Natalia Kostina

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scholar.google.ru/citations?user=h6RCDEQAAAAJ&hl

Education

Sept. 2017-Nov. 2021	ITMO University, Saint-Petersburg, Russia
PhD student	Department of Physics and Engineering
Title:	*'Optical forces in the field of evanescent waves at the interface between media'*
Sept. 2015-Jul. 2017	ITMO University, Saint-Petersburg, Russia
M.Sc. with distinction	Nanophotonics and Metamaterials
Title:	*'Optical binding and trapping of nanoparticles above the substrate via surface plasmon polariton interference'*
Sept. 2011-Jun. 2015	Kharkiv National University of Radio Electronics, Ukraine
B.Sc. with distinction	Laser Technology
Title:	*'Scattering of electromagnetic wave on metamaterial cylinder'*

Areas of research interest: Optical manipulations, evanescent fields, scattering, plasmonics, photonic crystals, metamaterials, nanophotonics

Background: dyadic Green's function, effective polarizability, time-averaged optical force, hyperbolic metamaterial dispersion, effective medium approach, scattering and transfer matrices for 1D photonic crystals, surface plasmon-polariton

Skills

Modeling and simulation: MATLAB, Lumerical, CST Microwave studio (basics), COMSOL (basics)

Auxiliary programs: Blender, Keyshot, Inkscape, Mendeley, LaTeX, MS Office

Languages: English (upper intermediate), German (beginner), Russian (native)

Teaching

June 2020 Summer practice for high school students 'Multilayered structures as Bragg mirrors for lasers'

June 2021 Summer practice for high school students ‘Sensitive sensors based on Bloch surface wave excitation’
September 2021-April 2022 Year practice for high school student ‘Optical forces on resonant nanoparticles dimer’
February 2022-May 2022 Course project of 1st year students 'Creation of cloud chamber and calculation of its parameters' as part of the thermodynamics course
September 2022-January 2023 Practical classes within the course 'General physics. Mechanics. Molecular physics. Thermodynamics'
September 2022-January 2023 Course project of 2nd year students 'Band structure and surface waves of photonic crystals' within the course of electrodynamics
September 2022-January 2023 Course project of 3rd year students 'Thermal effects of optical traps' within the course of electrodynamics.

Grants and awards

1) 2nd place in the contest of the young scientists reports at the conference ‘**Yenisei Photonics – 2022’.**
2) **‘Peculiar optomechanical effects in vicinity of photonic crystals’** № 20-1-5-115-1 Individual grant ‘PhD-Student’ from Theoretical Physics and Mathematics Advancement Foundation **‘BASIS’** Foundation, 2020-2021.
3) **‘Opto- and acoustomechanical interactions of subwavelength particles with surface and waveguide modes’** № 20-72- 10141 Russian Scientific Foundation (**RSF**), one of executors, since 2021.
4) **‘Nonlinear optomechanics’** № 18-72-10127 Russian Scientific Foundation (**RSF**), one of executors, 2018-2020.

Reviewer

2021 «Оптика и спектроскопия» English version ‘Optics and Spectroscopy’
2022 Scientific Reports

List of publications

[1] A. Ivinskaya, N. Kostina, A. Proskurin, M. I. Petrov, A. A. Bogdanov, S. Sukhov, A. V. Krasavin, A. Karabchevsky, A. S. Shalin, and P. Ginzburg, *Optomechanical Manipulation with Hyperbolic Metasurfaces*, ACS Photonics **5**, 4371 (2018).

[2] N. Kostina, M. Petrov, A. Ivinskaya, S. Sukhov, A. Bogdanov, I. Toftul, M. Nieto-Vesperinas, P. Ginzburg, and A. Shalin, *Optical Binding via Surface Plasmon Polariton Interference*, Phys. Rev. B **99**, 125416 (2019).

[3] N. A. Kostina, D. A. Kislov, A. N. Ivinskaya, A. Proskurin, D. N. Redka, A. Novitsky, P. Ginzburg, and A. S. Shalin, *Nanoscale Tunable Optical Binding Mediated by Hyperbolic Metamaterials*, ACS Photonics **7**, 425 (2020).

[4] N. A. Kostina, V. Bobrovs, M. Petrov, A. S. Shalin, *Optical Pulling and Pushing Forces via Bloch Surface Waves*, Optics Letters **47** (18), 4592-4595 (2022).

List of conferences & proceedings

[1] N. A. Kostina, M. I. Petrov, A. N. Ivinskaya, A. A. Bogdanov, A. S. Shalin, and P. B. Ginzburg, *Optical Binding near a Planar Interface*, in 2017 Progress In Electromagnetics Research Symposium - Spring (**PIERS**) (IEEE, 2017), pp. 581–582. 22-25 May, Saint-Petersburg,

Russia.

[2] N. A. Kostina, M. I. Petrov, A. N. Ivinskaya, A. A. Bogdanov, and A. S. Shalin, *Optical Binding of Two Nanoparticles near Interface*, in 2017 **Days on Diffraction** (DD) (IEEE, 2017), pp. 186–188. 19-23 June, Saint-Petersburg, Russia.

[3] N. A. Kostina, A. N. Ivinskaya, and A. S. Shalin, *Optical Binding near Plasmonic Substrates*, J. Phys. Conf. Ser. 1092, 012065 (2018). **METANANO 2018**, 17-21 September, Sochi, Russia.

[4] A. Ivinskaya, N. Kostina, M. I. Petrov, A. A. Bogdanov, S. Sukhov, P. Ginzburg, and A. S. Shalin, *Tractor Beams at Metamaterial Substrates*, J. Phys. Conf. Ser. 1092, 012132 (2018). **METANANO 2018**, 17-21 September, Sochi, Russia.

[5] A. S. Shalin, A. Ivinskaya, N. Kostina, M. I. Petrov, A. A. Bogdanov, S. Sukhov, and P. Ginzburg, *Numerical and Analytical Models for Calculating Optical Forces near Auxiliary Plasmonic Substrates*, in AIP Conference Proceedings (2019), p. 040004. **International Conference of Computational Methods in Sciences and Engineering 2019 (ICCMSE-2019),** 1-5 May, Rhodes, Greece.

[6] N. A. Kostina, D. A. Kislov, P. Ginzburg, and A. S. Shalin, *Optical Binding near Hyperbolic Metamaterial Substrates*, J. Phys. Conf. Ser. 1461, 012072 (2020). **METANANO 2019**, 15-19 July, Saint-Petersburg, Russia.

[7] N. A. Kostina, A. N. Ivinskaya, D. A. Kislov, P. Ginzburg, and A. S. Shalin, *Optical Manipulations via Auxiliary Substrates*, J. Phys. Conf. Ser. 1461, 012073 (2020). **METANANO 2019**, 15-19 July, Saint-Petersburg, Russia.

[8] N. A. Kostina, D. A. Kislov, A. Proskurin, P. Ginzburg, and A. S. Shalin, *Long-Range Optical Binding Due To Volumetric Modes Of Hyperbolic Metamaterial Slab*, *AIP Conference Proceedings*, 2300, 1. AIP Publishing LLC, 2020. **METANANO 2020**, 14-18 September, ONLINE.

[9] N. A. Kostina, A. S. Shalin, *Optical Pulling Force Near One-Dimensional Photonic Crystal*, *AIP Conference Proceedings*. 2300, 1. AIP Publishing LLC, 2020.**METANANO 2020**, 14-18 September, ONLINE.

[10] N. A. Kostina *Optical Binding Near Hyperbolic Metamaterial***, International Winter School in Semiconductor Physics 2019**, 28 Feb.-4 March, Zelenogorsk, Russia.

[11] N. A. Kostina *Optical Forces Near One-Dimensional Photonic Crystal***, International Winter School in Semiconductor Physics 2020**, 27 Feb.-2 March, Zelenogorsk, Russia.

[12] N. A. Kostina *One-Dimensional Periodic Structures For Optical Manipulation,* **Quantum Nanophotonics 2021**, 28 Feb.-5 March, ONLINE.

[13] N. A. Kostina, M. I. Petrov *Optical forces acting on a particle near photonic crystal surface,* **Yenisei Photonics - 2022**, 19 - 24 Sept., Krasnoyarsk, Russia.