

Curriculum Vitae

Dmitry V. Zhirihin (27.02.1995)

PhD



Personal data

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Languages: Russian (native speaker), English (fluently), Spanish (beginner)

Google Scholar: <https://scholar.google.com/citations?hl=ru&user=-6S0yekAAAAJ>

Education

- Sep. 2017 – Aug. 2020
ITMO University, Department of Physics and Engineering
Title of qualification: PhD in Physics and Mathematics
Thesis title: Development of photonic topological insulators based on all-dielectric structures in microwave frequency range
Supervisor: Dr. Alexey P. Slobozhanyuk
- Sep. 2015 – Jul. 2017
ITMO University, Nanophotonics and Metamaterials Department
Title of qualification: Master of Science, *cum laude*
Thesis title: Investigation of absorbers and polarizers based on metasurfaces for wide incident angle range
Supervisor: Dr. Stanislav B. Glybovski
- Sep. 2011 – Jul. 2015
Peter the Great Saint Petersburg Polytechnic University, Institute of Physics, Nanotechnology and Telecommunications, Quantum Electronics Department
Title of qualification: Bachelor of Applied Science
Thesis title: Research of different types of absorbing metasurfaces
Supervisor: Dr. Vadim V. Davydov

Work Experience

- May 2019 – present
Department of Physics and Engineering, ITMO University
Junior Research Fellow;
Main activities: Theoretical and experimental study of photonic topological structures
- Jul. 2017 – Apr. 2019
Department of physics and engineering, ITMO University
Research Engineer; supervisor: Dr. A.P. Slobozhanyuk
Main activities: Experimental realization of novel electromagnetic devices based on the concept of topological metamaterials
- Mar. – Aug. 2019
The City College of New York, The City University of New York
Research internship; group of prof. A.B. Khanikaev
(<https://www.cuny.edu/profiles/alexander-khanikaev>),
Main activities: Theoretical studying and experimental realization of high-order photonic topological insulators
- June – July 2018
The City College of New York, The City University of New York
Visiting student; group of prof. A.B. Khanikaev
(<https://www.cuny.edu/profiles/alexander-khanikaev>),
Main activities: Theoretical studying photonic topological insulators
- Nov. 2015 – Jun. 2017
Center of Nanophotonics and Metamaterials, ITMO University
Laboratory assistant; supervisor: Dr. S. B. Glybovski
Main activities: theoretical and numerical studies of metamaterials
- Dec. 2014 – Oct. 2015
Metamaterials Laboratory, ITMO University
Trainee; supervisor: Dr. S. B. Glybovski

Teaching

- Sept. 2021 – present
Department of Physics and Engineering, ITMO University
Teaching assistant for master course “*General Physics. Mechanics and Thermodynamics*”
- Sept. 2017 – 2019
Department of Physics and Engineering, ITMO University
Teaching assistant for master course “*Radio Engineering systems and signals*”

Volunteer activity

- 17 – 21 Sept. 2018
Sirius Art & Science Park Sochi, Sochi, Russia
Member of committee group of scientific conference *METANANO - 2018*
- 4 – 8 June 2018
ITMO University, Saint Petersburg, Russia
Member of committee group of scientific conference *Days on Diffraction 2018*
- Sept. 2010 – May 2013
High school №344, Saint Petersburg, Russia
Teacher for training high school students for Physics competitions

Publications

Journal papers

1. **D.V. Zhirihin**, Y.S. Kivshar “Topological photonics on a small scale”, *Small Science*, 2100065, 2021
2. A. Vakulenko, S. Kiriushchikina, M. Li, **D.V. Zhirihin**, X. Ni, S. Guddala, D. Korobkin, A. Alù, A. B. Khanikaev “Near-field characterization of higher-order topological photonic states at optical frequencies,” *Advanced Materials*, 2004376, 2021.
3. M. Li, **D. Zhirihin**, M. Gorbach, X. Ni, D. Filonov, A. Slobozhanyuk, A. Alu, A.B. Khanikaev “Higher-order topological states in photonic Kagome crystals with long range interactions,” *Nature Photonics*, 14, pp. 89–94, 2020.
4. A.A. Gorbach*, **D.V. Zhirihin***, A.P. Slobozhanyuk, M.A. Gorbach, A.B. Khanikaev, “Photonic Jackiw-Rebbi states in all-dielectric structures controlled by bianisotropy,” *Physical Review B*, 99, 205122, 2019. (* - equal contribution)
5. **D.V. Zhirihin**, S.V. Li, D.Y. Sokolov, A.P. Slobozhanyuk, M.A. Gorbach, A.B. Khanikaev, “Photonic spin Hall effect mediated by bianisotropy,” *Optics Letters*, vol. 44, pp. 1694-1697, 2019.
6. M.A. Gorbach, X. Ni, D.A. Smirnova, D. Korobkin, **D.V. Zhirihin**, A.P. Slobozhanyuk, P.A. Belov, A. Alù & A.B. Khanikaev, “Far-field probing of topological states in all-dielectric metasurfaces”, *Nature Communications*, vol. 9, pp. 909, 2018.
7. **D.V. Zhirihin**, C.R. Simovski, P.A. Belov and S.B. Glybovski, “Mushroom High-Impedance Metasurfaces for Perfect Absorption at Two Angles of Incidence,” *IEEE Antennas and Wireless Propagation Letters*, vol. 16, pp. 2626 - 2629, 2017.

Conference papers

1. N.A. Olekhno, A.D. Rozenblit, V.I. Kachin, O.I. Burmistrov, A.A. Dmitriev, P.S. Seregin, **D.V. Zhirihin**, M.A. Gorbach “Higher-Order Topological States in the Extended Two-Dimensional SSH Model and Their Electric Circuit Implementation” CLEO: QELS_Fundamental Science, FTu1M. 5 2021
2. **D. Zhirihin**, M. Li, M. Gorbach, X. Ni, D. Filonov, A. Slobozhanyuk, A. Alu, A. Khanikaev, “Demonstration of higher-order topological States in photonic kagome lattice with next-nearest-neighbour coupling,” *AIP Conference Proceedings* 2300 (1), 020139, 2020.
3. P.A. Ivanova, N.A. Olekhno, V.I. Kachin, **D.V. Zhirihin**, P.S. Seregin, M.A. Gorbach “Realizing topological corner states in two-dimensional Su-Schrieffer-Heeger model with next-nearest neighbor couplings,” *Journal of Physics: Conference Series* 1695 (1), 012142, 2020.
4. M.A. Gorbach, **D.V. Zhirihin**, D.A. Bobylev, A.A. Gorbach, S.V. Li, D.Y. Sokolov, A.P. Slobozhanyuk, A.B. Khanikaev, “Engineering coupling in electromagnetic topological models via staggered bianisotropy,” *Journal of Physics: Conference Series*, 1461 (1), 012053, 2020.
5. A. Vakulenko, S. Kiriushchikina, M. Li, **D.V. Zhirihin**, X. Ni, S. Guddala, D. Korobkin, A. Alù, A. B. Khanikaev “Experimental demonstration of higher-order topological states in photonic systems,” in *Conference of Lasers and Electro-Optics, OSA Technical Digest (Optical Society of America, 2020)*, paper JM3A.3, 2020.
6. **D.V. Zhirihin**, A. Gorbach, A.P. Slobozhanyuk, A. Khanikaev, M. Gorbach, “Observation of photonic Jackiw-Rebbi states in chains of all-dielectric bianisotropic particles,” *2019 IEEE International Conference on Microwaves, Antennas, Communications and Electronic Systems (COMCAS)*, pp.1-2, 2019.
7. **D. Zhirihin**, M. Li, D. Filonov, X. Ni, A. Slobozhanyuk, A. Alu, & A.B. Khanikaev, “Experimental observation of high-order topological corner states in 2D photonic Kagome lattice,” *2019 Thirteenth International Congress on Artificial Materials for Novel Wave Phenomena (Metamaterials)*, pp.492-494, 2019.

8. **D.V. Zhirihin**, D.S. Filonov, M.A. Gorlach, A.P. Slobozhanyuk, Y.S. Kivshar, A.B. Khanikaev, “Experimental realization of three-dimensional all-dielectric photonic topological insulators,” *2018 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting*, pp.3-4, 2019.
9. J. A. Parra, A. Sayanskiy, **D. Zhirihin**, S. B. Glybovski, and J. D. Baena, “Validity of homogenization for artificial plasmas: Straight strips versus zigzag strips” *12th International Congress on Artificial Materials for Novel Wave Phenomena (Metamaterials)*, pp. 31–33, 2018.
10. **D.V. Zhirihin**, M.A. Gorlach, X. Ni, D.A. Smirnova, D. Korobkin, A.P. Slobozhanyuk, P.A. Belov, A. Alù, A. B. Khanikaev, ”Experimental observation of spin-locked propagation of topological edge states in an open non-Hermitian metasurface,” *Journal of Physics: Conference Series*, vol. 1092, 2018.
11. **D.V. Zhirihin**, C.R. Simovski, P.A. Belov and S.B. Glybovski, “Mushroom-type HIS as a perfect absorber for two angles of incidence,” *11th International Congress on Engineered Materials Platforms for Novel Wave Phenomena (Metamaterials)*, pp. 397-399, 2017.

Under review

1. D.A. Bobylev, **D.V. Zhirihin**, D.I. Tihonenko, A. Vakulenko, D.A. Smirnova, A.B. Khanikaev, M.A. Gorlach “Higher-order topological phase induced by hybrid magneto-electric resonances” *Laser & Photonics Reviews [under review]* (<https://arxiv.org/abs/2107.14331>).
2. N.A. Olekhno, A.D. Rozenblit, V.I. Kachin, A.A. Dmitriev, O.I. Burmistrov, P.S. Seregin, **D.V. Zhirihin**, M.A. Gorlach “Higher-order topological states mediated by long-range coupling in D4-symmetric lattices” *Physical Review B Rapid Comm. [under review]* (<https://arxiv.org/abs/2103.08980>).
3. **D.V. Zhirihin**, M. Sidorenko, A.P. Slobozhanyuk, A. Alù, A.B. Khanikaev “A Topological Photonic Semimetal with Spin- and Valley-Polarized Dirac Continua and Embedded Edge States” *Advanced Science [under review]*

Cover

1. The paper “*Higher-order topological states in photonic Kagome crystals with long range interactions*” is on the cover of *Nature Photonics* (Volume 14 Issue 2, February 2020) (<https://www.nature.com/nphoton/volumes/14/issues/2>)
2. The paper “*Near-field characterization of higher-order topological photonic states at optical frequencies*” is on the cover of *Advanced Materials* (Volume 33 Issue 18, May 2021) (<https://onlinelibrary.wiley.com/toc/15214095/2021/33/18>)
3. The paper “*Near-field characterization of higher-order topological photonic states at optical frequencies*” is on the back cover of *Small Science* (Volume 1, Issue 12, December 2021) (<https://onlinelibrary.wiley.com/doi/10.1002/smssc.202170032>)

Scholarships, grants, honors, awards

1. Russian Science Foundation (Russia, 2021-2024)
2. IEEE MTT-S Graduate Fellowship 2020.
3. Discovery of the Year (Russia, 2019) indicator.ru
4. Russian Foundation of Basic Research 2019 code A (Russia, 2019-2020).
5. Russian Federation President Scholarship for studying abroad (Russia, 2018).
6. State PhD Scholarship (Russia, 2017 – 2020).
7. State Academic Scholarship (Russia, 2011 – 2017).

Popular-science publications

1. <https://indicator.ru/physics/nauka-vne-ramok-vosmichasovogo-rabochego-dnya.htm>

Membership in professional societies

1. SPIE student member (ID: 4172046).
2. IEEE AP-S, Photonics-S., MTTTS student member (ID: 94091160).

Journal reviewer

Nanophotonics [IF: 8.449], Optics and Laser Technology [IF: 3.867], Applied Physics Letters [IF: 3.791], Advanced Photonics Research

References

1. Dr. Alexey Slobozhanyuk, PhD, ITMO University, St. Petersburg, Russia.
e-mail: a.slobozhanyuk@metalab.ifmo.ru
2. Dr. Stanislav Glybovski, PhD, assistant professor, ITMO University, St. Petersburg, Russia.
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