

CURRICULUM VITAE

Personal information

Personal details **Aleksey K. Fedorov**, November 1, 1993, [RQC web-page](#).
RQC contacts akf@rqc.ru, 100A Novaya St., 143025, Skolkovo, Moscow Region, Russia.
LPTMS contacts aleksey.fedorov@lptms.u-psud.fr, 100 Bâtiment, 15 rue Georges Clémenceau, 91405, Orsay, France.

Education

Sept'15 – ... **CNRS PhD Student**, *Université Paris-Saclay, Laboratoire de Physique Théorique et Modèles Statistique, CNRS & Université Paris Sud XI*, Supervisor: Prof. [Georgy Shlyapnikov](#), Tutor: Prof. [Guillaume Roux](#).
Sept'09 – Jun'15 **Master of Science (with honor)**, *Bauman Moscow State Technical University — Bauman University*, Computer Science & Control Systems, Supervisor: Dr. [Yury Kurochkin](#).

Research experience

Oct'12 – ... **BSc Student/RQC Student Fellow/Junior Researcher**, *Russian Quantum Center, Quantum Optics & Many-body Theory*, Supervisor: Prof. [Georgy Shlyapnikov](#), Point of Contact: Prof. [Alexander Lvovsky](#).
Oct'12 – Jul'13 **BSc Student**, *Department of Physics, Bauman University, Condensed Matter Theory*, Supervisor: Dr. [Stanislav Yurchenko](#).
Dec'10 – Jun'14 **BSc Student**, *Institute for Problem in Mechanics, Russian Academy of Sciences, Mechanics of Controlled Systems*, Supervisor: Dr. [Alexander Ovseevich](#).

Research visits

Dec'13 – Jan'14 **Visiting Scholar**, *Department of Physics, Harvard University, Condensed Matter Theory*, Supervisor: Prof. [Eugene Demler](#).
Jul'12 – Aug'12 **Visiting Research Associate**, *Department of Physics and Astronomy, University of Calgary, Institute for Quantum Science and Technology*, Supervisor: Prof. [Alexander Lvovsky](#).

Professional activities

Reviewing Elsevier Recognized Reviewer ([Phys. Lett. A](#), [Ann. Phys.](#), and [Phys. C](#)), Mathematical Reviews, [Phys. Rev. A](#), [Europhys. Lett.](#), [J. Modern Optics](#), [Quant. Inf. Proc.](#), and [J. Theor. Comp. Chemistry](#).
Erdős number 4

Fellowships and awards

2015 Award for the Best poster, “Young Physicists Conference”, [Moscow Physical Society](#), with E.O. Kiktenko.
2015 Scholarship for students, [Imperial Moscow Technical School Club \(Alumni Club of the Bauman University\)](#).
2014 – 2015 Fellowship for students, [Dynasty Foundation](#).
2013 – 2015 Fellowship for students, [Russian Quantum Center](#).
2014 – 2015 Scholarship for students, [Russian Federation President](#).
2014 Scholarship for students, Scientific committee of the [Bauman University](#).
2013 – 2014 Scholarship for students, [Russian Federation Government](#).
2012 – 2013 Scholarship for students work in science, [Bauman University](#).
2013 “New Generation” Award, XV National forum for information security “INFOFORUM 2013”.
2011 – 2013 The best conference talk, [Moscow Institute for Physics and Technology](#).
2011 – 2013 The best student scientific work on theoretical physics, [Bauman University](#).
2012 Research Award for Students, [Institute for Problem in Mechanics RAS](#).
2012 Award for the Best student work on theoretical physics, [Bauman University](#).
2011 Award for the Best poster, “Young Physicists Conference”, [Moscow Physical Society](#).
2009 – 2012 UNESCO department diploma, [Bauman University](#).
2009 The best scientific work in program “Step into the Future, Moscow”, [Bauman University](#).

Publications in peer-reviewed journals

- 15 **A.K. Fedorov**, M.N. Anufriev, A.A. Zhirnov, K.V. Stepanov, E.T. Nesterov, D.E. Namiot, V.E. Karasik, and A.B. Pnev. [Gaussian mixture model for events recognition in optical time-domain reflectometry based sensing systems](#) // Review of Scientific Instruments **87**, 036107 (2016), [arXiv:1509.05998](#).
- 14 A.I. Ovseevich and **A.K. Fedorov**. [Feedback control for a system of linear oscillators](#) // Automation and Remote Control **76**, 1905–1917 (2015), [arXiv:1509.06056](#).
- 13 **A.K. Fedorov**, M.N. Anufriev, A.A. Zhirnov, E.T. Nesterov, D.E. Namiot, A.B. Pnev, and V.E. Karasik. [Towards events recognition in a distributed fiber-optic sensor system: Kolmogorov-Zurbenko filtering](#) // International Journal of Open Information Technologies **3**, 16–19 (2015), [arXiv:1509.05996](#).
- 12 **A.K. Fedorov** and A.I. Ovseevich. [Perturbation theory of observable linear systems](#) // Mathematical Notes **98**, 216–221 (2015), [arXiv:1404.6901](#).
- 11 E.O. Kiktenko, **A.K. Fedorov**, A.A. Strakhov, and V.I. Man'ko. [Single qudit realization of the Deutsch algorithm using superconducting many-level quantum circuits](#) // Physics Letters A **379**, 1409–1413 (2015), [arXiv:1503.01583](#).
- 10 A.I. Ovseevich and **A.K. Fedorov**. [Motion of a system of oscillators under the generalized dry friction control](#) // Automation and Remote Control **76**, 826–833 (2015), [arXiv:1505.00773](#).
- 9 I.A. Fedorov, **A.K. Fedorov**, Y.V. Kurochkin, and A.I. Lvovsky. [Tomography of a multimode quantum black box](#) // New Journal of Physics **17**, 043063 (2015), [arXiv:1403.0432](#); Featured in IOP Select 2015, RQC Press Release.
- 8 E.O. Kiktenko, **A.K. Fedorov**, O.V. Man'ko, and V.I. Man'ko. [Multilevel superconducting circuits as two-qubit systems: Operations, state preparation, and entropic inequalities](#) // Physical Review A **91**, 042312 (2015), [arXiv:1411.0157](#).
- 7 **A.K. Fedorov**, E.O. Kiktenko, O.V. Man'ko, and V.I. Man'ko. [Tomographic discord for a system of two coupled nanoelectric circuits](#) // Physica Scripta **90**, 055101 (2015), [arXiv:1409.5265](#).
- 6 **A.K. Fedorov**, I.L. Kurbakov, and Yu.E. Lozovik. [Roton-maxon spectrum and instability for weakly interacting dipolar excitons in a semiconductor layer](#) // Physical Review B **90**, 165430 (2014), [arXiv:1403.3956](#).
- 5 **A.K. Fedorov**, I.L. Kurbakov, Y.E. Shchadilova, and Yu.E. Lozovik. [Two-dimensional Bose gas of tilted dipoles: Roton instability & condensate depletion](#) // Physical Review A **90**, 043616 (2014), [arXiv:1407.6399](#).
- 4 E.O. Kiktenko and **A.K. Fedorov**. [Tomographic causal analysis of two-qubit states and tomographic discord](#) // Physics Letters A **378**, 1704–1710 (2014), [arXiv:1309.4948](#).
- 3 **A.K. Fedorov**. [Feynman integral and perturbation theory in quantum tomography](#) // Physics Letters A **377**, 2320–2323 (2013).
- 2 **A.K. Fedorov** and E.O. Kiktenko. [Quaternion representation and symplectic spin tomography](#) // Journal of Russian Laser Research **34**, 477–487 (2013), [arXiv:1308.6549](#).
- 1 A.I. Ovseevich and **A.K. Fedorov**. [Asymptotically optimal feedback control for a system of linear oscillators](#) // Doklady Mathematics **88**, 613–617 (2013).

Preprints

- 2016 E.O. Kiktenko, A.S. Trushechkin, Y.V. Kurochkin, and **A.K. Fedorov**. Post-processing procedure for industrial quantum key distribution systems, [arXiv:1603.08387](#).
- 2016 E.O. Kiktenko, A.A. Popov, and **A.K. Fedorov**. Bidirectional imperfect quantum teleportation with a single Bell state, [arXiv:1602.01420](#).
- 2016 **A.K. Fedorov**, S.I. Matveenko, V.I. Yudson, and G.V. Shlyapnikov. Novel p -wave superfluids of fermionic polar molecules, [arXiv:1601.03026](#).
- 2015 E.O. Kiktenko, **A.K. Fedorov**, and V.I. Man'ko. Teleportation in an indivisible quantum system // Quantum Measurements and Quantum Metrology (to be published in 2016), [arXiv:1512.05168](#).
- 2015 A.I. Ovseevich and **A.K. Fedorov**. Damping of a system of linear oscillators using the generalized dry friction // Proceedings of the Steklov Institute of Mathematics (to be published in 2016), [arXiv:1508.07775](#).
- 2013 **A.K. Fedorov** and A.I. Ovseevich. Asymptotic control theory for a system of linear oscillators // Moscow Mathematical Journal (to be published in 2016), [arXiv:1308.6090](#).

Conference and seminars presentations

- 29/03/2016 *Post-processing procedure for the industrial quantum key distribution system.* E.O. Kiktenko, A.S. Trushechkin, Y.V. Kurochkin, and **A.K. Fedorov**. The 3rd International School and Conference "Saint-Petersburg OPEN 2016", Saint-Petersburg, Russia.
Poster
- 03/02/2016 *Development of an industrial quantum key distributing device.* A.V. Duplinskiy, A.A. Kanapin, A.V. Losev, A.S. Sokolov, E.O. Kiktenko, and **A.K. Fedorov**. Young Physicist Conference, Moscow, Russia [*Physics in High Education (Special Issue)* **22**, 96 (2016)].
Award
- 29/01/2016 *Superfluids of fermionic polar molecules.* **A.K. Fedorov**, S.I. Matveenko, V.I. Yudson, and G.V. Shlyapnikov. The thirty-sixth edition of the "Journées de Physique Statistique", Paris, France.
Talk
- 18/01/2016 *Novel p -wave superfluids of fermionic polar molecules.* **A.K. Fedorov**. Laboratoire de Physique Théorique et Modèles Statistique (LPTMS) PhD Days, Orsay, France.
Talk
- 21/09/2015 *Floating bases quantum key distribution protocol with decoy states.* **A.K. Fedorov**, V.L. Kurochkin, and Y.V. Kurochkin. International Conference for Young Quantum Information Scientists, Palaiseau, France.
Poster
- 21/09/2015 *Roton phenomena of weakly interacting dipolar excitons in a semiconductor layer.* **A.K. Fedorov**. Collective electronic excitations in 2D, Final conference of the INDEX project, Pisa, Italy.
Invited talk
- 16/07/2015 *Complete characterization of multimode quantum process.* I.A. Fedorov, **A.K. Fedorov**, Y.V. Kurochkin, and A. I. Lvovsky. The Third International Conference on Quantum Technologies, Moscow, Russia.
Poster
- 14/07/2015 *Roton-maxon spectrum and local density waves in a two-dimensional Bose gas of dipoles.* **A.K. Fedorov**, I.L. Kurbakov, and Yu.E. Lozovik. The Third International Conference on Quantum Technologies, Moscow, Russia.
Poster
- 14/07/2015 *Quantum key distribution protocol with floating bases and decoy states.* Yu.V. Kurochkin, **A.K. Fedorov**, and V.L. Kurochkin. The Third International Conference on Quantum Technologies, Moscow, Russia.
Poster
- 06/07/2015 *Operating with five-level superconducting circuit as a two-qubit system.* E.O. Kiktenko, **A.K. Fedorov**, and V.I. Man'ko. The Third International Conference on Quantum Technologies, Moscow, Russia.
Poster
- 08/07/2015 *Local stable supersolid of tilted dipoles.* **A.K. Fedorov**. Workshop on Interacting Fermions: Precision Theory and Experiment, Trieste, Italy.
Poster
- 06/07/2015 *Quantum computations via multilevel superconducting circuit.* E.O. Kiktenko, **A.K. Fedorov**, A.A. Strakhov, and V.I. Man'ko. 22nd Central European Workshop on Quantum Optics, Warsaw, Poland.
Best poster
- 06/07/2015 *Tomographic discord and information asymmetry in two-qubit X -states.* **A.K. Fedorov**, E.O. Kiktenko, O.V. Man'ko, and V.I. Man'ko. 22nd Central European Workshop on Quantum Optics, Warsaw, Poland.
Poster
- 03/03/2015 *Roton phenomena and stability properties of dipolar condensates.* **A.K. Fedorov**, I.L. Kurbakov, and Yu.E. Lozovik. APS March Meeting 2015, San Antonio, Texas, USA [*Bulletin of the American Physical Society* **60**, 1 (2015)].
Poster
- 03/02/2015 *Symmetric discord for two-qubit X -states.* E.O. Kiktenko and **A.K. Fedorov**, Young Physicist Conference, Moscow, Russia [*Physics in High Education (Special Issue)* **21**, 26 (2015)].
Best poster
- 11/28/2014 *Local density waves of a two-dimensional gas of tilted dipoles.* **A.K. Fedorov**, I.L. Kurbakov, and Yu.E. Lozovik. 57th Scientific Conference of the Moscow Institute of Physics and Technology, Moscow, Russia.
Talk
- 11/25/2014 *Tomographic discord of two-qubit states.* **A.K. Fedorov**, E.O. Kiktenko, O.V. Man'ko, and V.I. Man'ko. 57th Scientific Conference of the Moscow Institute of Physics and Technology, Moscow, Russia.
Talk
- 07/15/2014 *Structural monitoring system with fiber Bragg grating sensors: Implementation and software solution.* **A.K. Fedorov**, V.A. Lazarev, I.P. Makhrov, N.O. Pozhar, M.N. Anufriev, A.B. Pnev, and V.E. Karasik. 23rd International Laser Physics Workshop, Sofia, Bulgaria [*Journal of Physics: Conference Series* **594**, 012049 (2015), arXiv:1412.5838].
Poster
- 07/15/2014 *Tomographic measure of asymmetry in two-qubit states.* **A.K. Fedorov**, E.O. Kiktenko, O.V. Man'ko, and V.I. Man'ko. 23rd International Laser Physics Workshop, Sofia, Bulgaria [*Journal of Physics: Conference Series* **594**, 012045 (2015), arXiv:1412.5812].
Talk
- 07/07/2014 *Perturbation theory of observable linear systems and asymptotic control theory.* **A.K. Fedorov** and A.I. Ovseevich. International Conference "Mathematics Days in Sofia", Sofia, Bulgaria.
Talk
- 06/17/2014 *Generalized dry-friction-type control for a system of oscillators.* A.I. Ovseevich and **A.K. Fedorov**. XII All-Russian Conference on Control Problems, Moscow, Russia.
Invited talk
- 06/02/2014 *Quantum cryptography: RQC project.* **A.K. Fedorov**. Digital security, personal data security, biometrics. Startup Village, Skolkovo, Moscow, Russia.
Invited talk

- 05/30/2014 *Roton-maxon spectrum and stability problem for dipolar atoms and excitons systems.* **A.K. Fedorov**, Y.E. Shchadilova, I.L. Kurbakov, and Yu.E. Lozovik. [International Conference on Problems of Strongly Correlated and Interacting Systems](#), St-Petersburg, Russia.
Poster
- 04/15/2014 *From approximate reachable sets to asymptotic control theory.* **A.K. Fedorov** and A.I. Ovseevich. [International Youth Conference "Geometry & Control"](#), Moscow, Russia.
Invited talk
- 04/14/2014 *Roton-maxon spectrum and stability problem for systems of dipolar bosonic particles.* **A.K. Fedorov**, Y.E. Shchadilova, I.L. Kurbakov, and Yu.E. Lozovik. ["Young Scientists of Russia"](#), Dynasty Foundation, Moscow, Russia.
Poster
- 03/23/2014 *Roton-maxon excitation spectrum for Q2D weakly interacting dipolar excitons.* **A.K. Fedorov**, I.L. Kurbakov, and Yu.E. Lozovik. [APS March Meeting 2014](#), Denver, Colorado, USA [[Bulletin of the American Physical Society](#) **59**, 1 (2014)].
Poster
- 11/29/2013 *Roton instability of Q2D weakly interacted dipolar excitons.* **A.K. Fedorov**, I.L. Kurbakov, and Yu.E. Lozovik. 56th Scientific Conference of the [Moscow Institute of Physics and Technology](#), Troitsk, Russia.
Best talk
- 10/29/2013 *Quantum tomography: current state and perspectives.* **A.K. Fedorov**. Colloquium, [Faculty of Fundamental Science, Department of Physics, Bauman University](#), Moscow, Russia.
Invited talk
- 10/29/2013 *2D and 1D systems with the dipole-dipole interaction.* **A.K. Fedorov**. Colloquium, [Faculty of Fundamental Science, Department of Physics, Bauman University](#), Moscow, Russia.
Invited talk
- 07/23/2013 *Feynman path integrals in quantum tomography.* **A.K. Fedorov**. [The Second International Conference on Quantum Technologies](#), Moscow.
Poster
- 07/23/2013 *2D tilted dipoles: density waves vs. phonon collapse.* **A.K. Fedorov**, I.L. Kurbakov and Yu.E. Lozovik. [The Second International Conference on Quantum Technologies](#), Moscow.
Poster
- 06/11/2013 *Asymptotically optimal feedback control for a system of linear oscillators* (plenary). [A.I. Ovseevich](#), and **A.K. Fedorov**. [The 39th International Conference "Application of Mathematics in Engineering and Economics"](#), Sozopol, Bulgaria [[AIP Conference Proceedings](#) **1570**, 257 (2013)].
Invited talk
- 06/06/2013 *Sensing of phase transition in medium with terahertz pulsed spectroscopy.* K.I. Zaytsev, I.N. Fokina, **A.K. Fedorov**, and S.O. Yurchenko. The 2nd Russia-Japan-USA Symposium on the Fundamental and Applied Problems of Terahertz Devices and Technologies, Moscow [[Journal of Physics: Conference Series](#) **486**, 012024 (2014)].
Poster
- 01/17/2013 *Feedback control for a system of linear oscillators.* A.I. Ovseevich and **A.K. Fedorov**. Seminar "Control theory and dynamics of systems" of academician F.L. Cherus'ko, [Institute for Problem in Mechanics RAS](#), Moscow, Russia.
Invited talk
- 11/23/2012 *Density wave supersolid in a two-dimensional gas of tilted dipoles.* **A.K. Fedorov**, I.L. Kurbakov, and Yu.E. Lozovik. [55th Scientific Conference of Moscow Institute of Physics and Technology](#), Troitsk, Russia
Best talk
- 11/15/2012 *Quantum optics in the phase space.* **A.K. Fedorov**. Seminar of Optical Society of America Chapters "Optics and Everything-Everything-Everything", Lomonosov Moscow State University, Moscow, Russia
Invited talk
- 10/03/2012 *Quantum cryptography: From Enigma to RSA and quantum computers.* **A.K. Fedorov**. Second Moscow Science Festival at the Bauman University.
Invited talk
- 09/13/2012 *Phase delay distribution in dome lens antenna with displaced feed array.* [V.I. Litun](#), V.N. Mitrokhin, and **A.K. Fedorov**. 22nd International Crimean Conference "Microwave & Telecommunication Technology", Sevastopol, Ukraine [[IEEE Proceedings Catalog Number CFP12788-PRT](#)].
Talk
- 08/10/2012 *Quantum tomograms and their application in quantum information science.* **A.K. Fedorov**. Quantum Lunch, Institute for Quantum Information Science, University of Calgary, Calgary, Canada.
Invited talk
- 07/27/2012 *Quantum tomograms and their application in quantum information science.* **A.K. Fedorov**, S.O. Yurchenko, K.I. Zaytsev, and I.N. Fokina. [21st International Laser Physics Workshop](#), Calgary, Canada [[Journal of Physics: Conference Series](#) **414**, 012040 (2013)].
Talk
- 07/25/2012 *Roton instability and phonon collapse of two-dimensional tilted dipole atoms.* **A.K. Fedorov**, I.L. Kurbakov, and Yu.E. Lozovik. [21st International Laser Physics Workshop](#), Calgary, Canada [[Journal of Physics: Conference Series](#) **414**, 012036 (2013)].
Poster
- 04/09/2012 *Feynman path integrals for quantum tomograms.* **A.K. Fedorov**. Seminar of the group of Prof. O.G. Smolyanov, Department of Theory of Functions and Functional analysis, Mathematics & Mechanics Faculty, Lomonosov Moscow State University, Moscow, Russia.
Talk
- 02/06/2012 *Roton instability phenomena of two-dimensional tilted dipole system in a thin layer.* **A.K. Fedorov**, Yu.E. Lozovik, and I.L. Kurbakov. Young Physicist Conference, Moscow, Russia [[Physics in High Education \(Special Issue\)](#) **18**, 61 (2012)].
Poster

- 11/25/2011 *Roton instability of two-dimensional tilted dipoles in a thin layer.* I.L. Kurbakov, Yu.E. Lozovik, and **A.K. Fedorov**. **Best talk** 54th Scientific Conference of Moscow Institute of Physics and Technology, Troitsk, Russia.
- 02/01/2011 Tomographic approach to quantum mechanics. **A.K. Fedorov** and S.O. Yurchenko. Young Physicist Conference, Moscow, Russia [**Best poster** *Physics in High Education (Special Issue)* **17**, 23 (2011)].
- 01/26/2011 *Tomographic representation in quantum mechanics.* **A.K. Fedorov** and S.O. Yurchenko. The 6th Russian Scientific Conference “Irreversible Processes in Nature and Technology”, Moscow, Russia. **Talk**
- 06/01/2010 *Probability representation of quantum states: quantum tomography.* **A.K. Fedorov**. Colloquium, **Talk** Faculty of Fundamental Science, Department of Physics, Bauman University, Moscow, Russia.

Teaching experience

- 2013 **Teaching**, *RQC quantum physics classes for high school students.*
- 2012 **Teaching**, Lecture course “Cryptography and steganography”, *Bauman University.*
- 2011 – 2013 **Teaching**, Lecture course “General physics”, *Evening school at Bauman University.*
- 2012 – 2013 **Supervising**, co-supervisor in high school research projects at “Step into the Future, Moscow”.

Popular articles

- 2014 **A.K. Fedorov** and R. Y. Yunusov. *How quantum sensors will change the world?* // *Engineering.com.*

References

1. **Prof. G.V. Shlyapnikov**, PhD advisor, LPTMS, University of Amsterdam, & Russian Quantum Center. shlyapn@lptms.u-psud.fr
2. **Prof. A.I. Lvovsky**, RQC Fellowship advisor, University of Calgary & Russian Quantum Center. lvov@ucalgary.ca
3. **Prof. Yu.E. Lozovik**, Frequent collaborator, Institute for Spectroscopy RAS. lozovik@isan.troitsk.ru
4. **Prof. V.I. Man'ko**, Frequent collaborator, P.N. Lebedev Physical Institute RAS. manko@lebedev.ru
5. **Prof. A.I. Ovseevich**, Undergraduate studies supervisor, Institute for Problem in Mechanics RAS. ovseev@ipmnet.ru