

Pavel Terekhov

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EDUCATION AND RESEARCH EXPERIENCE

ITMO University, Saint-Petersburg, Russia &
Ben-Gurion University of the Negev, Beer-Sheva, Israel

- Ph.D. in Electrical Engineering Sep 2016 – Sep 2020
 - Thesis: Light manipulation with all-dielectric metasurfaces made of high refractive index nanoparticles which support multipoles of second and third orders
 - Adviser: Dr. Alexander Shalin and Dr. Alina Karabchevsky
 - Focus: Dielectric nanophotonics, metasurfaces, multipole decomposition

Purdue University, West Lafayette, Indiana, USA

- Internship during Ph.D. Studies Nov 2019 – Sep 2020
 - Adviser: Prof. Alexandra Boltasseva
 - Focus: Nanophotonics, BIC, Perovskites

Peter the Great St.Petersburg Polytechnic University, Saint-Petersburg, Russia

- B.S. and M.S. in Technical Physics Sep 2009 – Jul 2016
 - Cumulative GPA: 4.3/5.0

AWARDS & SCHOLARSHIPS

- Scholarship of the President of Russian Federation for studying abroad 2019 – 2020
To fund the exchange program. One of 60 awarded in Russia.
- The Scholarship of the President of Russian Federation 2019 – 2020
In recognition of scientific contribution during PhD studies
- The Scholarship of the President of Russian Federation at the priority areas 2019 – 2020
In recognition of scientific contribution at priority area during PhD studies
- Best Poster Award at "Science & Progress" International Conference 2016
Peterhof, Russia

RESEARCH INTERESTS

- Dielectric nanophotonics
- Multipole decomposition
- Metasurfaces and nanoantennas
- Numerical modeling
- Bound states in the continuum
- Integrated photonics
- Perovskite photonics
- Nanoplasmonics

PUBLICATIONS

JOURNALS

- [8] **P. D. Terekhov**, A. B. Evlyukhin, D. Redka, V. S. Volkov, A. S. Shalin and A. Karabchevsky, "Magnetic Octupole Response of Dielectric Quadrumers," *Laser & Photonics Reviews*, 1900331, DOI: 10.1002/lpor.201900331, 2020.
- [7] **P. D. Terekhov**, A. B. Evlyukhin, A. S. Shalin and A. Karabchevsky, "Polarization-dependent asymmetric light scattering by silicon nanopyramids and their multipoles resonances," *Journal of Applied Physics*, vol. 125, pp. 173108, 2019.
- [6] H. K. Shamkhi, K. V. Baryshnikova, A. Sayanskiy, P. Kapitanova, P. Belov, **P. D. Terekhov**, A. Karabchevsky, A. B. Evlyukhin, Y. Kivshar and A. S. Shalin, "Transverse Scattering and Generalized Kerker Effects in All-Dielectric Mie-Resonant Metaoptics," *Physical Review Letters*, vol. 122, pp. 193905, 2019.
- [5] **P. D. Terekhov**, H. K. Shamkhi, E. A. Gurvitz, K. V. Baryshnikova, A. B. Evlyukhin, A. S. Shalin and A. Karabchevsky, "Broadband forward scattering from dielectric cubic nanoantenna in lossless media," *Optics Express*, vol. 128, iss. 8, pp. 173108, 2019.

- [4] **P. D. Terekhov**, K. V. Baryshnikova, Y. Greenberg, Y. H. Fu, A. B. Evlyukhin, A. S. Shalin and A. Karabchevsky, “Enhanced absorption in all-dielectric metasurfaces due to magnetic dipole excitation,” *Scientific Reports*, vol. 9, pp. 3438, 2019. **In TOP 100 in Physics in SciRep 2019**
- [3] **P. D. Terekhov**, V. E. Babicheva, K. V. Baryshnikova, A. S. Shalin, A. Karabchevsky and A. B. Evlyukhin, “Multipole analysis of dielectric metasurfaces composed of nonspherical nanoparticles and lattice invisibility effect,” *Physical Review B*, vol. 99, pp. 045424, 2019.
- [2] **P. D. Terekhov**, K. V. Baryshnikova, Y. A. Artemyev, A. S. Shalin, A. Karabchevsky and A. B. Evlyukhin, “Multipolar response of nonspherical silicon nanoparticles in the visible and near-infrared spectral ranges,” *Physical Review B*, vol. 96, pp. 035443, 2017.
- [1] **P. D. Terekhov**, K. V. Baryshnikova, A. S. Shalin, A. Karabchevsky and A. B. Evlyukhin, “Resonant forward scattering of light by high-refractive-index dielectric nanoparticles with toroidal dipole contribution,” *Optics Letters*, vol. 42, iss. 4, pp. 835-838, 2017.

CONFERENCE PROCEEDINGS

- [7] **P. D. Terekhov**, V. E. Babicheva, K. V. Baryshnikova, A. S. Shalin, A. Karabchevsky and A. B. Evlyukhin, “Transmission and reflection features of all-dielectrics metasurfaces with electric and magnetic resonances,” in *Photonic and Phononic Properties of Engineered Nanostructures IX. – International Society for Optics and Photonics*, vol. 10927, 2019.
- [6] H. K. Shamkhi, K. V. Baryshnikova, A. Sayanskiy, P. Kapitanova, P. Belov, **P. D. Terekhov**, A. Karabchevsky, A. B. Evlyukhin, Y. Kivshar and A. S. Shalin, “Extraordinary transparent metasurfaces composed of transverse scatterers,” in *Thirteenth International Congress on Artificial Materials for Novel Wave Phenomena (Metamaterials)*, IEEE, 2019.
- [5] **P. D. Terekhov**, K. V. Baryshnikova, Y. A. Artemyev, A. S. Shalin, A. Karabchevsky and A. B. Evlyukhin, “Optical multipole resonances of non-spherical silicon nanoparticles and the influence of illumination direction,” in *Optical Components and Materials XV. – International Society for Optics and Photonics*, vol. 10528, 2018.
- [4] **P. D. Terekhov**, K. V. Baryshnikova, A. S. Shalin, A. Karabchevsky and A. B. Evlyukhin, “Toroidal dipole associated resonant forward scattering of light by silicon nanoparticles,” in *Progress In Electromagnetics Research Symposium-Spring (PIERS)*, IEEE, 2017.
- [3] **P. D. Terekhov**, K. V. Baryshnikova, Y. A. Artemyev, A. S. Shalin, A. Karabchevsky and A. B. Evlyukhin, “Multipole optical response of silicon nanoparticles of a conical shape,” in *2017 Days on Diffraction (DD)*, IEEE, 2017.
- [2] **P. D. Terekhov**, K. V. Baryshnikova, A. B. Evlyukhin and A. S. Shalin, “Destructive interference between electric and toroidal dipole moments in TiO₂ cylinders and frustums with coaxial voids,” in *Journal of Physics: Conference Series*, vol. 929, iss. 1, 2017.
- [1] **P. D. Terekhov**, K. V. Baryshnikova, A. S. Shalin, A. B. Evlyukhin and I. A. Khromova, “Nonradiating anapole modes of dielectric particles in terahertz range,” in *2016 Days on Diffraction (DD)*, IEEE, 2016.

CONFERENCE ABSTRACTS AND PRESENTATIONS

- [16] P. D. Terekhov et al., “Metasurface invisibility and Generalized Kerker-effect applications for dielectric nanophotonics,” *NANOP 2019, Munich, Germany*, Oral Talk, 2019.
- [15] P. D. Terekhov et al., “Multipole evolution in dielectric nanoscatterers in lossless optical media and forward scattering amplification,” *METANANO 2019, Saint-Petersburg, Russia*, Poster Presentation, 2019.
- [14] P. D. Terekhov et al., “Multipole analysis of unusual absorption and other properties of dielectric metasurfaces,” *METANANO 2019, Saint-Petersburg, Russia*, Oral Talk, 2019.
- [13] P. D. Terekhov et al., “High-refractive-index nanoparticles embedded in media: multipole evolution and broadband forward scattering enhancement,” *SPIE Photonics West 2019, San-Francisco, USA*, Oral Talk, 2019.
- [12] P. D. Terekhov et al., “Transmission and reflection features of all-dielectrics metasurfaces with electric and magnetic resonances,” *SPIE Photonics West 2019, San-Francisco, USA*, Oral Talk, 2019.

- [11] P. D. Terekhov et al., “All-dielectric metasurface engineered absorption in near-infrared,” *Abstracts of LALS 2018, Ramat-Gan, Israel, Oral Talk, session co-chair*, 2018.
- [10] P. D. Terekhov et al., “Multipole evolution and directional scattering in dielectric nanocubes embedded in media,” *NANO.IL.2018, Jerusalem, Israel, Poster Presentation*, 2018.
- [9] V. E. Babicheva, P. D. Terekhov et al., “Lattice Kerker effect in nanoparticle arrays with electric and magnetic dipole resonances,” *SPIE Photonics West 2018, San-Francisco, USA, Oral Talk*, 2018.
- [8] P. D. Terekhov et al., “Optical multipole resonances of non-spherical silicon nanoparticles and the influence of illumination direction,” *SPIE Photonics West 2018, San-Francisco, USA, Invited Oral Talk*, 2018.
- [7] P. D. Terekhov et al., “Excitation of high-order multipoles in Si metasurface,” *SPIE Photonics West 2018, San-Francisco, USA, Oral Talk*, 2018.
- [6] P. D. Terekhov et al., “Excitation of high-order multipoles in silicon metasurface,” “*When Light Meets Matter - Celebrating Yehiam Prior’s first 70 Years*” *International Conference, Weizmann University, Israel, Poster Presentation*, 2018.
- [5] P. D. Terekhov et al., “Multipole optical response of silicon nanoparticles of different shape,” *Days on Diffraction 2017, Saint-Petersburg, Russia, Oral Talk*, 2017.
- [4] P. D. Terekhov et al., “Toroidal dipole associated resonant forward scattering of light by silicon nanoparticlese,” *PIERS 2017, Saint-Petersburg, Russia, Oral Talk*, 2017.
- [3] P. D. Terekhov et al., “Nonradiating anapole modes of dielectric microparticles in terahertz range,” *Physica.SPb/2016, Saint-Petersburg, Russia, Poster Presentation*, 2016.
- [2] P. D. Terekhov et al., “Destructive mode interference in TiO₂ cylinders with coaxial void,” “*Science and Progress 2016*”, *Saint-Petersburg, Russia, Poster Presentation*, 2016.
- [1] P. D. Terekhov et al., “Nonradiating anapole modes of dielectric nanoparticles in microwave range,” “*Days on Diffraction 2016*”, *Saint-Petersburg, Russia, Poster Presentation*, 2016.

RESEARCH SKILLS

Modeling and Simulations

- Extensive experience in full-wave time-domain and frequency-domain modeling and simulation of photonic devices
- COMSOL Multiphysics, Lumerical, CST Microwave Studio, S⁴
- Experience with HPC clusters

Optical Characterization

- Building optical setups for transmission and reflection measurements
- Trained for ellipsometry and thermal-ellipsometry measurements

Technical Software and Programming

- MATLAB, Python, Wolfram Mathematica (basic)
- T_EX, L_AT_EX, Github, Origin Pro, Adobe Illustrator, Microsoft Word, Microsoft Excel, Microsoft PowerPoint, AutoCAD

Administrative Skills & Paperwork

- Experience in writing and submitting grant proposals
- Basic experience in the budget planning
- Experience in scientific advising with undergraduate and graduate students

PROFESSIONAL AFFILIATIONS & ACTIVITIES

The International Society for Optics and Photonics,

Bellingham, Washington, USA

- Student Member 2017 – Present

Peer Reviewer

- Optics Express

CAMPUS ACTIVITIES

SPIE Student Chapter

- Member, Ben-Gurion University of the Negev 2017 – 2019
- Member, Purdue University 2020 – Present

LANGUAGES

- Russian: Native language.
- English: Fluent (speaking, reading, writing).

INTERESTS

Sports, reading, boardgames

LINKS

- Google Scholar
- Researchgate
- ORCID
- Publons

REFERENCES

- **Dr Alexander Shalin**
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- **Dr Alina Karabchevsky**
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- **Dr Andrey Evlyukhin**
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