-College has expanded since then and later changed the name to Unium. In 2012, Unium possessed the largest network of educational centers in Russia (source [Unium website](#)) with several thousand students attending its courses.

HONORS:

2015, Best performance recognition, Skolkovo Institute of Science and Technology

1998-99, Harry Drickamer Research Fellowship, University of Illinois. (awarded "for excellence in physics research")

1998, Jordan Asketh Fellowship, Physics Department, University of Illinois. (The fellowship is annually awarded `` to an outstanding European [graduate] student who displays excellence and originality in a scientific field...")

1994, M.S. with highest honors (Summa Cum Laude), Moscow Institute of Physics and Technology.

RESEARCH INTERESTS:

Dynamics-to-statistics and quantum-to-classical transition in nonequilibrium many-body systems; chaos, decoherence, foundations of quantum statistical physics;

Spin dynamics, spin-spin relaxation in nuclear magnetic resonance (NMR);

High-temperature superconductivity, spin- and charge-density waves in strongly correlated electronic systems;

FUNDING:

2017 - 2021 - **30 mln Rubles** - PI - Grant from Russian Science Foundation “Statistical Behavior of thermally isolated many-body quantum systems”

2016 - 2018 - **37.5 mln Rubles** - PI - Grant of the Next Generation Program of Skoltech-MIT collaboration “Investigations of high-temperature superconductors and other complex quantum materials”.

2014 - 2017 - **18 mln Rubles** -PI- Startup research package at Skoltech

2009-2012 - **128 000 Euro** - PI - “Equilibrium properties of isolated quantum systems beyond the micro-canonical ensemble”, Innovationsfond Frontier, University of Heidelberg/DFG(German research society)

2010-2011 - **15 000 Euro** - PI - “Pre-delocalization of energy in the medium of interacting two-level systems”, Center for Quantum Dynamics, University of Heidelberg

2010-2011 - **25 000 Euro** - co-PI - “Casimir-Polder Force between an Atom and a Liquid”, Center for Quantum Dynamics, University of Heidelberg

PUBLICATIONS:

Refereed: (selected publications are marked by *)

[55] P. E. Dolgirev, A.V. Rozhkov, A. Zong, A. Kogar, N. Gedik, and B. V. Fine, *Amplitude dynamics of charge density wave in LaTe₃: theoretical description of pump-probe experiments*, [Phys. Rev. B **101**, 054203 \(2020\)](#), eprint [arXiv:1904.09795](#)

[54] G. A. Starkov and B. V. Fine, *Free induction decays in nuclear spin-1/2 lattices with small number of interacting neighbors: the cases of silicon and fluorapatite*, [Phys. Rev. B **101**, 024428 \(2020\)](#), eprint [arXiv:1911.00990](#)

[53] A. V. Aristova, V. K. Bhartiya and B. V. Fine, *Modeling superconductivity in the background of a spin-vortex checkerboard*, [Phys. Rev. B **100**, 174503 \(2019\)](#) e-print [arXiv:1703.09979](#)

[52] S. A. Romanov, A. E. Aliev, B. V. Fine, A. S. Anisimov, and A. G. Nasibulin, *Highly efficient thermophones based on freestanding single-walled carbon nanotube films*, [Nanoscale Horizons **4**, 1158 \(2019\)](#).

*[51] A. Zong, A. Kogar, Y.-Q. Bie, T. Rohwer, Ch. Lee, E. Baldini, E. Ergeçen, M. B. Yilmaz, B. Freelon, E. J. Sie, H. Zhou, J. Straquadine, P. Walmsley, P. E. Dolgirev, A. V. Rozhkov, I. R. Fisher, P. Jarillo-Herrero, B. V. Fine, N. Gedik, *Evidence of topological defects in a photo-induced phase transition*, [Nature Physics **15**, 27 \(2019\)](#) (e-print [arXiv:1806.02766](#))

[50] P. Navez, G. A. Starkov, B. V. Fine, *Classical spin simulations with a quantum two-spin correction*, [Eur. Phys. J. Spec. Top. **227**, 2013 \(2019\)](#). eprint [arXiv:1812.02155](#)

*[49] G. A. Starkov, B. V. Fine , *Hybrid quantum-classical method for simulating high-temperature dynamics of nuclear spins in solids*, [Physical Review B **98**, 214421 \(2018\)](#) e-print [arXiv:1806.09355](#)

*[48] A. E. Tarkhov, B. V. Fine, *Estimating ergodization time of a chaotic many-particle system from a time reversal of equilibrium noise*, [New J. Phys. **20** 123021 \(2018\)](#) e-print [arXiv:1804.09732](#) (2018)

[47] O. Lychkovskiy, B. V. Fine, *Spin excitation spectrum of high-temperature cuprate superconductors from finite cluster simulations*, [J. Phys.: Condens. Matter **30** 405801, \(2018\)](#). (e-print [arXiv:1712.09979](#)) (2018).

*[46] K. Ji, B. V. Fine, *Suppression of heating in quantum spin clusters under periodic driving as a dynamic localization effect*, [Phys. Rev. Lett. **121**, 050602 \(2018\)](#) (e-print [arXiv:1712.10028](#))

[45] W. Hahn, B. V. Fine, *Quantifying Stability of Quantum Statistical Ensembles*, [J. Stat. Mech: Theory and Experiment **2018**, 023107 \(2018\)](#) (e-print [arXiv:1706.04751](#))

[44] F. Kolley, O. Bohigas and B. V. Fine, *Quantum Quenches with Random Matrix Hamiltonians and Disordered Potentials*, [Ann. Phys. \(Berlin\) **2017**, 1700009 \(2017\)](#) (e-print [arXiv:1209.2954](#))

- [43] A. E. Tarkhov, S. Wimberger and B. V. Fine, *Extracting Lyapunov exponents from the echo dynamics of Bose-Einstein condensates on a lattice*, [Phys. Rev. A **96**, 023624 \(2017\)](#) (e-print [arXiv:1705.08176](#))
- [42] P. E. Dolgirev and B. V. Fine, *Pseudogap and Fermi surface in the presence of a spin-vortex checkerboard for 1/8-doped lanthanum cuprates*, [Phys. Rev. B **96**, 075137 \(2017\)](#) (e-print [arXiv:1705.08542](#))
- [41] W. Hahn and B. V. Fine, *Thermalization as an invisibility cloak for fragile quantum superpositions*, [Phys. Rev. A **96**, 012119 \(2017\)](#) (e-print [arXiv:1705.06467](#))
- [40] C. M. Kropf, J. Kohlrantz, J. Haase, and B. V. Fine, *Anomalous longitudinal relaxation of nuclear spins in CaF₂*, [Fortschr. Phys. **65**, 1600023\(2017\) / DOI 10.1002/prop.201600023](#) (e-print [arXiv:1510.06589](#))
- *[39] W. Hahn, B.V. Fine, *Stability of quantum statistical ensembles with respect to local measurements*, [Phys. Rev. E **94**, 062106 \(2016\)](#) (e-print [arXiv:1601.06402](#))
- [38] B. V. Fine, *Comment on “Broken translational and rotational symmetry via charge stripe order in underdoped YBa₂Cu₃O_{6+y}”*, [Science **351**, 235-a \(2016\)](#) (e-print [arXiv:1602.00888](#))
- [37] A. S. de Wijn, B. Hess, B. V. Fine, *Chaotic properties of spin lattices near second-order phase transitions*, [Phys. Rev. E **92**, 062929 \(2015\)](#) (eprint [arXiv:1410.5599](#))
- [36] T. A. Elsayed and B. V. Fine, *Sensitivity to small perturbations in systems of large quantum spins*, [Phys. Scr. **2015** 014011, \(2015\)](#) (eprint [arXiv:1409.4763](#))
- [35] T. A. Elsayed and B. V. Fine, *Effectiveness of classical spin simulations for describing NMR relaxation of quantum spins*, [Phys. Rev. B **91**, 094424 \(2015\)](#) (eprint [arXiv:1409.8564](#))
- [34] T. A. Elsayed, B. Hess and B. V. Fine, *Signatures of chaos in time series generated by many-spin systems at high temperatures*, [Phys. Rev. E **90**, 022910 \(2014\)](#) (eprint [arXiv:1105.4575](#))
- *[33] B. V. Fine, T. A. Elsayed, C. M. Kropf, and A. S. de Wijn, *Absence of exponential sensitivity to small perturbations in nonintegrable systems of spins 1/2*, [Phys. Rev. E **89**, 012923 \(2014\)](#) (eprint [arXiv:1305.2817](#))
- [32] A. S. de Wijn, B. Hess, and B. V. Fine, *Lyapunov instabilities in lattices of interacting classical spins at infinite temperature*, [J. Phys. A: Math. Theor. **46** 254012 \(2013\)](#) [Special issue on Lyapunov analysis] (2013) eprint [arXiv:1209.1468](#)
- *[31] T. A. Elsayed, B. V. Fine, *Regression relation for pure quantum states and its implications for efficient computing*, [Phys. Rev. Lett. **110**, 070404 \(2013\)](#) (eprint [arXiv:1208.4652](#))
- [30] J. G. Brandenburg and B. V. Fine, *Dimensionality of spin modulations in 1/8-doped lanthanum cuprates from the perspective of NQR and muSR experiments*, [J. Supercond. Nov. Magn. **26**, 2621 \(2013\)](#) (eprint [arXiv:1209.1934](#))

- [29] B. V. Fine and F. Hantschel, *An alternative to the conventional micro-canonical ensemble*, [Physica Scripta T151, 014078 \(2012\)](#) (eprint [arXiv:1010.4673](#))
- [28] C. M. Kropf and B. V. Fine, *Nonsecular resonances for the coupling between nuclear spins in solids*, [Phys. Rev. B 86, 094401 \(2012\)](#) (eprint [arXiv:1108.3997](#))
- [27] B. V. Fine, T. A. Elsayed, E. G. Sorte and B. Saam, *Asymptotic and intermediate long-time behavior of nuclear free induction decays in polycrystalline solids and powders*, [Phys. Rev. B 86, 054439 \(2012\)](#) (eprint [arXiv:1201.1793](#))
- *[26] A. S. de Wijn, B. Hess and B. V. Fine, *Largest Lyapunov exponents for the lattices of interacting classical spins*, [Phys. Rev. Lett. 109, 034101 \(2012\)](#) (eprint [arXiv:1205.2901](#))
- [25] E. G. Sorte, B. V. Fine and B. Saam, *Phase relationship between the long-time beats of free induction decays and spin echoes in solids*, [Phys. Rev. B 85, 174425 \(2012\)](#) (eprint [arXiv:1102.0527](#))
- [24] W. Hahn and B. V. Fine, *Non-Entangling Channels for Multiple Collisions of Quantum Wave Packets*, [Phys. Rev. A 85, 032713 \(2012\)](#) (eprint [arXiv:1104.5421](#))
- *[23] K. Ji and B. V. Fine, *Non-thermal statistics in isolated quantum spin clusters after a series of perturbations*, [Phys. Rev. Lett. 107, 050401 \(2011\)](#) (eprint [arXiv:1102.3651](#))
- [22] F. Hantschel and B. V. Fine, *Monte Carlo sampling of energy-constrained quantum superpositions in high-dimensional Hilbert spaces*, [Eur. Phys. J. D 63, 73 \(2011\)](#) (eprint [arXiv:1102.0531](#))
- [21] E. G. Sorte, B. V. Fine and B. Saam, *Longtime behavior of nuclear spin decays in various lattices*, [Phys. Rev. B 83, 064302 \(2011\)](#) (eprint [arXiv:1010.6044](#))
- [20] B. V. Fine, *Implications of magnetic vortex lattice scenario for 1/8-doped lanthanum cuprates*, [J. Supercond. Nov. Magn. 24, 1207 \(2011\)](#) (eprint [arXiv:0810.1889](#))
- [19] T. Egami, B.V. Fine, D. Parshall, A. Subedi and D. J. Singh, *Spin-Phonon Coupling and Superconductivity in Fe Pnictides*, [Adv. Cond. Mat. Phys. 2010, 164916 \(2010\)](#) (eprint [arXiv:0907.2734](#))
- [18] T. Egami, B.V. Fine, D.J. Singh, D. Parshall, C. de la Cruz and P. Dai, *Spin-lattice coupling in iron-pnictide superconductors*, [Physica C 470, S294 \(2010\)](#) (eprint [arXiv:0908:4361](#))
- *[17] B. V. Fine, *Typical state of an isolated quantum system with fixed energy and unrestricted participation of eigenstates*, [Phys. Rev. E 80, 051130 \(2009\)](#), (eprint [arXiv:0903:0626](#))
- *[16] S. W. Morgan, B. V. Fine, and B. Saam, *Universal Long-Time Behavior of Nuclear Spin Decays in a Solid*, [Phys. Rev. Lett. 101, 067601 \(2008\)](#), (eprint [arXiv:0805.1751](#))
- [15] B. Fine and T. Egami, *Intermediate spin-charge order in the cuprates*, [Journal of Physics Conference Series 108, 012005 \(2008\)](#)

- *[14] B. V. Fine and T. Egami, *Phase separation in the vicinity of quantum-critical doping concentration: Implications for high-temperature superconductors*, [Phys. Rev. B 77, 014519 \(2008\)](#) (eprint [arXiv:0707.3994](#))
- *[13] B. V. Fine, *Magnetic vortices instead of stripes: another interpretation of magnetic neutron scattering in lanthanum cuprates*, [Phys. Rev. B 75, 060504 \(2007\)](#) (eprint [cond-mat/0610748](#))
- [12] B. V. Fine, *Interpretation of low-temperature nuclear quadrupole resonance spectra in La(1.875)Ba(0.125)CuO(4) in terms of two-dimensional spin superstructure*, [Phys. Rev. B 75, 014205 \(2007\)](#), (eprint [cond-mat/0606300](#))
- *[11] B.V. Fine, *Longtime behavior of spin echo*, [Phys. Rev. Lett. 94, 247601 \(2005\)](#) (e-print [cond-mat/0411345](#))
- [10] B. V. Fine, *Temperature dependence of the superconducting gap in high-Tc cuprates*, [Phys. Rev. Lett. 94, 157005 \(2005\)](#) (e-print [cond-mat/0408211](#))
- *[9] B. V. Fine, F. Mintert and A. Buchleitner, *Equilibrium entanglement vanishes at finite temperature*, [Phys. Rev. B 71, 153105 \(2005\)](#), (e-print [cond-mat/0505739](#))
- [8] B. V. Fine, J. P. R. Bakker and J. I. Dijkhuis, *Long-range fluctuations of random potential landscape as a mechanism of 1/f noise in hydrogenated amorphous silicon* , *Fluctuations and Noise Letters* 5, L443-L456 (2005), preprint <http://www.thphys.uni-heidelberg.de/~fine/fnl.pdf>
- *[7] B. V. Fine, *Long-Time Relaxation on Spin Lattice as a Manifestation of Chaotic Dynamics* , [Int. J. Mod. Phys. B 18, 1119 \(2004\)](#), (e-print [cond-mat/9911230](#))
- *[6] B. V. Fine, *Hypothesis of two-dimensional stripe arrangement and its implications for the superconductivity in high-Tc cuprates*, [Phys. Rev. B 70, 224508 \(2004\)](#), (e-print [cond-mat/0308428](#))
- [5] J. P. R. Bakker, P. J. S. van Capel, B. V. Fine, and J. I. Dijkhuis, *New experimental evidence for the role of long-range potential fluctuations in the mechanism of 1/f noise in a-Si:H*, [J. Non-Cryst. Solids 338-340, 310 \(2004\)](#), (e-print [cond-mat/0310468](#))
- *[4] B. V. Fine, J. P. R. Bakker and J. I. Dijkhuis, *Long-range potential fluctuations and 1/f noise in hydrogenated amorphous silicon*, [Phys. Rev. B 68, 125207 \(2003\)](#) (e-print [cond-mat/0210680](#))
- [3] B. V. Fine, *Universal Long-Time Relaxation on the Lattice of Classical Spins: Markovian Behavior on non-Markovian Timescales*, [J. Stat. Phys. 112, 319 \(2003\)](#) (e-print [cond-mat/9911229](#))
- [2] J. P. R. Bakker, P. J. S. van Capel, B. V. Fine, and J. I. Dijkhuis, *Generation-Recombination noise in a-Si:H Studied by Device Simulations*, [MRS Proceedings 715, A2.6](#), (2002), <http://www.thphys.uni-heidelberg.de/~fine/mrs2002.doc>
- [1] B. V. Fine, *NMR Spin-Spin Relaxation as Kinetics in Spin Phase Space* , [Phys.Rev.Lett. 79, 4673 \(1997\)](#) (e-print [cond-mat/9707249](#))

Not refereed/Preprints:

[58] W. Hahn and B. V. Fine, *Attraction Induced by Mutual Quantum Measurements of Velocity*, eprint [arXiv:1903.09065](https://arxiv.org/abs/1903.09065) (2019)

[57] B. V. Fine, Superconductivity in the background of two-dimensional stripe superstructure, in "[New Challenges in Superconductivity: Experimental Advances and Emerging Theories](#)", edited by J. Ashkenazi, M.V. Eremin, J. L. Cohn, I. Eremin, D. Manske, D. Pavuna, and F. Zuo (Kluwer Academic Publishers), pp. 159-164 (2004), (e-print [cond-mat/0404488](#))

[56] B. V. Fine, Theory of high-temperature spin dynamics, Ph. D. thesis, University of Illinois at Urbana-Champaign, (2000), <http://www.thphys.uni-heidelberg.de/~fine/thesis.ps>

Group publications:

Since 2014, the members of B. F.'s group at Skoltech have additionally published **26 articles** without B.F.'s coauthorship, including three in Physical Review Letters.

TEACHING:

Electricity and Magnetism + Modern Physics, course for pre-med students, University of Tennessee, Summer 2006;

"Nuclear spin dynamics in solids: computational challenges and microscopic chaos", Univ. Heidelberg, Graduate Days, March 2008;

Quantum mechanics seminar, Univ. Heidelberg, Summer 2008; Summer 2009; Winter 2011; Summer 2012.

Physik 1, Univ. Heidelberg, Winter 2008, Winter 2009; Winter 2012.

Introduction to Superconductivity, Univ. Heidelberg, Graduate Days, March 2009;

Nuclear spin dynamics in solids, Univ. Heidelberg, Summer 2010;

High-Temperature Superconductivity, Univ. Heidelberg, Summer 2011;

Physics I: Mechanics and Thermodynamics, Nazarbayev Univ., Fall 2013;

Classical Mechanics, Nazarbayev Univ., Fall 2013;

Physics II: Electricity, Magnetism and Optics, Nazarbayev Univ., Spring 2014;

Thermodynamics and Statistical Physics, Nazarbayev Univ., Spring 2014

Introduction to Solid-State Physics, Skoltech, Fall 2014

Advanced Solid-State Physics, Skoltech, Fall 2015, 2016, 2017, 2018, 2019

Energy Colloquium, Skoltech, Fall 2015, Spring 2016

High-Temperature Superconductors, Fall 2016

Educational outreach activities:

2017 - 2019: Conceived, organized and coordinated tutoring program "[Turbo-science](#)" for gifted high-school students across Russia - in cooperation with [educational center Sirius](#).

SUPERVISION:

Supervised Ph.D. theses

at University of Heidelberg:

2013 **Tarek Elsayed** "Chaos and Relaxation in Classical and Quantum Spin Systems"
Continued as a postdoc at the University of Heidelberg and then at the Aarhus University, Denmark.
Currently, Lecturer at October University for Modern Sciences & Arts, Egypt.

2015 **Frank Hantschel** "Energy transport in the medium of interacting two-level systems"
Continued in IT industry

2016 **Walter Hahn** "Stability of quantum statistical ensembles with respect to local measurements"
Continued as a postdoc at the University of Heidelberg, then Skoltech, then Technical University of Delft

at Skoltech:

2019 **Grigory Starkov** "Simulations of High-Temperature Spin Dynamics"
Continued as a postdoc at the University of Bochum

Andrey Tarkhov (started Apr.2016)

Anastasia Aristova (started Dec. 2016) - [winner of the prize for the best student poster presentation at international conference "Complex Quantum Matter 2018", Frascati, Italy](#)

Igor Ermakov (started June 2018)

Supervised Diploma/Master works:

at University of Heidelberg:

- 2010 **Frank Hantschel** “The quantum microcanonical ensemble”
continued as a Ph.D. student in the group of Boris Fine, University of Heidelberg
- 2010 **Walter Hahn** “Multiple scattering of quantum wave packets in one dimension”
continued as a Ph.D. student in the group of Boris Fine, University of Heidelberg
- 2010 **Benjamin Hess** “Investigations of Lyapunov spectra for classical spin lattices”
continued as a Ph.D. student in the group of Peter Schmelchert, University of Hamburg
- 2011 **Chahan Kropf** “Time-averaging of the nuclear spin-spin interaction Hamiltonian in solid state NMR: Recoupling of non-secular terms”
continued as a Ph.D. student in the group of Andreas Buchleitner, University of Freiburg
- 2011 **Fabian Kolley** “Unconventional statistical ensembles in thermally isolated quantum systems and random matrix Hamiltonians”
continued as a Ph.D. student in the group of Ullrich Schollwöck, Ludwig-Maximilians-Universität München
- 2011 **Gerit Brandenburg** “Dimensionality of Spin Modulations in High-Temperature Cuprate Superconductors”
continued as a Ph.D. student in the group of Stephan Grimme, University of Bonn
- 2013 **Rafael Beinke** “Dynamic thermalization of lattice models governed by the discrete nonlinear Schrödinger equation”
continued as a Ph.D. student in the group of Lorenz Cederbaum, University of Heidelberg

at Skoltech:

- 2016 **Svetlana Medvedeva** – cosupervision, “Heating and Cooling of Injection Nanolasers”
continued as a Ph.D. student at Moscow Institute of Physics and Technology
- 2016 **Alina Khisameeva** – cosupervision, “Investigation of plasma excitations in a two-dimensional anisotropic fermion system”
continued as a Ph.D. student at the institute for Solid-State Physics, Chernogolovka
- 2017 **Alexander Korenkov** – cosupervision, “Study of Microwave Single-Photon Sources Based on Superconducting Flux Qubits”

continued as a Ph.D. student at Yale

2017 **Pavel Dolgirev**, “Electronic band structure in the presence of spin density modulations: application to high-temperature cuprate superconductors”

continued as a Ph.D. student at Harvard

Currently supervised Master Students at Skoltech:

Egor Skorokhodov (since July, 2018)

Sophia Kokanova (since September, 2018)

Undergraduate supervision:

at Nazarbayev University, academic year 2013/2014:

Yerbolat Dauletyarov, *continued to Ph.D. study at University of Arizona, Tucson*

Rustam Gatamov, *continued to Ph.D. study at Vanderbilt University*

Batyr Ilyas, *continued to Ph.D. study at Massachusetts Institute of Technology*

Nikolay Yegovtsev, *continued to Ph.D. study at University of Colorado, Boulder*

Research Scientists - current and former members of B.F.'s group :

at University of Heidelberg, Skoltech and MIPT:

Kai Ji, currently [assistant professor at Shanghai Normal University](#)

Tarek Elsayed – currently, [assistant professor at the American University in Cairo](#), Egypt

Walter Hahn – currently a research scientist at the Technical University of Delft

Patrick Navez – currently a research scientist at the Technical University of Dresden

Alexander Rozhkov – currently a senior research scientist at Skoltech, staff scientist at the Institute for Applied Hydrodynamics/Lecturer at Moscow Institute of Physics and Technology

Oleg Lychkovskiy – current – winner of the grant of Russian Science Foundation (15 mln Rubles) to built a junior research group

ADMINISTRATIVE RESPONSIBILITIES:

2016 – 2019: member of Skoltech Academic Council (elected by a secret vote of all Skoltech faculty)

2017: Organized international symposium [“Perspectives on high-temperature superconductivity”](#)

2016 – 2017: member of Skoltech Education Committee

2014 – 2016: Coordinator of Energy educational program + coordinator of Master of Science program in Applied Mathematics and Physics

2013-2014: Curriculum development of Bachelor, Master and Ph.D. programs in Physics at Nazarbayev University.

2008-2013: Co-organizer of a semi-annual graduate school at the University of Heidelberg called [Graduate Days](#).

INVITED TALKS since 2008

"Phase separation in cuprates: a theoretical criterion and some possible scenarios."
July 2008 Conference "Stripes08", Erice
Dec.2008, Hofstra University

"Absence of Boltzmann-Gibbs equilibrium in the typical state of isolated quantum systems with fixed energy and unrestricted participation of eigenstates."
May 2009 University of Osnabrück;
June 2009 University of Freiburg;
July 2009 University of Karlsruhe;
July 2009 Conference "Non-linear dynamics in quantum systems", Krasnoyarsk;
Aug. 2009 University of Utah.
Feb. 2010, University of Tennessee, Knoxville

"Theory of NMR spin-spin relaxation in solids: present status and future prospects"
Nov. 2009, University of Leipzig

Spin vortex scenario for 1/8-doped lanthanum cuprates and related topics
July 2010, Conference "Stripes 2010", Erice
Aug. 2010, Max Planck Institute for Solid State Research, Stuttgart

Emergence of non-thermal statistics in isolated quantum spin clusters under non-adiabatic perturbations
Mar. 2011, University Paul Sabatier, Toulouse
July 2011, Conference "Frontiers of Quantum and Mesoscopic Thermodynamics", Prague
Sep.2011, Workshop „Finite-Temperature Non-Equilibrium Superfluid Systems“, Heidelberg

Implications of the spin vortex lattice scenario for μ SR and NQR experiments in 1/8-doped lanthanum cuprates

July 2011, Conference “Stripes2011”, Rome

Nonequilibrium properties of thermally isolated quantum systems

Feb. 2012, University of Illinois, Urbana-Champaign

Apr. 2012, Nanyang Technological University, Singapore

Apr. 2012, University of New South Wales, Sydney

May. 2012, University of Freiburg

July 2012, Conference “Stripes 2012”, Erice

Aug. 2012, University of California, Santa Barbara

June.2013, Massachusetts Institute of Technology, Cambridge, USA

Absence of exponential sensitivity to small perturbations in nonintegrable systems of spins 1/2

June 2013, University of Leipzig

July 2013, Conference “Frontiers of Quantum and Mesoscopic Thermodynamics”, Prague

Oct 2013, Conference “Complex Nonlinear Systems”, Samarkand

Signatures of chaos in the dynamics of classical and quantum spin systems

June 2013, University of Freiburg

Reversing Chaos

Dec. 2014, Landau Institute for Theoretical Physics, Chernogolovka, Russia

Jan., 2015, University of Hamburg, Germany

Apr. 2015, EMN Meeting on Quantum Technology, Beijing, China

Jun. 2015, Quantum Metamaterials Conference, Spetses, Greece

Jun. 2015, 20th National Conference on Statistical Physics, Parma, Italy

Sep. 2017, Conference “Modern Developments in Magnetic Resonance”, Kazan, Russia

Jun. 2018, From Solid State to BioPhysics IX: From Basic to Life Sciences, Dubrovnik, Croatia

Sep. 2018, Conference on Quantum Technologies PhysTech Quant, Dolgoprudny, Russia

Effectiveness of classical spin simulations for describing NMR relaxation of quantum spins

Feb., 2015, Leibniz Institute for Solid-State Physics, Dresden, Germany

Feb., 2015, University of Leipzig, Germany

Apr. 2015, Nazarbayev University, Astana, Kazakhstan

Nonsecular resonances of interacting nuclear spins in solids

Jul. 2015, conference “Frontiers of Quantum and Mesoscopic Thermodynamics”, Prague, Czech Republic.

June 2019, University of Leipzig, Germany

Stability of quantum statistical ensembles with respect to local measurements

June 2016, Quantum Metamaterials Conference, Spetses, Greece

June 2016, 10th International Workshop on Disordered Systems, Brescia, Italy

Sep 2016, Conference 3d Dynamic Days Central Asia, Astana, Kazakhstan

Fermi-surface in the presence of spin-vortex checkerboard

June 2016, Conference “Superstripes 2016”, Ischia, Italy

Sep. 2016, Massachusetts Institute of Technology, Cambridge, USA

Low-energy electronic excitations in the presence of spin-vortex checkerboard

June 2017, Conference “Superstripes 2017”, Ischia, Italy

Sep. 2017, Workshop Non-Linear Effects and Short-Time Dynamics in Novel Superconductors and Correlated Spin-Orbit Coupled Systems, Daejeon, South Korea

Lyapunov exponents in many-body systems from Loschmidt echoes

July 2017, Conference “Frontiers of Quantum and Mesoscopic Thermodynamics”, Prague, Czech Republic

Mar. 2018, Workshop “Non-thermal Quantum Systems: glassiness, scrambling, and dynamical control”, Boston, USA

Dynamics of charge-density wave in LaTe_3

June 2018, Conference “Complex Quantum Matter 2018”, Frascati, Italy

Oct. 2018, Skoltech-MIT conference, Moscow, Russia

Nov. 2018, Nazarbayev University, Astana, Kazakhstan

July 2019, Summer School “Interaction between Radiation and Quantum Matter“, Moscow, Russia

Hybrid quantum-classical method for simulating high-temperature dynamics of nuclear spins in solids,

June 2018, University of Leipzig, Germany

Sep. 2018, Technical University of Delft, the Netherlands

Sep. 2018, Conference Modern Developments of Magnetic Resonance, Kazan, Russia

June 2019, University of Stuttgart, Germany

Many-body dynamic localization effect in periodically driven finite clusters of spins $1/2$ without disorder,

July 2019, Conference "Frontiers of quantum and Mesoscopic Thermodynamics", Prague, Czech Republic

Oct. 2019, Mini-symposium “Complex behavior of many-body quantum systems”, Skoltech, Russia

Chaotic properties of spin lattices at high temperatures,

Sep. 2019, Workshop "Applications of Random Matrix Theory to many-body physics", Simons Center, Stony Brook, USA

Nov. 2019, Workshop "Thermalization, many-body localization and hydrodynamics", ICTS Bangalore, India

Statistical ensembles realized in manybody quantum systems with and without monitoring,

Dec. 2019, Workshop "Quantization of Dissipative Chaos: Ideas and Means", Bad Honnef, Germany

IN THE MEDIA:

2020: [Mystique of the solid-state](#), Novaya gazeta [in Russian]

2018: [Laser makes wonders with quantum materials](#), Stimulus magazine [in Russian].

2018: [Ph.D. student Anastasia Aristova wins the best poster award at the prestigious international conference "Quantum Complex Matter 2018"](#)

2017-2018: Tutoring program Turbo-Science / Skoltech-Sirius

[Lecture "Chaos"](#) [in Russian]

[Lecture "Superconductivity"](#) [in Russian]

[Sirius interview](#) [in Russian]

[Turbo-Science project presentations](#) [in Russian]

2017:

Symposium ["Perspectives on high-temperature superconductivity"](#)

[article in Skoltech news](#)

[pictures from symposium](#)

2017:

Skoltech news: ["Quantum superpositions of different temperatures: is it possible?"](#)

same in Russian - Moscow journal ЭкоГрад: ["Квантовые суперпозиции разных температур: возможно ли это?"](#)

2015:

[Interview to radio station Echo of Moscow](#) [in Russian]

2012:

Pro-physik.de: ["Quantenchaos im Einkristall"](#) [in German]

2008:

ScienceDaily: ["Quantum Chaos Unveiled?"](#)

Spektrum der Wissenschaft/Spektrumdirekt.de: ["Chaos auch in der Quantenmechanik"](#) [in German]