Ivan Toftul

(updated: April 29, 2021)

email: toftul.ivan@gmail.com (primary)
itoftul@itmo.ru
ivan.toftul@metalab.ifmo.ru

telegram: @toftl, +7 999 226 45 15

Born: 24 March 1994, Volgograd, Russia

Citizenship: Russian

google scholar: Ivan Toftul

Basic info

PhD student in Theoretical Optics, Department of Physics and Engineering @ ITMO University.
Advised by Mihail Petrov.

Research interests

Theoretical Nanophotonics, Spin and Orbital Angular Momentum, Optical and Acoustical Force, Metamaterials and Metasurfaces, Acoustics.

Scientific tools

- Pen and paper
- Direct coding (Python, Julia, etc)
- COMSOL Multiphysics

Education

2018 – now **PhD in Optics**
ITMO University, St. Petersburg, Russia
Optical torque and force, mode decomposition approach, orbital and spin momentum

2016 – 2018 **Master in Theoretical Physics**
Academic University, St. Petersburg, Russia
Theoretical physics, quantum optics, optical forces

2012 – 2016 **Bachelor in Physics**
Volgograd State Technical University, Volgograd, Russia
Plasma physics, numerical experiments

Languages

- **Human**
  Rassian (native), English (fluent), Japanese (basic)
- **Machine**
  Python, Julia, bash, gnuplot, C/C++, Matlab, Mathematica, Markdown, LaTeX

Internships

2019 (for 6 month) **RIKEN** (Tokyo, Japan) — Theoretical Quantum Physics Laboratory
Project: Acoustic force and torque and its connection with canonical momenta
Hosting professor: ***Franco Nori***
Local scientific adviser: ***Konstantin Bliokh***

2018 (for 6 month) **OIST** (Okinawa, Japan) — Light-Matter Interactions Unit
Project: Optical force and torque near nanofibers. SAM and OAM of fiber modes
Hosting professor: ***Síle Nic Chormaic***
Local scientific advisers: ***Viet Giang Truong*** *and* ***Fam Le Kien***

Teaching experience

2019 Computer modeling in physics
(lecturer, Bachelor course at ITMO University)

2020 – 2021 Optomechanics
(assistant, Master course at ITMO University)

2019 – 2020 Plasmonics: From Fundamentals to Modern Applications
(assistant, online course available on edx.org and Stepik)

Work experience

2017 – now Junior Research Associate, PhD @ ITMO University

2014 – 2015 Research assistant @ Volgograd State Technical University

Publications & Conferences

- ### Papers

1. Mirolyubov MA, Samusev AK, **Toftul ID**, Petrov MI. Spectral characteristics and temporal dynamics of tunable acoustic resonators in the strong coupling regime. **JETP Letters**. VOLUME 113, ISSUE 8, PAGE 553 (2021) (in Russian).
2. **Toftul ID**, Bliokh KY, Petrov MI, Nori F. Acoustic Radiation Force and Torque on Small Particles as Measures of the Canonical Momentum and Spin Densities. **Physical Review Letters**. 123, 183901 (2019).
3. **Toftul ID**, Kornovan DF, Petrov MI. Self-trapped nanoparticle binding via waveguide mode. **ACS Photonics** 2020, 7, 1, 114-119.
4. Georgiy Tkachenko, **Ivan Toftul**, Cindy Esporlas, Aili Maimaiti, Fam Le Kien, Viet Giang Truong, and Síle Nic Chormaic, "Light-induced rotation of dielectric microparticles around an optical nanofiber," **Optica** 7, 59-62 (2020).
5. Kostina N, Petrov M, Ivinskaya A, Sukhov S, Bogdanov A, **Toftul I**, Nieto-Vesperinas M, Ginzburg P, Shalin A. Optical binding via surface plasmon polariton interference. **Physical Review B**. 2019 Mar 13;99(12):125416.

- ### Proceedings

1. **Toftul, I.**, Bliokh, K. & Petrov, M. Acoustic forces and torques: Directional scattering and acoustic spin. AIP Conference Proceedings 2300, 020127 (2020).

2. Tkachenko, G., **Toftul, I.**, V. G., & Chormaic, S. N. (2020, June). Orbiting of dielectric particles around a single-mode ultrathin fiber waveguide. In Optical Manipulation and Structured Materials Conference 2020 (Vol. 11522, p. 115220F). International Society for Optics and Photonics.

3. Truong VG, **Toftul ID**, Le Kien F, Petrov MI, Chormaic SN. Angular momenta and negative azimuthal forces induced on a particle via guided light in ultrathin optical fibers. In Optical Manipulation and Its Applications 2019 Apr 15 (pp. AM3E-5). Optical Society of America.

4. Kornovan DF, **Toftul ID**, Chebykin AV, Petrov MI, Iorsh IV. Temporal dynamics of a quantum emitter with multiple excited states in the vicinity of an anisotropic metasurface. In Journal of Physics: Conference Series 2018 Sep (Vol. 1092, No. 1, p. 012063). IOP Publishing.

5. **Toftul ID**, Kornovan DF, Petrov MI. Particle binding over a nanofiber. InJournal of Physics: Conference Series 2018 Mar (Vol. 993, No. 1, p. 012019). IOP Publishing.

6. **Toftul ID**, Bogdanov AA, Petrov MI. The motion of nanoparticles under the non-conservative forces mediated by surface plasmon polaritons. InJournal of Physics Conference Series 2017 Nov (Vol. 917, No. 6).

7. **Toftul I.D.** Simulation of hot plasma in GDL setup using molecular dynamics approach / I. D.Toftul, D. G. Kovtun //VNKSF-22 (Rostov-on-Don, 2016). — pp. 215–216. (no DOI, in Russian)

8. **Toftul I.D.** Simulation of blood flow in vessel with considering turbulation effects / I. D. Toftul, N. V. Gretsova //VNKSF-20 (Izhevsk, 2014) — pp. 389–390. (no DOI, in Russian)

- ## Conferences & Schools

2021

1. APS March Meeting 2021. March 15–19.
2. Quantum Nanophotonics (Benasque). Feb 28 – Mar 05.

2020

1. METANANO 2020. V International Conference on Metamaterials and Nanophotonics (**2 oral talks**).

2019

1. ONNA: Optical Nanofibre Applications.
2. Conference on Nanophotonics: Foundations & Applications.

2018

1. International Winter School on Physics of Semiconductors.
2. ITMO Summber school on photonics.
3. Okinawa School in Physics: Coherent Quantum Dynamics.
4. JSAP photonics annual meeting.

2017

1. 4th International School and Conference "St. Petersburg OPEN 2017".
2. International Winter School on Physics of Semiconductors.
3. XIX All-Russian Youth Conference on the Physics of Semiconductors and Nanostructures, Semiconductor Opto-and Nanoelectronics.

< 2017

1. VNKSF22, 2016 (Rostov-on-Don).
2. VNKSF20, 2014 (Izhevsk).

- ## DOI of all papers & proceedings

1. 10.1063/5.0032100
2. 10.1117/12.2573514
3. 10.1021/acsphotonics.9b01157
4. 10.1364/OPTICA.374441
5. 10.1103/PhysRevLett.123.183901
6. 10.1103/PhysRevB.99.125416
7. 10.1088/1742-6596/993/1/012019
8. 10.1088/1742-6596/1092/1/012063
9. 10.1088/1742-6596/917/6/062056

In mass media

1. Личный опыт: как мы готовили курс по компьютерному моделированию в бакалавриате Нового физтеха.
   link: harb.com.
2. Новейшая наука с корнями в Древнем Риме: что такое нанофотоника и как ее изучают?
   link: physics.itmo.ru.
3. Improving the manipulation of microparticles by sound.
   link: PHYS.ORG.
4. Russian scientists in Japan / Русские учёные в Японии (in Russian).
   link: YouTube.

Hobbies and passions

Science, Photography, GNU/Linux, Theater (watch and play)

Other info

- **ORCID:** 0000-0003-3588-5403
- **Scopus Author ID:** 57198356910
- **WoS ResearcherID** D-6004-2018