

Curriculum vitae
Sergey N. Shevchenko

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Research: http://www.ilt.kharkov.ua/bvi/structure/d16/en/dynamics_mesoscopic.html

Publications – **GS:** <https://scholar.google.com.ua/citations?user=TfSG1KoAAAAJ&hl>; also in
SCOPUS: <https://www.scopus.com/authid/detail.uri?authorId=7101791730>,
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Official positions:

1.11.2016 – present: **Head of Department of Superconducting and Mesoscopic structures, ILTPE:** www.ilt.kharkov.ua/bvi/structure/d16/en
 01.2008 – 10.2016: senior research fellow in ILTPE (also 1.06-31.10.2016: acting department head);
 12.2004 – 12.2007: research fellow in ILTPE;
 11.2002 – 12.2004: junior research fellow in ILTPE;
 11.1999 – 11.2002: Ph.D. student in ILTPE;

09.2013 – 05.2020: part-time **professor in V. N. Karazin Kharkiv National University**, Department of Physics and Technology; spring semester: Mathematical physics (practicals for second-year students) and “Quantum Engineering and Mesoscopic Physics” (lecture course for fifth-year students) fall semester: Mathematical physics (practicals for third-year students);

Short research visits (from one week to two months):

2007 – 11.2019,.. – RIKEN (Wako, Japan), one or two three-week (one-month) visits per year;
 2016 – University of Queensland (Brisbane, Australia);
 2015, 2016 – Nikolaev Institute of Inorganic Chemistry (Novosibirsk, Russia);
 2004, 2006 – 2014, 2018 – F. Schiller University and IPHT (Jena, Germany);
 1999-2002 – Grenoble High Magnetic Field Laboratory CNRS&MPI (France).

Referee of the journals Phys. Rev. Lett., Phys. Rev. A and B, Low Temp. Phys., etc.

Member of the ILTPE Scientific Councils “Electronic properties of normal metals and superconductors” (since 2011, since 2017 Deputy Head) and “Theoretical Physics” (since 2014); member of the ILTPE Dissertation Defence Council (since 2015).

Member of the Council of Young Scientists (YS) of ILTPE (2003-2010); In Organizing Committee of the YS Conferences “Low Temperature Physics” in ILTPE (2004-2010). In Program Committee of this conference (since 2010).

Education:

Institution of doctoral candidacy:

09.2008 – 08.2011: ILTPE, Kharkov, Ukraine.

Degree: Dr. Sci. (defended 23.04.2013, degree granted 10.10.2013) in speciality Theoretical Physics
 Research Project: “Dynamical quantum effects in systems with Josephson qubits” (adviser: Prof. A.N. Omelyanchouk)

Graduate:

11.1999 – 11.2002: ILTPE, Kharkov, Ukraine.

Degree: Ph.D. (defended 08.07.2003, degree granted 12.11.2003) in speciality Theoretical Physics
 Research Project: “Current-carrying states in mesoscopic normal and superconducting systems” (supervisor: Prof. Yu.A. Kolesnichenko)

Undergraduate:

09.1993 – 03.1999: Kharkov State University, Department of Physics and Technology.

Degree: Specialist Diploma with Distinction in Theoretical Physics
 Thesis: “Influence of spin-orbit interaction and hyperfine magnetic field on currents in two-dimensional electron gas” (supervisor: DSc A.S. Rozhavsky, ILTPE);

Supervision:

Kitsenko Aleksandr

Bachelor student since July 2022.

Kofman Polina

PhD student, 11.2023 – present

Master’s thesis (5.2023): “Phase control: nonadiabatic dynamics of qubits”

Bachelor’s thesis (6.2021): “Majorana transitions with linear perturbations”.

The best University graduate (06.2023), second-rank diploma at the Akhiezer competition of students works, KhNU (10.2021), RIKEN IPA short-term scholarship (4 month visit 2022-2023)

Journal publications: Sci. Rep., arXiv

Ryzhov Artem

PhD student, 11.2020 – present

Master’s thesis (2018): “Resonant excitation and dynamics of the quantum four-level system”.

RIKEN IPA short-term scholarship (for 6 months 2022-2023)

Journal publications: PRB, EPJST, arXiv

Liul Maxim

PhD thesis (to be defended 06.12.2023): “Interferometry of multi-level quantum systems”

Internship in RIKEN (11.2023-...), Scholarship of the National Academy of Sciences of Ukraine for young researchers (since 05.2023), grant of NASU for young researchers (together with O. Il’inskaya, since 07.2023).

Journal publications: LTP, PRB, EPJST

Ivakhnenko Oleg

PhD thesis (defended 12.10.2023): “Dynamics of nonadiabatic transitions in quantum and classical two-level systems”

Master’s thesis (2019): “Landau-Zener-Stückelberg-Majorana transitions for interferometry and quantum control”

Bachelor’s thesis (2017): “Dynamics of membrane for creation of memcapacitance”.

RIKEN Postdoc (11.2023-...), RIKEN IPA long-term scholarship (05.2022 – 10.2023); RIKEN IPA short-term scholarship (for 6 months 2018-2019); internships in RIKEN (2017, 2018, 2019); Prize of the ILTPE at the annual competition for the best articles: Phys. Rev. B (2020); Prize for young scientists and students of higher educational institutions for the best scientific work, National Academy of Sciences of Ukraine (March 2019); First-rank diploma at the University

competition of the student works and third-rank diploma at the all-Ukrainian competition of the student works (2018).

Journal publications: 3 x Sci. Rep., PRB, Phys. Rep., arXiv

Alumni:

Nakonechnyi Mikhail

PhD student, 11.2018 – 10.2021 (left the PhD course) Journal publications: PRB, LTP

Karpov Denis

PhD thesis (2018): “Features of the electrodynamics of the mesoscopic system of superconducting quantum bits interacting with a resonator.”

Master’s thesis (2014): “Amplification of transmitted signal in doubly-driven qubit-resonator system”.

Bachelor’s thesis (2012): “Dressed states of the qubit in resonator”.

First-rank diploma at the University competition of the student works and second-rank diploma at the all-Ukrainian competition of the student works (2013); personal travel scholarship RFFI, Novosibirsk State Technical University, Novosibirsk (6-8, 2015); President of Ukraine scholarship (2017); DAAD scholarships (2017-2018, 2019).

Journal publications: PRApplied, 2 x PRB, 3 x LTP, EPJB.

Rubanov Dmitriy

Bachelor’s thesis (2015): “Interaction of the electrically coupled quantum dot and nano-mechanical-resonator”. Journal publication: PRB.

Temchenko Evgeniy

Master’s thesis (2010): “Multiphoton excitations and population inversion in the system of two flux qubits”.

Yearly project (2009): “Theoretical study of dissipative dynamics of superconducting qubits systems”.

First-rank diploma at the University competition of the student works and second-rank diploma at the all-Ukrainian competition of the student works (2009).

Journal publications: 2 x PRB, J. Phys. Conf. Ser.

Grants, Scholarships, and Awards:

In different years: participation in national and bilateral grants (together with Germany, Russia, and Japan).

7.2023 – ...: NFDU Grant (Call: Science for the Recovery of Ukraine in the War and Post-War Periods) “Thermal imaging study of soft tissues with thermal injury and mathematical modeling of the processes accompanying it” (ILTPE team [G. Shustakova, E. Gordienko, Yu. Fomenko, O. Ivakhnenko] + the team from Institute for Problems of Cryobiology and Cryomedicine of the NAS of Ukraine)

6.2023: awarded IOP Trusted Reviewer status (Only the top 15% of reviewers achieve this recognition and receive certification) <https://accreditations.ioppublishing.org/9eee9caa-6015-4724-a88e-14628ee49aef>

10.2020 – 10.2024: NATO Science for Peace Grant for the project titled: “Single Microwave Photon Counter based on Tunable Flux Qubit”, Project # G5796, together with the groups of A. Kordyuk (Kiev), M. Grajcar (Bratislava), V. Krasnov (Stockholm), P. Febvre (Grenoble).

07.2020 – 06.2023: Army Research Office ARO Grant for the project titled: “Driven Quantum Systems: Landau-Zener-Stückelberg-Majorana Physics”, Contract No. W911NF2010261.

1.2020: Award of V.N. Karazin Kharkiv National University for the textbook “Mesoscopic Physics meets Quantum Engineering”.

2.2017: B.I. Verkin Prize of the National Academy of Sciences of Ukraine “for the theoretical and experimental study of Josephson qubits for quantum computation”.

2016 and 2019: Grants of President of Ukraine for Doctors of Sciences.

08.2010: DAAD Scholarship, Institute for Photonic Technologies (Jena, Germany).

05.2010: Award (decoration) of National Academy of Sciences “Talent, Inspiration, Labour”.

04.2010: Academic rank: “Senior Researcher” by High Attestation Commission of Ukraine

02.2010: National Academy of Sciences of Ukraine Award for the young scientists for the best scientific works (together with Yuzepovich O.I. and Luzhbin D.A.; for the series of works: “New quantum and dimensional effects in superconducting and mesoscopic structures”).

01.2008: Third prize at the open competition for the best YS’s papers in theoretical physics within the framework of the seminar “Problems of theoretical physics” dedicated to the centenary of L.D. Landau.

03.2006 – 03.2008: INTAS YS Fellowship Grant.

2005: YS Grant of President of Ukraine.

10.2004 – 01.2005: DAAD Scholarship, F. Schiller University, Institute for Solid State Physics (Jena, Germany).

10.2002 – 10.2004: Scholarship of President of Ukraine.

10.1999 – 01.2000: CIES Scholarship of French Government, Grenoble High Magnetic Field Laboratory (France).

Prizes of the ILTPE at the annual competition for the best articles: Phys. Rev. B (2020); Phys. Rev. B (2018); Phys. Rev. B (2014); Low Temp. Phys. (2010); Phys. Rep. (2010); Phys. Rev. B (2008); Phys. Rev. B (2006); Low Temp. Phys. (2005); Phys. Rev. B (2003).

Languages: Russian (native), Ukrainian, English, French.

Selected publications:

Lecture notes:

S. N. Shevchenko, Mesoscopic Physics meets Quantum Engineering, World Scientific, July 2019 (<https://doi.org/10.1142/11310>, ISBN: 978-981-12-0139-4)

Monograph:

A.N. Omelyanchouk, E.V. Il'ichev, S.N. Shevchenko, Quantum coherent phenomena in Josephson qubits, Naukova Dumka, Kiev, 2013 (in Russian) (www.ilt.kharkov.ua/bvi/publisher/omelyanchuk.html, ISBN 978-966-00-1260-8)

Review articles:

- 1) O.V. Ivakhnenko, S.N. Shevchenko, and F. Nori, Nonadiabatic Landau-Zener-Stuckelberg-Majorana transitions, dynamics, and interference, review article, *Phys. Rep.* **995**, 1-89 (2023).
- 2) S.N. Shevchenko, A.N. Omelyanchouk, and E. Il'ichev, Multiphoton transitions in Josephson-junction qubits, *Low Temp. Phys.* **38**, 283 (2012).
- 3) S.N. Shevchenko, S. Ashhab, and F. Nori, Landau-Zener-Stuckelberg interferometry, *Phys. Rep.* **492**, 1 (2010).

Journal publications:

- 1) P.O. Kofman, O.V. Ivakhnenko, S. N. Shevchenko, and F. Nori, Majorana's approach to nonadiabatic transitions validates the adiabatic-impulse approximation, *Sci. Rep.* **13**, 553 (2023).
- 2) K. Ono, S. N. Shevchenko, T. Mori, S. Moriyama, and F. Nori, Single-spin qubit analogous to a quantum heat engine, *Phys. Rev. Lett.* **125**, 166802 (2020) (Editors' Suggestion; PhysOrg)
- 3) K. Ono, S. N. Shevchenko, T. Mori, S. Moriyama, and F. Nori, Quantum interferometry with a g-factor-tunable spin qubit, *Phys. Rev. Lett.* **122**, 207703 (2019)
- 4) S. N. Shevchenko and D. S. Karpov, Thermometry and memcapacitance with qubit-resonator system, *Phys. Rev. Applied* **10**, 014013 (2018).
- 5) R. D. Yamaletdinov, O. V. Ivakhnenko, O. V. Sedelnikova, S. N. Shevchenko, Y. V. Pershin, Snap-through transition of buckled graphene membranes for memcapacitor applications, *Sci. Rep.* **8**, 3566 (2018).
- 6) S. N. Shevchenko, Y. V. Pershin, and F. Nori, Qubit-based memcapacitors and meminductors, *Phys. Rev. Applied* **6**, 014006 (2016).
- 7) M. F. Gonzalez-Zalba, S. N. Shevchenko, S. Barraud, J. R. Johansson, A. J. Ferguson, F. Nori, and A. C. Betz, Gate-sensing coherent charge oscillations in a silicon field-effect transistor, *Nano Lett.* **16**, 1614 (2016).
- 8) S. N. Shevchenko, G. Oelsner, Ya. S. Greenberg, P. Macha, D. S. Karpov, M. Grajcar, U. Hübner, A. N. Omelyanchouk, and E. Il'ichev, Amplification and attenuation of the transmitted signal by doubly-dressed states, *Phys. Rev. B* **89**, 184504 (2014).
- 9) S.N. Shevchenko, S.H.W. van der Ploeg, M. Grajcar, E. Il'ichev, A.N. Omelyanchouk, H.-G. Meyer, Resonant excitations of single and coupled flux qubits connected to tank circuit, *Phys. Rev. B* **78**, 174527 (2008).
- 10) A. Izmailkov, S.H.W. van der Ploeg, S.N. Shevchenko, M. Grajcar, E. Il'ichev, A.N. Omelyanchouk, and H.-G. Meyer, Consistency of ground state and spectroscopic measurements on flux qubits, *Phys. Rev. Lett.* **101**, 017003 (2008).
- 11) S.N. Shevchenko, Impedance measurement technique for quantum systems, *Eur. Phys. J. B* **61**, 187 (2008).
- 12) V.I. Shnyrkov, Th. Wagner, D. Born, S.N. Shevchenko, W. Krech, A.N. Omelyanchouk, E. Il'ichev, and H.-G. Meyer, Multiphoton transitions between energy levels in a phase-biased Cooper-pair box, *Phys. Rev. B* **73**, 024506 (2006).
- 13) S.N. Shevchenko, A.S. Kiyko, A.N. Omelyanchouk, W. Krech, Dynamic behaviour of Josephson-junction qubits: crossover between Rabi oscillations and Landau-Zener transitions, *Low Temp. Phys.* **31**, 569 (2005).
- 14) Yu.A. Kolesnichenko, A.N. Omelyanchouk, and S.N. Shevchenko, Josephson and spontaneous currents at the interface between two *d*-wave superconductors with transport current in the banks, *Low Temp. Phys.* **30**, 213 (2004).
- 15) Yu.V. Pershin, S.N. Shevchenko, I.D. Vagner, and P. Wyder, Electronic transport through nuclear-spin-polarization-induced quantum wire, *Phys. Rev. B* **66**, 035303 (2002).
- 16) S.N. Shevchenko and Yu.A. Kolesnichenko, Conductance of the elliptically shaped quantum wire, *JETP* **92**, 811 (2001).
- 17) V.A. Cherkassky, S.N. Shevchenko, A.S. Rozhavsky, I.D. Vagner, Hyperfine-driven spontaneous persistent currents in mesoscopic rings, *Low Temp. Phys.* **25**, 541 (1999).

Seminars in: RIKEN (Wako, Japan), Keio University (Yokohama, Japan), IPHT (Jena, Germany), University of Konstanz (Germany), CNRS (Grenoble, France), Institute of Inorganic Chemistry

(Novosibirsk, Russia), University of Queensland (Brisbane, Australia), Kyiv Academic University.

Selected talks and lectures:

US-Ukraine Quantum Forum, August 28-31, 2023

Lecture at the “Physics Reports Seminar Series”:

<https://doi.org/10.52843/cassyni.n9g9kw> (26.07.2023).

International Conference “Frontiers of Quantum and Mesoscopic Thermodynamics”, 31 July - 6 August 2022, Prague, Czech Republic;

International Workshop “Quantum Research and Education in Europe and in Ukraine”, July 27-28, 2022, Kyiv;

Presidium of the National Academy of Sciences of Ukraine, December 8, 2021;

APS March Meeting, March 15-19, 2021;

International School and Symposium on Nanoscale Transport and phoTonics, ISNTT2019, November 18-22, 2019 NTT Atsugi R&D Center, Japan;

International Symposium on Frontiers of Quantum Transport in Nano Science, Institute of Industrial Science, Kashiwa Campus, University of Tokyo, Kashiwa, Japan, November 7-10, 2018;

Summer School on Superconducting Electronics - Menorca, Spain, 23-28 September 2018;

Summer School on Modern Quantum Technologies, Bogolyubov Institute for Theoretical Physics, Kiev, 10-14 September 2018;

International School and Symposium on Nanoscale Transport and phoTonics, November 13-17, 2017 NTT Atsugi R&D Center, Japan;

Advanced Workshop on Landau-Zener Interferometry and Quantum Control in Condensed Matter, 29 Sept. – 3 Oct., 2014, ICTP ECAR, Izmir, Turkey;

DPG-Spring Meeting, March 25-30, 2012, Berlin, Germany;

XIII International Conference on Quantum Optics and Quantum Information, May 28 - June 1, 2010, Kiev.