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Deputy Director, Chief Researcher

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Education

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| Ph.D. in Physics and Math., Moscow State Institute of Radio Engineering, Electronics and Automation | 2012 |
| M.D. in Physics and Math., Moscow Engineering Physics Institute | 2009 |

Professional appointments

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| Institute of ultra-high frequency semiconductor electronics of Russian academy of sciences (IUHFSE RAS) | |
| Deputy Director | 2014–p.t. |
| Professor | 2018–p.t. |
| Chief researcher | 2016–p.t. |
| Senior researcher | 2013–2014 |
| Junior researcher | 2012–2013 |
| Moscow Institute of Physics and Technology (MIPT), Center for Photonics and 2D Materials | |
| Chief researcher | 2018–p.t. |
| Prokhorov General Physics Institute of the Russian Academy of Sciences (GPI RAS), Laboratory of Broadband Dielectric Spectroscopy | |
| Chief researcher | 2018–p.t. |
| National Research Nuclear University Moscow Engineering Physics Institute | |
| Assistant Professor | 2012 |
| Engineer | 2009–2012 |

Research interests

- THz devices and applications
- Low-dimensional systems of A3B5 compounds
- Microwave and mm-wave semiconductor device physics

Honors/Awards/Participation

- Gold medal Winner of the Russian academy of Sciences for his contribution to the development of THz quantum-cascade lasers 2019
2014
- Winner of the President of Russia scholarship for young scientists MK-5450.2018.2 2018
- Winner of Skolkovo Summer school for young leaders in science (at OpUS)
- Scholarship Diploma of the Mokerov foundation for the support of science and education 2011
- Diplomas for the best issue on the Kurchatov's school for young scientists 2009, 2011
- Full member of scientific consortium "Prospective materials and electron component base for telecommunication systems" 2015-p.t.
- Certificated expert of the Russian academy of Sciences 2016-p.t.
- Certificated expert of the Russian Science Foundation 2019-p.t.
- Full member of the scientific council at 2D materials and Photonics Center, MIPT 2019-p.t.
- Full member of the scientific council at IUHFSE RAS 2014-p.t.
- Full member of the scientific council at Mokerov's foundation for the support of science and education 2018-p.t.
- Supervisor of annual symposium "Potential possibilities of the nanoheterostructures development operating in the THz frequency range (over 0.3 THz) for telecommunication systems" at IUHFSE RAS 2015-p.t.
- Member of the Organizing Committee of annual International Congress on Graphene, 2D Materials and Applications 2019-p.t.
- Member of the International Program Committee of the THz optics and biophotonics at annual International conference Saratov Fall Meeting 2018-p.t.

Language proficiency

Russian: native
English: advanced
Italian: basic

Principal Investigator of the Projects

1. Russian Science Foundation (RSF), grant 18-79-10195 "Photoconductive antennas based on novel physical principles for the development of instruments for medical diagnosis of malignancies: manufacturing technology, theoretical and experimental studies", duration 2018-2021, budget 5 mln. RUB/year.
2. Ministry of Science and Higher Education of the Russian Federation, project AAAA-A19-119071890026-2 "InGaAs/InAlAs strain-induced superlattices for THz photomixers", duration 2019-2021, budget 25 mln. RUB/year.
3. Federal Agency for Scientific Organizations, project AAAA-A18-118030590049-2 "Exploratory research aimed at the development of THz emitters and detectors (high-electron mobility transistor and a photoconductive antenna on a chip)", duration 2018 year, budget 12 mln. RUB.
4. Federal Agency for Scientific Organizations, project AAAA-A17-117070550013-2 "Development of the physical principles of manufacturing technology of low-temperature grown GaAs and/or InGaAs

photoconductive substrates for THz emitters (frequency range 0.5 THz-5.0 THz)", duration 2017 year, budget 8 mln. RUB.

5. Russian foundation for basic research (RFBR), grant 20-32-70129 "Photoconductive semiconductor-based optical-to-terahertz converters with increased efficiency featuring plasmonic and subdiffraction caustics", duration 2019-2020.

6. RFBR grant 18-07-01145 "Terahertz detector based on GaAs structure with Sn nanowires with quasi-one-dimensional electron transport", duration 2018-2019.

7. RFBR grant 16-07-00187 "Investigation of terahertz generation and detection in low-temperature grown metamorphic structures with high density of scattering centers", duration 2016-2017.

8. RFBR grant 14-07-31108 "Investigation of electron transport in AlGaAs/InGaAs/(Al)GaAs heterostructures with the composite spacer containing nano-sized AlAs barriers", duration 2015-2016.

9. Research Institute of Electrical Communication (RIEC), Tohoku University, RIEC Nation-wide Cooperative Research Project H30/A04 "Japan-Russia International collaborative research on gated GaAs structures with an array of self-assembled Sn-nanowires and their terahertz applications", duration 2018-2019. The host team PI is Prof. T. Otsuji, http://www.otsuji.riec.tohoku.ac.jp/english/index_en.php

10. RIEC Nation-wide Cooperative Research Project H31/A31 "Japan-Russia International collaborative research on high sensitive and tunable room-temperature plasmonic photoconductive antenna-detector", duration 2019-2020.

11. RIEC Nation-wide Cooperative Research Project R02/A12 "Japan-Russia International collaborative research on a large-area photoconductive terahertz detector for high-speed imaging", duration 2020-2021.

Selected peer-reviewed publications

1. A.E. Yachmenev, S.S. Pushkarev, R. R. Reznik, R.A. Khabibullin, **D.S. Ponomarev**, *Arsenides- and related III-V materials-based multilayered structures for terahertz applications: various designs and growth technology*, Progress in Crystal Growth and Characterization of Materials (2020), in press, DOI: 10.1016/j.pcrysgrow.2020.100485, IF = 4.463
2. I.V. Minin, O.V. Minin, I.A. Glinskiy, R.A. Khabibullin, R. Malureanu, A.V. Lavrinenko, D.I. Yakubovskiy, A.V. Arsenin, V.S. Volkov, **D.S. Ponomarev**, *Plasmonic nanojet: an experimental demonstration*, Optics Letters, 45(11), 1 (2020), DOI: 10.1364/OL.391861, IF = 3.866
3. **D S Ponomarev**, D V Lavrukhin, A E Yachmenev, R A Khabibullin, I E Semenikhin, V V Vyurkov, K. Maremyanin, V.I. Gavrilenko, M Ryzhii, M. Shur, T Otsuji and V Ryzhii, *Sub-terahertz FET detector with self-assembled Sn-nanowires*, J. Phys. D: Appl. Phys. 53 075102 (2020), DOI: 10.1088/1361-6463/ab588f, IF = 2.829
4. Kirill I Zaytsev, Irina N. Dolganova, Nikita V Chernomyrdin, Gleb M. Katyba, Arseniy Gavdush, Olga P. Cherkasova, Gennady Komandin, Marina A. Shchedrina, Anatoly N. Khodan, **Dmitry S. Ponomarev**, Igor V. Reshetov, Valerij Karasik, Maksim Skorobogatiy, Vladimir N Kurlov and Valery V Tuchin, *The progress and perspectives of terahertz technology for diagnosis of neoplasms: A review*, J. Optics, 22 013001 (2020), DOI: 10.1088/2040-8986/ab4dc3, IF = 2.753
5. A.E. Yachmenev, D.V. Lavrukhin, I.A. Glinskiy, N.V. Zenchenko, Yu.G. Goncharov, I.E. Spektor, R.A. Khabibullin, T. Otsuji, and **D.S. Ponomarev**, *Metallic and dielectric metasurfaces in photoconductive terahertz devices: a review*, Optical Engineering, 59(6), 061608 (2019), DOI: 10.1117/1.OE.59.6.061608, IF = 1.40

6. Lavrukhin, D.V., Yachmenev, A.E., Pavlov, A.Y., Khabibullin, R.A., Goncharov, Y.G., Spector, I.E., Komandin, G.A., Yurchenko, S.O., Chernomyrdin, N.V., Zaytsev, K.I., **Ponomarev, D.S.** *Shaping the spectrum of terahertz photoconductive antenna by frequency-dependent impedance modulation*, Semiconductor Science and Technology, 34 (3), 034005 (2019), DOI: 10.1088/1361-6641/aaff31, IF = 2.654
7. **Ponomarev, D.S.**, Gorodetsky, A., Yachmenev, A.E., Pushkarev, S.S., Khabibullin, R.A., Grekhov, M.M., Zaytsev, K.I., Khusyainov, D.I., Buryakov, A.M., Mishina, E.D. *Enhanced terahertz emission from strain-induced InGaAs/InAlAs superlattices*, Journal of Applied Physics, 125 (15), 151605 (2019), DOI: 10.1063/1.5079697, IF = 2.328
8. D.V. Lavrukhin, A.E. Yachmenev, I.A. Glinskiy, R.A. Khabibullin, Y.G. Goncharov, M. Ryzhii, T. Otsuji, I.E. Spector, M. Shur, M. Skorobogatiy, K.I. Zaytsev, **D.S. Ponomarev**, *Terahertz photoconductive emitter with dielectric-embedded high-aspect-ratio plasmonic grating for operation with low-power optical pumps*, AIP Advances 9, 015112 5p. (2019), DOI: 10.1063/1.5081119, IF = 1.731
9. Victor Ryzhii, **Dmitry S. Ponomarev**, Maxim Ryzhii, Vladimir Mitin, Michael S. Shur, and Taiichi Otsuji, *Negative and positive terahertz and infrared photoconductivity in uncooled graphene*, Optical Materials Express, 9(2), p. 585-597 (2019), DOI: 10.1364/OME.9.000585, IF = 2.673
10. V. Ryzhii, M. Ryzhii, **D.S Ponomarev**, V.G. Leiman, V. Mitin, M.S. Shur, T. Otsuji, *Negative photoconductivity and hot-carrier bolometric detection of terahertz radiation in graphene-phosphorene hybrid structures*, Journal of Applied Physics, 125 (15), 151608 (2019), DOI: 10.1063/1.5054142, IF = 2.328
11. R.A. Khabibullin, N.V. Shchavruk, **D.S. Ponomarev**, D.V. Ushakov, A.A. Afonenko, K.V. Maremyanin, O.Yu. Volkov, V.V. Pavlovskiy, A.A. Dubinov, *The operation of THz quantum cascade laser in the region of negative differential resistance*, Opto-Electronics Review, 27 329-333 (2019), DOI: 10.1016/j.opelre.2019.11.002, IF = 1.580
12. N. V. Chernomyrdin, A. S. Kucheryavenko, G. S. Kolontaeva, G. M. Katyba, I. N. Dolganova, P. A. Karalkin, **D. S. Ponomarev**, V. N. Kurlov, I. V. Reshetov, M. Skorobogatiy, V. V. Tuchin, and K. I. Zaytsev, *Reflection-mode continuous-wave 0.15λ -resolution terahertz solid immersion microscopy of soft biological tissues*, Applied Physics Letters, 113, 111102 (2018), DOI: 10.1063/1.5045480, IF = 3.521
13. D.V. Ushakov, A.A. Afonenko, A.A. Dubinov, V.I. Gavrilenko, O.Yu. Volkov, N.V. Shchavruk, **D.S. Ponomarev**, R.A. Khabibullin, *Mode loss spectra in THz quantum-cascade lasers with gold- and silver-based double metal waveguides*, Quantum Electronics, 48 (11), pp. 1005-1008 (2018), DOI: 10.1070/QEL16806, IF = 1.404
14. I.V. Minin, O.V. Minin, **D.S. Ponomarev**, I.A. Glinskiy. *Photonic Hook Plasmons: A New Curved Surface Wave*. Annalen der Physik. 530(12), 1800359 5p. (2018), DOI: 10.1002/andp.201800359, IF = 3.276
15. V. Ryzhii, M. Ryzhii, D. Svintsov, V. Leiman, P. P. Maltsev, **D. S. Ponomarev**, V. Mitin, M. S. Shur, and T. Otsuji, *Real-space-transfer mechanism of negative differential conductivity in gated graphene-phosphorene hybrid structures: Phenomenological heating model*, Journal of Applied Physics 124(11), 114501 (2018), DOI: 10.1063/1.5046135, IF = 2.328
16. V Ryzhii, T Otsuji, M Ryzhii, **D S Ponomarev**, V E Karasik, V G Leiman, V Mitin and M S Shur, *Electrical modulation of terahertz radiation using graphene-phosphorene heterostructures*, Semiconductor science and technology, 33 124010 (2018), DOI: 10.1088/1361-6641/aae9b2, IF = 2.654
17. **D.S. Ponomarev**, D.V. Lavrukhin, A.E. Yachmenev, R.A. Khabibullin, I. Semenikhin, V. Vyurkov, M. Ryzhii, T. Otsuji, V. Ryzhii. *Lateral terahertz hot-electron bolometer based on an*

- array of Sn nanowires in GaAs*, Journal of Physics D: Applied Physics, 51, 135101 (2018), DOI: 10.1088/1361-6463/aab11d, IF = 2.829
18. R.A. Khabibullin, A.E. Yachmenev, D.V. Lavrukhin, **D.S. Ponomarev**, A.S. Bugayev, P.P. Maltsev, *Pseudomorphic HEMT with Sn nanowires on a vicinal GaAs substrate*, Semiconductor Science and Technology, 30, 085009 (2015), DOI: 10.1088/0268-1242/30/8/085009, IF = 2.654
 19. V A Kulbachinskii, N A Yuzeeva, G B Galiev, E A Klimov, I S Vasil'evskii, R A Khabibullin, **D S Ponomarev**, *Electron effective masses in an InGaAs quantum well with InAs and GaAs inserts*, Semiconductor science and technology, 27(3), 035021 (2012), DOI: 10.1088/0268-1242/27/3/035021, IF = 2.654
 20. Buryakov, A.M., Khusyainov, D.I., Mishina, E.D., Khabibullin, R.A., Yachmenev, A.E., **Ponomarev, D.S.**, *The Role of Excitation Photons Energy in the Photoinduced Carrier Dynamics in InGaAs/InAlAs Superlattice Heterostructures*, Technical Physics Letters, 44 (12), pp. 1115-1119 (2018), DOI: 10.1134/S1063785018120192
 21. **Ponomarev, D.S.**, Khabibullin, R.A., Klochkov, A.N., Yachmenev, A.E., Bugaev, A.S., Khusyainov, D.I., Buriakov, A.M., Bilyk, V.P., Mishina, E.D., *Ultrafast Dynamics of Photoexcited Charge Carriers in In_{0.53}Ga_{0.47}As/In_{0.52}Al_{0.48}As Superlattices under Femtosecond Laser Excitation*, Semiconductors, 52 (7), pp. 864-869 (2018), DOI: 10.1134/S1063782618070175
 22. D.V. Lavrukhin, P.P. Galiev, A.Yu. Pavlov, A.E. Yachmenev, M.V. Maytama, I.A. Glinskiy, R.A. Khabibullin, Yu.G. Goncharov, K.I. Zaytsev, **D.S. Ponomarev**, *Plasmonic photoconductive antennas for terahertz pulsed spectroscopy of malignancies*, Optics and Spectroscopy, 126 (5), pp. 580-586 (2019), DOI: 10.1134/S0030400X19050199
 23. D.V. Lavrukhin, A.E. Yachmenev, I.A. Glinskiy, N.V. Zenchenko, R.A. Khabibullin, Yu.G. Goncharov, I.E. Spektor, K.I. Zaytsev, **D.S. Ponomarev**, *Radiation efficiency of terahertz antennas featuring conventional topology and metallic metasurface: a comparative analysis*, Optics and Spectroscopy, Vol. 129, No. 1, P. 1012-1019 (2020), DOI: 10.21883/0000000000
 24. D. I. Khusyainov, A. M. Buryakov, V. R. Bilyk, E. D. Mishina, **D. S. Ponomarev**, R. A. Khabibullin, and A. E. Yachmenev, *Epitaxial Stresses in an InGaAs Photoconductive Layer for Terahertz Antennas*, Technical Physics Letters, Vol. 43, No. 11, pp. 1020–1022 (2017), DOI: 10.1134/S1063785017110220
 25. **D. S. Ponomarev**, R. A. Khabibullin, A. E. Yachmenev, A. Yu. Pavlov, D. N. Slapovskiy, I. A. Glinskiy, D. V. Lavrukhin, O. A. Ruban, P. P. Maltsev, *Electrical and Thermal Properties of Photoconductive Antennas Based on In_xGa_{1-x}As (x > 0.3) with a Metamorphic Buffer Layer for the Generation of Terahertz Radiation*, Semiconductors, Vol. 51, No. 9, pp. 1218–1223 (2017), DOI: 10.1134/S1063782617090160
 26. **D.S. Ponomarev**, R.A. Khabibullin, A.E. Yachmenev, P.P. Maltsev, I.E. Ilyakov, B.V. Shishkin, R.A. Akhmedzhanov, *Intensive Terahertz Radiation from In_xGa_{1-x}As due to Photo-Dember Effect*, International Journal of High Speed Electronics and Systems Vol. 25, Nos. 3 & 4, pp. 1640023 (2016), DOI: 10.1142/S0129156416400231
 27. **D.S. Ponomarev**, R.A. Khabibullin, A.E. Yachmenev, P.P. Maltsev, M.M. Grekhov, I.E. Ilyakov, B.V. Shishkin, R.A. Akhmedzhanov, *Terahertz radiation in In_{0.38}Ga_{0.62}As grown on a GaAs wafer with a metamorphic buffer layer under femtosecond laser excitation*, Semiconductors, Vol. 51, No. 4, pp. 509–513 (2017), DOI: 10.1134/S1063782617040170
 28. R.A. Khabibullin, G.B. Galiev, E.A. Klimov, A.E. Yachmenev, A.S. Bugaev, **D.S. Ponomarev**, D.V. Lavrukhin, P.P. Maltsev, *Investigation of the optical properties of GaAs with δ-Si doping grown by molecular-beam epitaxy at low temperatures*, Semiconductors, 49(7), 911-914 (2015), DOI: 10.1134/S1063782615070179

29. I.A. Glinskiy, R.A. Khabibullin, **D.S. Ponomarev**, *Total efficiency of optical-to-terahertz conversion in photoconductive antennas based on LT GaAs and $In_{0.38}Ga_{0.62}As$* , Russian Microelectronics, Vol. 46, № 6, P. 408-413 (2017), DOI: 10.1134/S1063739717060051
30. D. V. Lavrukhin, A. E. Yachmenev, R. R. Galiev, R. A. Khabibullin, **D.S. Ponomarev**, Yu. V. Fedorov, P. P. Maltsev, *MHEMT with a power-gain cut-off frequency of $f_{max} = 0.63$ THz on the basis of a $In_{0.42}Al_{0.58}As/In_{0.42}Ga_{0.58}As/In_{0.42}Al_{0.58}As/GaAs$ nanoheterostructure*, Semiconductors, 48(1), 69–72 (2014), DOI: 10.1134/S1063782614010187
31. D.V. Lavrukhin, R.A. Khabibullin, **D.S. Ponomarev**, P.P. Maltsev, *Photoluminescence of heterostructures containing an $In_xGa_{1-x}As$ quantum well with a high x content at different excitation powers*, Semiconductors, 49(9) 1218-1221 (2015), DOI: 10.1134/S1063782615090183

Remarks

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| Total number of publications | 105 |
| Patents on invention (Intellectual Property Rights of Russian Federation) | 8 |
| Teaching courses | 2 |
| Plenary, invited and oral talks on international meetings | 50 |