	PETROV, Mikhail I. PhD in Physics and Mathematics
Research interests	✓ Quantum optics ✓ Quantum physics ✓ Nanophotonics ✓ Plasmonics ✓ Nanoantennas ✓ Acoustics ✓ Acoustic metamaterials ✓ Nonlinear optics ✓ Optical forces ✓ Optomechanics ✓ Nanostructures ✓ Metasurfaces ✓ Metamaterials ✓ Light scattering ✓ Harmonic generation
Features of the PhD program	The postgraduate program lasts four years. During this time, a student must publish at least three articles (Scopus/WoS, Q1-Q2), participate in three international conferences, and complete four courses.
List of the supervisor's research projects (participation/supervision)	✓ New materials and devices based on acoustic metastructures (Russian Science Foundation Grant No. 25-79-31027) ✓ Nanophotonic metastructures for ultrafast optical computing (Priority 2030) ✓ Development of methods for precision spatial control of resonant particles (Russian Science Foundation Grant No. 25-22-20034)
List of potential thesis topics	✓ Nonlinear dielectric metasurfaces for ultrafast control of radiation ✓ Neuromorphic optical computing ✓ High-Q resonances in acoustic and optical metasurfaces ✓ Acoustic metastructures for sound control ✓ Optical and acoustic forces for mechanical manipulation of micro- and nanoscale objects
Publications in the last five years	60 (Scopus / Web of Science / RSCI)
Key publications	1. Barulin A., Pashina O., Ryabov D., Sergaeva O., Sadrieva Z., Shcherbakov A., Rutckaia V., Schilling J., Bogdanov A., Sinev I., Chernov A., **Petrov M.** Thermo-optical bistability enabled by bound states in the continuum in silicon metasurfaces // Laser & Photonics Reviews. – 2024. – Vol. 18. – №. 10. - P. 2301399. DOI: https://doi.org/10.1002/lpor.202301399. Impact Factor: 10.9 2. Vikram M.P., Nishida K., Li C.-H., Riabov D., Pashina O., Tang Y.-L., Makarov S.V., Takahara J., **Petrov M.I.,** Chu S.-W. Photo-thermo-optical modulation of Raman scattering from Mie-resonant silicon nanostructures // Nanophotonics. – 2024. – Vol. 13. – №. 18. – P.

	3581–3589. DOI: https://doi.org/10.1515/nanoph-2023-0922. Impact Factor: 7.3 3. Gladyshev S., Pashina O., Proskurin A., Nikolaeva A., Sadrieva Z., **Petrov M.,** Bogdanov A., Frizyuk K. Fast simulation of light scattering and harmonic generation in axially symmetric structures in COMSOL // ACS Photonics. – 2024. – Vol. 11. – №. 2. – P. 404–418. DOI: https://doi.org/10.1021/acsphotonics.3c01166. Impact Factor: 6.7 4. Sergeeva K.A., Pavlov D.V., Seredin A.A., Mitsai E.V., Sergeev A.A., Modin E.B., Sokolova A.V., Lau T.C., Baryshnikova K.V., **Petrov M.I.,** Kershaw S.V., Kuchmizhak A.A., Wong K.S., Rogach A.L. Laser-printed plasmonic metasurface supporting bound states in the continuum enhances and shapes infrared spontaneous emission of coupled HgTe quantum dots // Advanced Functional Materials. – 2023. – Vol. 33. – №. 44. – P. 1–8. DOI: https://doi.org/10.1002/adfm.202307660. Impact Factor: 18.5 5. Toftul I., Fedorovich G., Kislov D., Frizyuk K., Koshelev K., Kivshar Y., **Petrov M.** Nonlinearity-induced optical torque // Physical Review Letters. – 2023. – Vol. 130. – №. 24. – P. 243802. DOI: https://doi.org/10.1103/PhysRevLett.130.243802. Impact Factor: 8.1 6. Sheremet A.S., **Petrov M.I.,** Iorsh I.V., Poshakinskiy A.V., Poddubny A.N. Waveguide quantum electrodynamics: Collective radiance and photon-photon correlations // Rev. Mod. Phys. – 2023. – Vol. 95. – №. 1. – P. 015002. DOI: https://doi.org/10.1103/RevModPhys.95.015002. Impact Factor: 44.8 7. Ryabov D., Pashina O., Zograf G., Makarov S., **Petrov M.I.** Nonlinear optical heating of all-dielectric super-cavity: efficient light-to-heat conversion through giant thermorefractive bistability //Nanophotonics. – 2022. – Vol. 11. – №. 17. – P. 3981-3991. DOI: https://doi.org/10.1515/nanoph-2022-0074. Impact Factor: 7.3 8. Deriy I., Toftil I., **Petrov M.,** Bogdanov A. Bound states in the continuum in compact acoustic resonators //Physical Review Letters. – 2022. – Vol. 128. – №. 8. – P. 084301. DOI: https://doi.org/10.1103/PhysRevLett.128.084301. Impact Factor: 9.0 9. Zograf G.P., **Petrov M.I.,** Makarov S.V., Kivshar Y.S. All-dielectric thermonanophotonics //Advances in Optics and Photonics. – 2021. – Vol. 13. – №. 3. – P. 643-702. DOI: https://doi.org/10.1364/AOP.426047. Impact Factor: 25.2 10. Frizyuk K., Melik-Gaykazyan E., Choi J.-H., **Petrov M.I.,** Park H.-G., Kivshar Y. Nonlinear circular dichroism in Mie-resonant nanoparticle dimers //Nano Letters. – 2021. – Т. 21. – №. 10. – С. 4381-4387. DOI: https://doi.org/10.1021/acs.nanolett.1c01025. Impact Factor: 9.6
Supervisor's specific requirements	✓ English language — upper-intermediate ✓ Knowledge in the following areas (not necessarily all, depending on the project): electrodynamics, quantum mechanics, condensed

	matter physics, numerical modeling, photonics/acoustics, theoretical physics, experimental methods in optics
Code of the subject area of the PhD program	1.3.3 Theoretical Physics 1.3.4 Radiophysics 1.3.6 Optics 1.3.8 Condensed Matter Physics