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Employment History

- 2019 – 2023 📌 **Engineer**, School of Physics and Engineering, ITMO University.
- 2023 – ⋯⋯ 📌 **Engineer**, School of Engineering and Natural Sciences, University of Iceland.

Education

- 2023 – ⋯⋯ 📌 **Ph.D., University of Iceland** Physics.
Thesis title: *Cryogenic holography at millimeter wavelengths.*
- 2021 – 2025 📌 **Ph.D., ITMO** Radiophysics.
Thesis title: *Tunable microwave wire media-filled cavities for axion search.*
- 2019 – 2021 📌 **M.Sc. Physics, ITMO** in Radiophysics.
Thesis title: *Method for minimizing the electric field in a surface coil for magnetic resonance imaging with a constant field level of 7 T.*
- 2015 – 2019 📌 **B.Sc. Physics, SPbPU** in Radiophysics.
Thesis title: *Study of the focusing properties of a diffraction membrane (photon sieve).*

Research Publications

Journal Articles

- 1 Lindahl, J., **Balafendiev, R.**, Kaur, G., Singh, G., Rosso, A. G., Conrad, J., ... Jeong, J. (2026). Spiral tuning of wire-metamaterial cavity for a plasma haloscope. *Phys. Rev. Appl.*, -. doi:10.1103/n1hb-9d3p
- 2 Koreshin, E., Gladyshev, S., Matchenya, I., **Balafendiev, R.**, Terekhov, I., Belov, P., & Bogdanov, A. (2025). Bound states in the continuum in a wire medium. *Phys. Rev. B*, 112, L081302. doi:10.1103/wvv8-qdk5
- 3 Enriquez, J. A., **Balafendiev, R.**, Millar, A. J., Simovski, C., & Belov, P. (2025). Uniform field in microwave cavities through the use of effective magnetic walls. *Phys. Rev. Appl.*, 23, 054053. doi:10.1103/PhysRevApplied.23.054053
- 4 Sakhno, D., **Balafendiev, R.**, & Belov, P. A. (2024). Anisotropy in a wire medium resulting from the rectangularity of a unit cell. *Phys. Rev. B*, 110, L140303. doi:10.1103/PhysRevB.110.L140303
- 5 Kowitt, N., **Balafendiev, R.**, Sun, D., Wooten, M., Droster, A., Gorlach, M. A., ... Belov, P. A. (2023). Tunable wire metamaterials for an axion haloscope. *Phys. Rev. Appl.*, 20, 044051. doi:10.1103/PhysRevApplied.20.044051

- 6 Millar, A. J., Anlage, S. M., **Balafendiev, R.**, Belov, P., van Bibber, K., Conrad, J., ... Marvinney, C. (2023). Searching for dark matter with plasma haloscopes. *Phys. Rev. D*, *107*, 055013. [doi:10.1103/PhysRevD.107.055013](https://doi.org/10.1103/PhysRevD.107.055013)
- 7 **Balafendiev, R.**, Simovski, C., Millar, A. J., & Belov, P. (2022). Wire metamaterial filled metallic resonators. *Physical Review B*, *106*, 75106. [doi:10.1103/PhysRevB.106.075106](https://doi.org/10.1103/PhysRevB.106.075106)
- 8 **Balafendiev, R.**, Solomakha, G., Dubois, M., Abdeddaim, R., Enoch, S., Simovski, C., & Glybovski, S. (2022). An antenna based on three coupled dipoles with minimized e-field for ultra-high-field mri. *IEEE Transactions on Antennas and Propagation*, 1–1. [doi:10.1109/TAP.2022.3195515](https://doi.org/10.1109/TAP.2022.3195515)
- 9 Lezhennikova, K., Simovski, C., Abdeddaim, R., **Balafendiev, R.**, & Glybovski, S. (2021). Extending a birdcage coil for magnetic resonance imaging of a human head with an artificial magnetic shield. *Photonics Nanostructures - Fundam. Appl.*, *43*, 100890. [doi:10.1016/j.photonics.2020.100890](https://doi.org/10.1016/j.photonics.2020.100890)

Under review

- 1 Ren, X., **Balafendiev, R.**, & Gudmundsson, J. E. (2026). *Polarization rotation through differential transmission in refractive cmb telescopes identified using a hybrid physical optics method*. **Submitted to Applied Optics**. arXiv: 2601.03925 [astro-ph. IM]. Retrieved from <https://arxiv.org/abs/2601.03925>
- 2 **Balafendiev, R.**, Kaur, G., Enriquez, J. A., Singh, G., Millar, A. J., Gudmundsson, J. E., & Belov, P. (2025). *Tunable epsilon near zero metamaterial with rotating obround-shaped meta-atoms*. **Submitted to Laser & Photonics Reviews**. arXiv: 2506.04428 [physics.optics]. Retrieved from <https://arxiv.org/abs/2506.04428>
- 3 Collaboration, T. S. O., Abril-Cabezas, I., Adachi, S., Ade, P., Adler, A. E., Agrawal, P., ... Zubeldia, I. (2025). *The simons observatory: Forecasted constraints on primordial gravitational waves with the expanded array of small aperture telescopes*. arXiv: 2512.15833 [astro-ph. CO]. Retrieved from <https://arxiv.org/abs/2512.15833>
- 4 Singh, G., **Balafendiev, R.**, Bist, M. S., Gascard, T. J. L. J., Kaur, G., Primoi, V., & Gudmundsson, J. E. (2025). *Optimizing broadband microwave absorbers for applications in the 70-200 ghz range*. **Submitted to Applied Optics**. arXiv: 2511.05309 [astro-ph. IM]. Retrieved from <https://arxiv.org/abs/2511.05309>

Conference Proceedings





- 1 **Balafendiev, R.**, Jeong, J., Kaur, G., Singh, G., Belov, P., & Gudmundsson, J. (2025). Packing a wire metamaterial haloscope into a cylindrical footprint using spiral geometry. In *2025 nineteenth international congress on artificial materials for novel wave phenomena (metamaterials)* (pp. X-024-X-026). [doi:10.1109/Metamaterials65622.2025.11174244](https://doi.org/10.1109/Metamaterials65622.2025.11174244)
- 2 **Balafendiev, R.**, Kaur, G., Singh, G., Millar, A., Belov, P., & Gudmundsson, J. (2024). Tunable plasma-like metamaterial with rotating elements. In *2024 eighteenth international congress on artificial materials for novel wave phenomena (metamaterials)* (pp. 1–3). [doi:10.1109/Metamaterials62190.2024.10703260](https://doi.org/10.1109/Metamaterials62190.2024.10703260)
- 3 **Balafendiev, R.**, Gascard, T., & Gudmundsson, J. E. (2024). Vector beam mapping at millimeter wavelengths using a robot arm. In J. Zmuidzinas & J.-R. Gao (Eds.), *Millimeter, submillimeter, and far-infrared detectors and instrumentation for astronomy xii* (Vol. 13102, 131021Y). International Society for Optics and Photonics. [doi:10.1117/12.3020315](https://doi.org/10.1117/12.3020315)
- 4 Singh, G., **Balafendiev, R.**, Bao, Z., Gascard, T. J. L. J., Gudmundsson, J. E., Kaur, G., & Primoi, V. (2024). Reflectance measurements of mm-wave absorbers using frequency-domain continuous wave THz spectroscopy. In J. Zmuidzinas & J.-R. Gao (Eds.), *Millimeter, submillimeter, and far-infrared detectors and instrumentation for astronomy xii* (Vol. 13102, 131021W). International Society for Optics and Photonics. [doi:10.1117/12.3021440](https://doi.org/10.1117/12.3021440)

- 5 **Balafendiev, R.**, Gorlach, M., & Belov, P. (2023). Mechanically tunable wire metamaterial. In *2023 seventeenth international congress on artificial materials for novel wave phenomena (metamaterials)* (pp. X-034-X-036). [doi:10.1109/Metamaterials58257.2023.10289542](https://doi.org/10.1109/Metamaterials58257.2023.10289542)
- 6 **Balafendiev, R.**, Simovski, C., Millar, A., & Belov, P. (2022). Wire metamaterial use for dark matter detection. In *2022 sixteenth international congress on artificial materials for novel wave phenomena (metamaterials)* (pp. 1–3). [doi:10.1109/Metamaterials54993.2022.9920785](https://doi.org/10.1109/Metamaterials54993.2022.9920785)
- 7 **Balafendiev, R.**, ZalipaeV, V., GlyboVski, S., & Solomakha, G. (2021). Optimization of leaky-wave surface coil current using an analytical approach. In *J. phys. conf. ser.* (Vol. 2015, p. 012011). [doi:10.1088/1742-6596/2015/1/012011](https://doi.org/10.1088/1742-6596/2015/1/012011)
- 8 Solomakha, G., Egorova, N., **Balafendiev, R.**, Simovski, C., & GlyboVski, S. (2021). Wideband Coil Based on Microstrip Line for Multiheteronuclear Magnetic Resonance Spectroscopy. In *J. phys. conf. ser.* (Vol. 2015, p. 012146). [doi:10.1088/1742-6596/2015/1/012146](https://doi.org/10.1088/1742-6596/2015/1/012146)
- 9 **Balafendiev, R.**, Solomakha, G., Dubois, M., Abdeddaim, R., Simovski, C., & GlyboVski, S. (2020). A method for E-field reduction using a surface coil based on three coupled dipoles. In *Aip conf. proc.* (Vol. 2300, p. 020006). [doi:10.1063/5.0031759](https://doi.org/10.1063/5.0031759)
- 10 Solomakha, G., **Balafendiev, R.**, & GlyboVski, S. (2020). A method for current phase manipulation in RF-Cols for UHF MRI using individually driven slots. In *Aip conf. proc.* (Vol. 2300, p. 020121). [doi:10.1063/5.0031919](https://doi.org/10.1063/5.0031919)






Grants and Scholarships

2021  **ITMO Academic Scholarship**, ITMO University.

Teaching Experience

- 2021  **Basics of metamaterials**. *ITMO University*. Assistant lecturer to Yuri Baloshin.
- 2022  **General physics**. *ITMO University*. Assistant lecturer to Alexey Scherbakov.
-  **Simulations of optical effects**. *ITMO University*. Assistant lecturer to Kseniia Baryshnikova.
- 2023  **General physics**. *University of Iceland*. Assistant lecturer to Jón Emil Guðmundsson.

Skills

Languages	 Strong reading, writing and speaking competencies for English and Russian Beginner level skills in Japanese and Icelandic
Coding	 Python, Matlab, Mathematica, LabVIEW, \LaTeX , Qt
Simulation Software	 COMSOL Multiphysics, CST MWS, Qucs, RoboDK
Graphics Software	 Inkscape, GIMP, Blender
Misc.	 Academic research, Microwave measurements