

Curriculum Vitae – Prof. Michał Matuszewski

Personal data:

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Professional Experience:

- 2023- Professor at the Center for Theoretical Physics of the Polish Academy of Sciences, Warsaw, Poland.
- 2018-2023 Deputy head of the Division of Theoretical Physics (ON 5) at the Institute of Physics of the Polish Academy of Sciences.
- 2015-2018 Head of the Quantum Optics Group (ON 2.6) at the Institute of Physics of the Polish Academy of Sciences, Warsaw, Poland.
- 2022- Full professor at the Institute of Physics of the Polish Academy of Sciences, Warsaw, Poland.
- 2013-2022 Associate professor (profesor nadzwyczajny, profesor instytutu) at the Institute of Physics of the Polish Academy of Sciences, Warsaw, Poland.
- 2010-2013 Assistant professor (adiunkt) at the Institute of Physics of the Polish Academy of Sciences, Warsaw, Poland.
- 2009-2010 ARC Australian Postdoctoral Fellow (APD) at the Nonlinear Physics Centre, Research School of Physical Sciences and Engineering, Australian National University, Canberra.
- 2007-2008 Postdoctoral Fellow at the Nonlinear Physics Centre, Research School of Physical Sciences and Engineering, Australian National University, Canberra.

Qualifications:

- 2021 Professor title granted by the President of the Republic of Poland.
- 2012 DSc (habilitation) in Theoretical Physics, Institute of Physics of the Polish Academy of Sciences, Warsaw, Poland.
- 2007 PhD in Theoretical Physics, Faculty of Physics, Warsaw University, „Poszukiwanie wielowymiarowych solitonów optycznych przy użyciu metod wariacyjnych”, supervisor: dr hab. Marek Trippenbach.
- 2004-2007 Postgraduate studies at the Warsaw University, Faculty of Physics, Chair for Quantum Optics and Atomic Physics, supervisor: dr hab. Marek Trippenbach.
- 2004 MSc in Theoretical Physics, Faculty of Physics, Warsaw University, „Badanie propagacji impulsów świetlnych w nieliniowych ośrodkach optycznych”, supervisor: dr hab. Marek Trippenbach.
- 1999-2004 Undergraduate studies at the Warsaw University, Individual Inter-faculty Studies in Mathematics and Natural Sciences.
- 2003 BSc in Computer Science at the Faculty of Mathematics, Informatics, and

Mechanics, Warsaw University.

Prizes, Awards, and Fellowships:

- Scholarship for outstanding young scientists, Ministry of Science and Higher Education (2012-2015).
- Stefan Pieńkowski award of the Polish Academy of Sciences in the field of Physics and Astronomy (2011).
- “HOMING PLUS” research fellowship, Foundation for Polish Science, 2010-2012.
- Australian Postdoctoral Fellowship (APD) three-year research fellowship funded by the Australian Research Council (ARC), 2009-2011.
- Oliphant Endowment Fund Postdoctoral Fellowship, two-year research fellowship at the Australian National University, 2008-2009.
- Scholarship for the best young scientists (START), Foundation for Polish Science, 2006 and 2007,
- Scholarship of the Minister of Education of Poland, 1999, 2002-2003 and 2003-2004,
- Bronze medal at the 40th International Mathematical Olympiad, Bucharest (1999),
- Four prizes of polish Mathematics and Physics Olympiads, 1998 and 1999,
- Scholarship from the Polish Childrens’ Fund (1998-99),
- Scholarship from the Prime Minister of Poland (1998).

Research areas:

- Exciton-polaritons in semiconductor microcavities,
- Optical neural networks, machine learning,
- Bose-Einstein condensates, superfluidity,
- Nonequilibrium phase transitions, spontaneous symmetry breaking and defect formation,
- Solitons in continuous and periodic nonlinear media, nonlinear optics.

Other activities:

- Member of Scientific Councils of the Institute of Physics, Polish Academy of Sciences (2019-) and the Center of Theoretical Physics of the Polish Academy of Sciences (2023-).
- Secretary of the Scientific Council of the Institute of Physics of the Polish Academy of Sciences, (2019-2022).
- Member of the selection committee of the Director of the Institute of Physics of the Polish Academy of Sciences (2020).
- Member of the Committee on Assistant and Associate Professors of the Scientific Council of the Institute of Physics of the Polish Academy of Sciences (2019-).
- Secretary of the Committee on Independent Researchers of the Scientific Council of the Institute of Physics of the Polish Academy of Sciences (2023-).
- Member of the organizing committee of the International School and

- Conference on the Physics of Semiconductors "Jaszowiec" (2021-).
- Member of the organizing committee of the Wilhelm and Else Heraeus Foundation Seminar "Lattice-based Quantum Simulation", December 2021.
- Member of program committees of the 10th International Conference on Spontaneous Coherence in Excitonic Systems (ICSCE 10) and the 4th International Conference on Terahertz Emission, Metamaterials and Nanophotonics (TERAMETANANO-4).
- Organizer of the meeting of the international project QuantERA-Interpol, Warsaw, 15-16 January 2020.
- Member of the Science Dissemination committee of the Minister of Science and Higher Education of Poland (2014-2016).
- Member of the Young Researchers Council, advisory committee of the Minister of Science and Higher Education of Poland (2012-2013).
- Co-organizer of the "1st Young Researchers Forum", April 2013.
- Member of the Committee of the Australian National University Mountaineering Club (2008-2010).
- Elector of the Dean of the Faculty of Physics at the University of Warsaw (representative of PhD students, 2005).

Supervision of students:

- Piotr Stępnicki, MSc, "Polarytony w polu magnetycznym", co-supervisor together with prof. Witold Bardyszewski, University of Warsaw, 2015.
- Michał Kulczykowski, PhD, "Procesy nierównowagowe i stany zlokalizowane w kondensatach ekscytonowo-polarytonowych" (2013-2018).
- Paweł Miętka, PhD, "Exciton-Polariton Condensates with Internal Degrees of Freedom" (2016-2021).
- Andrzej Opala, PhD, "Complex dynamics of nonlinear modes of an exciton-polariton condensate" (2017-2022).
- Supervision of ~10 interns at the MSc level.

Teaching experience:

- Teaching at the Institute of Physics, Polish Academy of Sciences (60h): Lectures "Nonlinear Physics in a nutshell" and "Topological insulators".
- Teaching at the University of Warsaw (240h): Topological insulators (Lecture, 2022/2023), Physics I, Foundations of Modern Physics, Computer Laboratory, Programming in C++, Nonlinear Optics.
- Lectures for the general public (Festiwal Nauki 2010, 2022).
- Member of the Central Committee of the Polish Physics Olympiad, 2005-2007 and 2010-2012.

Stays in external institutions:

- July-August 2005, visiting student in the group of prof. Wiesław Królikowski, Laser Physics Centre, Australian National University, Canberra.
- November 2010, visit in the group of prof. Kai Bongs, University of Birmingham, UK.

- January-March 2011, visit in the group of prof. Yuri Kivshar, Australian National University, Canberra.
- June 2011, visit in the group of prof. Alexey Kavokin, University of Southampton, UK.
- October 2011, visit in the group of prof. Kai Bongs, University of Birmingham, UK.
- February 2012, visit in the group of prof. Alexey Kavokin, University of Southampton, UK.
- February 2013, visit in the group of prof. Jacqueline Bloch, CNRS/LPN, France.
- February 2013, visit in the group of prof. Alberto Bramati, Université Pierre et Marie Curie - Paris 6, France.
- February-March 2014, visit in the group of dr Elena Ostrovskaya, Australian National University, Canberra.
- July 2014, visit in the group of dr Fabrice Laussy, Universidad Autónoma de Madrid.
- August 2015, visit in the group of dr Marzena Szymańska, University College London.
- October 2016, visit in the group of prof. Daniele Sanvitto, Lecce, Italy.
- March 2018, visit in the group of dr Marzena Szymańska, University College London.
- January 2019, visit in the group of dr Marzena Szymańska, University College London.
- February 2019, visit in the group of prof. Marco Fianculli, University of Milano-Bicocca.
- May 2022, one-month visit in the group of prof. Maciej Lewenstein, ICFO, Casteldefels, Spain.
- July-August 2023, two-week visit in the group of prof. Maciej Lewenstein, ICFO, Casteldefels, Spain.

Leader of research projects:

- “QUantum reservoir cOmputing based on eNgeered DEfect NetworkS in trAnSition meTAl dichalcogEnides” (QUANDENSATE), Principal investigator, Pathfinder Open, international consortium led by Politecnico Milano, European Commission, 2023-2027.
- “Neuromorphic Polariton Accelerator” (PolArt), Principal investigator, Pathfinder Open, international consortium led by the University of Warsaw, European Commission, 2023-2027.
- “Quantum Optical Networks based on Exciton-polaritons” (Q-ONE), Principal investigator, Pathfinder Challenge, international consortium led by CNR Nanotec Lecce, European Commission, 2023-2027.
- “Quantum effects and physical implementations of optical neural networks”, OPUS scheme grant 2021/43/B/ST3/00752, National Science Center, 2022-2026.
- “Pattern recognition with exciton-polariton lattices”, OPUS scheme grant 2020/37/B/ST3/01657, lead beneficiary: University of Warsaw, National Science Center, 2021-2025.
- “InterPol. Polariton lattices: a solid state platform for quantum simulations of correlated and topological states”, Principal investigator of the

international consortium led by prof. Marzena Szymańska from UCL, Quant-ERA scheme grant 2017/25/Z/ST3/03032, National Science Center and European Commission, 2018-2022.

- “New quantum states in polaritonic fluids of light”, SONATA BIS scheme grant 2016/22/E/ST3/00045, National Science Center, 2017-2022.
- “Nonequilibrium bosonic gases in semiconductors under the influence of external fields”, OPUS scheme grant 2015/17/B/ST3/02273, National Science Center, 2016-2018.
- “Nonlinear phenomena in polariton and exciton superfluids”, grant for PhD holders starting a career in research (SONATA), National Science Center, 2011-2017.
- “Kwantowe stany i przemiany fazowe w kondensatach Bosego-Einsteina ze spinem”, Iuventus Plus, Ministry of Science and Higher Education, 2012-2013.
- “Magnetic interactions in spinor Bose-Einstein condensates”, HOMING PLUS, Foundation for Polish Science, EU funded, 2010-2012.
- Discovery Project „Nonlinear optics in soft matter”, Australian Research Council, 2009-2010.

Participation in research projects:

- European Union project „Nanodesigning of atomic and molecular quantum matter” (NAME-QUAM), 2010-2012.
- Centre of Excellence for Quantum-Atom Optics (ACQAO), Australian Research Council, 2007-2010.
- Grant MNiSW N202 128539 „Dynamiczne zmiany koherencji w gazach kwantowych” (2010-2012).
- Grant KBN 2P03B 04325 „Nieliniowa Optyka Fotonów i Atomów”, Polish Ministry of Science.
- Grant MNiI PBZ MIN-008/P03/2003 „Informatyka i inżynieria kwantowa”, Polish Ministry of Science (2006-2007).
- Grant MNiI N202 014 31/0567 „Badania solitonów w nieliniowych ośrodkach optycznych i kondensatach Bosego-Einsteina z periodyczną modulacją” (promotorski), Polish Ministry of Science (2006-2007).

Professional memberships:

- Towarzystwo Naukowe Warszawskie,
- European Physical Society,
- Mediterranean Institute of Fundamental Physics.

Referee of journals:

- Nature Photonics,
- Nature Communications,
- Physical Review Letters,
- Physical Review A,
- Physical Review B,
- Physical Review E,

- Optics Letters,
- Journal of Physics B,
- New Journal of Physics,
- Chaos, Solitons, and Fractals,
- Superlattices and Microstructures,
- Acta Physica Polonica A.

Conferences:

- ~20 invited lectures, 10 contributed oral presentations at international conferences and workshops.

Foreign languages:

- English – fluent,
- Spanish – intermediate,
- German – basic.

Refereed research papers:

1. M. Matuszewski, W. Wasilewski, M. Trippenbach, Y. B. Band, "Self-consistent treatment of the full vectorial nonlinear optical pulse propagation equation in an isotropic medium", *Opt. Commun.* **221**, 337-351 (2003). *Impact Factor: 1.58.*
2. M. Trippenbach, M. Matuszewski, E. Infeld, Cao Long Van, R. S. Tasgal, Y. B. Band, "Enhancement of third harmonic generation by wave vector mismatch to counter phase-modulation", *Opt. Commun.* **229**, 391-395 (2004). *Impact Factor: 1.58.*
3. R. S. Tasgal, M. Trippenbach, M. Matuszewski, Y. B. Band, "Highly nonlinear dynamics of third-harmonic generation by focused beams", *Phys. Rev. A* **69**, 013809 (2004). *Impact Factor: 2.9.*
4. M. Matuszewski, M. Trippenbach, B. A. Malomed, E. Infeld, A. A. Skorupski, "Two-dimensional dispersion-managed light bullets in Kerr media", *Phys. Rev. E* **70**, 016603 (2004). *Impact Factor: 2.35.*
5. M. Trippenbach, M. Matuszewski, B. A. Malomed, "Stabilization of three-dimensional matter-waves solitons in an optical lattice", *Europhys. Lett.* **70**, 8-14 (2005). *Impact Factor: 2.12.*
6. M. Matuszewski, E. Infeld, B. A. Malomed, M. Trippenbach, "Fully three dimensional breather solitons can be created using Feshbach resonance", *Phys. Rev. Lett.* **95**, 050403 (2005). *Impact Factor: 7.4.*
7. M. Matuszewski, E. Infeld, M. Trippenbach, "Stability analysis of three dimensional breather solitons in a Bose Einstein Condensate", *Proc. R. Soc. A* **461**, 3561-3574 (2005). *Impact Factor: 1.4.*
8. M. Matuszewski, C. R. Rosberg, D. N. Neshev, A. A. Sukhorukov, A. Mitchell, M. Trippenbach, M. W. Austin, W. Królikowski, Y. S. Kivshar, "Crossover from self-defocusing to discrete trapping in nonlinear waveguide arrays", *Opt. Express* **14**, 254 - 259 (2006). *Impact Factor: 3.8.*
9. M. Matuszewski, E. Infeld, B. A. Malomed, M. Trippenbach, "Stabilization of three-dimensional light bullets by a transverse lattice in a Kerr medium with dispersion management", *Opt. Commun.* **259**, 49-54 (2006). *Impact Factor: 1.58.*
10. P. Ziń, E. Infeld, M. Matuszewski, G. Rowlands, M. Trippenbach, "Method for obtaining exact solutions of the nonlinear Schrödinger equation for a double-square-well potential", *Phys. Rev. A* **73**, 022105 (2006). *Impact Factor: 2.9.*
11. E. Infeld, M. Matuszewski, M. Trippenbach, "A hybrid variational method of describing pulse splitting by dispersion management", *J. Phys. B* **39**, L113-L118 (2006). *Impact Factor: 1.76.*
12. M. Matuszewski, W. Królikowski, M. Trippenbach, Y. S. Kivshar, "Simple and efficient generation of gap solitons in Bose-Einstein condensates", *Phys. Rev. A* **73**, 063621 (2006). *Impact Factor: 2.9.*
13. E. Infeld, M. Matuszewski, C. Shino, M. Trippenbach, "Can a variational approach describe pulse splitting in a dispersion managed system?", *Optica Applicata* **36**, 575 (2006). *Impact Factor: 0.46.*
14. M. Matuszewski, B. A. Malomed, M. Trippenbach, "Spontaneous symmetry breaking of solitons trapped in a double-channel potential", *Phys. Rev. A* **75**, 063621 (2007). *Impact Factor: 2.9.*

15. M. Matuszewski, B. A. Malomed, M. Trippenbach, “Competition between attractive and repulsive interactions in two-component Bose-Einstein condensates trapped in an optical lattice”, *Phys. Rev. A* **76**, 043826 (2007). *Impact Factor: 2.9*.
16. M. Matuszewski, W. Królikowski, Y. S. Kivshar, “Spatial solitons and light-induced instabilities in colloidal media”, *Opt. Express* **16**, 1371 (2008). *Impact Factor: 3.8*.
17. M. Trippenbach, E. Infeld, J. Gocalek, M. Matuszewski, M. Oberthaler, B. A. Malomed, “Spontaneous symmetry breaking of gap solitons and phase transitions in double-well traps”, *Phys. Rev. A* **78**, 013603 (2008). *Impact Factor: 2.9*.
18. M. Matuszewski, T. J. Alexander, Y. S. Kivshar, “Spin-Domain Formation in Antiferromagnetic Condensates” *Phys. Rev. A* **78**, 023632 (2008). *Impact Factor: 2.9*.
19. M. Matuszewski, W. Królikowski, Y. S. Kivshar, “Soliton interactions and transformations in hard-sphere colloids”, *Phys. Rev. A* **79**, 023814 (2009). *Impact Factor: 2.9*.
20. M. Matuszewski, W. Królikowski, Y. S. Kivshar, “Bistable solitons in colloidal media”, *Photonics Lett. Pol.* **1**, 4 (2009).
21. N. V. Hung, M. Matuszewski, M. Trippenbach, “Matter wave soliton collisions in the quasi one dimensional potential”, *Physica D* **238**, 1449-1455 (2009). *Impact Factor: 1.74*.
22. M. Matuszewski, T. J. Alexander, Y. S. Kivshar, “Excited spin states and phase separation in spinor Bose-Einstein condensates”, *Phys. Rev. A* **80**, 023602 (2009). *Impact Factor: 2.9*.
23. M. Matuszewski, “Engineering optical soliton bistability in colloidal media”, *Phys. Rev. A* **81**, 013820 (2010). *Impact Factor: 2.9*.
24. M. Matuszewski, I. L. Garanovich, A. A. Sukhorukov, “Light bullets in nonlinear periodically curved waveguide arrays”, *Phys. Rev. A* **81**, 043833 (2010). *Impact Factor: 2.9*.
25. M. Matuszewski, T. J. Alexander, Y. S. Kivshar, “Magnetic domains in spinor Bose-Einstein condensates”, *Fiz. Nizk. Temp.* **36**, 883 (2010). *Impact Factor: 0.78*.
26. M. Matuszewski, “Rotonlike instability and pattern formation in spinor Bose-Einstein condensates”, *Phys. Rev. Lett.* **105**, 020405 (2010). *Impact Factor: 7.4*.
27. M. Matuszewski, “Ground states of trapped spin-1 condensates in magnetic field”, *Phys. Rev. A* **82**, 053630 (2010). *Impact Factor: 2.9*.
28. T. Świsłocki, M. Matuszewski, “Controlled creation of spin domains in spin-1 Bose-Einstein condensates by phase separation”, *Phys. Rev. A* **85**, 023601 (2012). *Impact Factor: 2.9*.
29. M. Matuszewski, T. Taylor, A. V. Kavokin, “Exciton supersolidity in hybrid Bose-Fermi mixtures”, *Phys. Rev. Lett.* **108**, 060401 (2012). *Impact Factor: 7.4*.
30. M. Matuszewski, K. Bongs, J. Kronjäger, “Patterns and excitations in antiferromagnetic spinor condensates”, *Phys. Rev. A* **85**, 023635 (2012). *Impact Factor: 2.9*.
31. M. Matuszewski, T. C. H. Liew, Y. G. Rubo, and A. V. Kavokin, “Spin-orbital coupling and topology of spin-degenerate cold exciton gases”, *Phys. Rev. B* **86**, 115321 (2012). *Impact Factor: 3.7*.
32. T. Świsłocki, E. Witkowska, J. Dziarmaga, M. Matuszewski, “Double universality of a quantum phase transition in spinor condensates: Modification of the Kibble-Zurek

- mechanism by a conservation law”, Phys. Rev. Lett. **110**, 045303 (2013). *Impact Factor: 7.4.*
33. E. Witkowska, J. Dziarmaga, T. Świsłocki, M. Matuszewski, “Dynamics of the modified Kibble-Žurek mechanism in antiferromagnetic spin-1 condensates”, Phys. Rev. B **88**, 054508 (2013). *Impact Factor: 3.7.*
 34. P. Stepnicki, M. Matuszewski, “Tight-binding model for exciton-polariton condensates in external potentials”, Phys. Rev. A **88**, 033626 (2013). *Impact Factor: 2.9.*
 35. M. Matuszewski, E. Witkowska, “Universality in nonequilibrium condensation of exciton-polaritons”, Phys. Rev. B **89**, 155318 (2014). *Impact Factor: 3.7.*
 36. Y. Xue, M. Matuszewski, “Creation and Abrupt Decay of a Quasistationary Dark Soliton in a Polariton Condensate”, Phys. Rev. Lett. **112**, 216401 (2014). *Impact Factor: 7.4.*
 37. Emilia Witkowska, Tomasz Świsłocki, Michał Matuszewski, “Thermal fluctuations and quantum phase transition in antiferromagnetic Bose-Einstein condensates”, Phys. Rev. A **90**, 033604 (2014). *Impact Factor: 2.9.*
 38. N. Bobrovska, E. A. Ostrovskaya, M. Matuszewski, “Stability and spatial coherence of nonresonantly pumped exciton-polariton condensates”, Phys. Rev. B **90**, 205304 (2014). *Impact Factor: 3.7.*
 39. T. C. H. Liew, O. A. Egorov, M. Matuszewski, O. Kyriienko, X. Ma, E. A. Ostrovskaya, “Instability-induced formation and nonequilibrium dynamics of phase defects in polariton condensates”, Phys. Rev. B **91**, 085413 (2015). *Impact Factor: 3.7.*
 40. B. Piętka, D. Zygmunt, M. Król, M. R. Molas, A. A. L. Nicolet, F. Morier-Genoud, J. Szczytko, J. Łusakowski, P. Zięba, I. Tralle, P. Stepnicki, M. Matuszewski, M. Potemski, B. Deveaud, “Magnetic field tuning of exciton-polaritons in a semiconductor microcavity”, Phys. Rev. B **91**, 075309 (2015). *Impact Factor: 3.7.*
 41. P. Stepnicki, B. Piętka, F. Morier-Genoud, B. Deveaud, M. Matuszewski, “Analytical method for determining quantum well exciton properties in a magnetic field”, Phys. Rev. B **91**, 195302 (2015). *Impact Factor: 3.7.*
 42. M. Kulczykowski, N. Bobrovska, M. Matuszewski, “Bright sink-type localized states in exciton-polariton condensates”, Phys. Rev. B **91**, 245310 (2015). *Impact Factor: 3.7.*
 43. N. Bobrovska, M. Matuszewski, “Adiabatic approximation and fluctuations in exciton-polariton condensates”, Phys. Rev. B **92**, 035311 (2015). *Impact Factor: 3.7.*
 44. L. Dominici, M. Petrov, M. Matuszewski, D. Ballarini, M. De Giorgi, D. Colas, E. Cancellieri, B. Silva Fernández, A. Bramati, G. Gigli, A. Kavokin, F. Laussy, D. Sanvitto, “Real-space collapse of a polariton condensate”, Nature Commun. **6**, 8993 (2015). *Impact Factor: 11.47.*
 45. O. Voronich, A. Buraczewski, M. Matuszewski, and M. Stobińska, “Exciton-polariton localized wave packets in a microcavity”, Phys. Rev. B **93**, 245310 (2016). *Impact Factor: 3.7.*
 46. Tomasz Świsłocki, Emilia Witkowska, Michał Matuszewski, “Nonadiabatic quantum phase transition in a trapped spinor condensate”, Phys. Rev. A **94**, 043635 (2016). *Impact Factor: 2.9.*
 47. M. Kulczykowski, M. Matuszewski, “Phase ordering kinetics of a nonequilibrium exciton-polariton condensate”, Phys. Rev. B **95**, 075306 (2017). *Impact Factor: 3.7.*

48. N. Bobrovska, M. Matuszewski, T. C. H. Liew, and O. Kyriienko, “Interactive optomechanical coupling with nonlinear polaritonic systems”, *Phys. Rev. B* **95**, 085309 (2017). *Impact Factor: 3.7*.
49. R. Mirek, M. Król, K. Lekenta, J.-G. Rousset, M. Nawrocki, M. Kulczykowski, M. Matuszewski, J. Szczytko, W. Pacuski, and B. Piętka, “Angular dependence of giant Zeeman effect for semimagnetic cavity polaritons”, *Phys. Rev. B* **95**, 085429 (2017) *Impact Factor: 3.7*.
50. O. Voronych, A. Buraczewski, M. Matuszewski, M. Stobińska, “Numerical modeling of exciton–polariton Bose–Einstein condensate in a microcavity”, *Computer Phys. Commun.* **215**, 246–258 (2017). *Impact Factor: 3.6*.
51. B. Piętka, M. R. Molas, N. Bobrovska, M. Król, R. Mirek, K. Lekenta, P. Stepnicki, F. Morier-Genoud, J. Szczytko, B. Deveaud, M. Matuszewski, and M. Potemski, “2s exciton-polariton revealed in an external magnetic field”, *Phys. Rev. B* **96**, 081402(R) (2017). *Impact Factor: 3.7*.
52. B. Piętka, N. Bobrovska, D. Stephan, M. Teich, M. Król, S. Winnerl, A. Pashkin, R. Mirek, K. Lekenta, F. Morier-Genoud, H. Schneider, B. Deveaud, M. Helm, M. Matuszewski, and J. Szczytko, “Doubly Dressed Bosons: Exciton Polaritons in a Strong Terahertz Field”, *Phys. Rev. Lett.* **119**, 077403 (2017). *Impact Factor: 8.5*.
53. P. Miętki and M. Matuszewski, “Magnetic polarons in a nonequilibrium polariton condensate”, *Phys. Rev. B* **96**, 115310 (2017). *Impact Factor: 3.7*.
54. A. Gianfrate, L. Dominici, O. Voronych, M. Matuszewski, M. Stobińska, D. Ballarini, M. De Giorgi, G. Gigli, D. Sanvitto, “Superluminal X-waves in a polariton quantum fluid”, *Light: Science & Applications* **7**, 17119 (2018). *Impact Factor: 14.6*.
55. N. Bobrovska, M. Matuszewski, K. S. Daskalakis, S. A. Maier, S. Kéna-Cohen, “Dynamical Instability of a Nonequilibrium Exciton-Polariton Condensate”, *ACS Photonics*, **5**, 111 (2018). *Impact Factor: 6.8*.
56. Y. Xue, Y. Jiang, G. Wang, R. Wang, S. Feng, M. Matuszewski, “Creation of stable dark and anti-dark solitons in polariton dyad”, *Optics Express* **26**, 6267-6275 (2018). *Impact Factor: 3.3*.
57. T. Świsłocki, A. Zembrzuski, M. Matuszewski, E. Witkowska, “Dynamic hysteresis from bistability in an antiferromagnetic spinor condensate”, *Phys. Rev. A* **97**, 033629 (2018). *Impact Factor: 2.9*.
58. A. Opala, M. Pieczarka, N. Bobrovska, M. Matuszewski, “Dynamics of defect-induced dark solitons in an exciton-polariton condensate”, *Phys. Rev. B* **97**, 155304 (2018). *Impact Factor: 3.8*.
59. Mateusz Król, Rafał Mirek, Katarzyna Lekenta, Jean-Guy Rousset, Daniel Stephan, Michał Nawrocki, Michał Matuszewski, Jacek Szczytko, Wojciech Pacuski, Barbara Piętka, “Spin polarized semimagnetic exciton-polariton condensate in magnetic field”, *Scientific Reports* **8**, 6694 (2018). *Impact Factor: 4.8*.
60. E. Estrecho, T. Gao, N. Bobrovska, M. D. Fraser, M. Steger, L. Pfeiffer, K. West, T. C. H. Liew, M. Matuszewski, D. W. Snoke, A. G. Truscott & E. A. Ostrovskaya, “Single-shot condensation of exciton polaritons and the hole burning effect”, *Nature Communications* **9**, 2944 (2018). *Impact Factor: 12.4*.
61. T. Suski, G. Staszczak, K. P. Korona, P. Lefebvre, E. Monroy, P. A. Drozd, G. Muzioł, C. Skierbiszewski, M. Kulczykowski, M. Matuszewski, E. Grzanka, S. Grzanka, K. Pieniak, K. Gibasiewicz, A. Khachapuridze, J. Smalc-Koziorowska, L. Marona, and P. Perlin, “Switching of exciton character in double InGaN/GaN

- quantum wells”, Phys. Rev. B **98**, 165302 (2018). *Impact Factor*: 3.8.
62. Paweł Miętki, Michał Matuszewski, “Spontaneous formation of spin lattices in semimagnetic exciton-polariton condensates”, Phys. Rev. B **98**, 195303 (2018). *Impact Factor*: 3.8.
63. Andrzej Opala, Maciej Pieczarka, and Michał Matuszewski, “Theory of relaxation oscillations in exciton-polariton condensates”, Phys. Rev. B **98**, 195312 (2018). *Impact Factor*: 3.8.
64. M. Król, R. Mirek, D. Stephan, K. Lekenta, J.-G. Rousset, W. Pacuski, A. V. Kavokin, M. Matuszewski, J. Szczytko, B. Piętka, "Giant spin Meissner effect in a nonequilibrium exciton-polariton gas", Phys. Rev. B **99**, 115318 (2109). *Impact Factor*: 3.8.
65. Sanjib Ghosh, Andrzej Opala, Michał Matuszewski, Tomasz Paterek, Timothy C. H. Liew, "Quantum reservoir processing", npj Quantum Information **5**, 35 (2019). *Impact Factor*: 9.2.
66. Nataliya Bobrovska, Andrzej Opala, Paweł Miętki, Michał Kulczykowski, Piotr Szymczak, Michiel Wouters, Michał Matuszewski, "Critical dynamics and tree-like spatiotemporal patterns in exciton-polariton condensates", Phys. Rev. B **99**, 205301 (2019). *Impact Factor*: 3.8.
67. Davide Caputo, Nataliya Bobrovska, Dario Ballarini, Michal Matuszewski, Milena De Giorgi, Lorenzo Dominici, Kenneth West, Loren N. Pfeiffer, Giuseppe Gigli, Daniele Sanvitto, "Josephson vortices induced by phase twisting a polariton superfluid", Nature Photonics **13**, 488–493 (2019). *Impact Factor*: 38.6.
68. Andrzej Opala, Sanjib Ghosh, Timothy C.H. Liew, Michał Matuszewski, "Neuromorphic Computing in Ginzburg-Landau Polariton-Lattice Systems", Phys. Rev. Applied **11**, 064029 (2019). *Impact Factor*: 4.8.
69. E. Estrecho, T. Gao, N. Bobrovska, D. Comber-Todd, M. D. Fraser, M. Steger, K. West, L. N. Pfeiffer, J. Levinsen, M. M. Parish, T. C. H. Liew, M. Matuszewski, D. W. Snoke, A. G. Truscott, E. A. Ostrovskaya, "Direct measurement of polariton-polariton interaction strength in the Thomas-Fermi regime of exciton-polariton condensation", Phys. Rev. B **100**, 035306 (2019). *Impact Factor*: 3.8.
70. K. Rechcińska, M. Król, R. Mazur, P. Morawiak, R. Mirek, K. Łempicka, W. Bardyszewski, M. Matuszewski, P. Kula, W. Piecek, P. G. Lagoudakis, B. Piętka, J. Szczytko, "Engineering spin-orbit synthetic Hamiltonians in liquid-crystal optical cavities", Science **366**, 727-730 (2019). *Impact Factor*: 41.1.
71. Dario Ballarini, Antonio Gianfrate, Riccardo Panico, Andrzej Opala, Sanjib Ghosh, Lorenzo Dominici, Vincenzo Ardizzone, Milena De Giorgi, Giovanni Lerario, Giuseppe Gigli, Timothy C. H. Liew, Michal Matuszewski, and Daniele Sanvitto, "Polaritonic Neuromorphic Computing Outperforms Linear Classifiers", Nano Lett. **20**, 3506–3512 (2020). *Impact Factor*: 12.3.
72. P. Comaron, V. Shahnazaryan, W. Brzezicki, T. Hyart, and M. Matuszewski, "Non-Hermitian topological end-mode lasing in polariton systems", Phys. Rev. Research **2**, 022051(R) (2020).
73. H. Xu, S. Ghosh, M. Matuszewski, and T. C.H. Liew, "Universal Self-Correcting Computing with Disordered Exciton-Polariton Neural Networks", Phys. Rev. Applied **13**, 064074 (2020). *Impact Factor*: 4.2.
74. P. Comaron, V. Shahnazaryan, and M. Matuszewski, "Coherent transfer of topological interface states", Optics Express **28**, 38698-38709 (2020). *Impact Factor*:

3.7.

75. P. Deuar, A. Ferrier, M. Matuszewski, G. Orso, M. H. Szymańska, "Fully quantum scalable description of driven-dissipative lattice models", *PRX Quantum* **2**, 010319 (2021).
76. Mateusz Król, Helgi Sigurdsson, Katarzyna Rechcińska, Przemysław Oliwa, Krzysztof Tyszka, Witold Bardyszewski, Andrzej Opala, Michał Matuszewski, Przemysław Morawiak, Rafał Mazur, Wiktor Piecek, Przemysław Kula, Pavlos G. Lagoudakis, Barbara Piętka, and Jacek Szczytko, "Observation of second-order meron polarization textures in optical microcavities", *Optica* **8**, 255-261 (2021).
77. Rafał Mirek, Andrzej Opala, Paolo Comaron, Magdalena Furman, Mateusz Król, Krzysztof Tyszka, Bartłomiej Seredyński, Dario Ballarini, Daniele Sanvitto, Timothy C. H. Liew, Wojciech Pacuski, Jan Suffczyński, Jacek Szczytko, Michał Matuszewski, and Barbara Piętka, "Neuromorphic Binarized Polariton Networks", *Nano Lett.* **21**, 3715–3720 (2021).
78. Sanjib Ghosh, Andrzej Opala, Michał Matuszewski, Tomasz Paterek, Timothy C. H. Liew, "Reconstructing Quantum States With Quantum Reservoir Networks", *IEEE Trans. Neural Netw. Learn. Syst.* **32**, 3148 (2021).
79. M. Matuszewski, A. Opala, R. Mirek, M. Furman, M. Król, K. Tyszka, T.C.H. Liew, D. Ballarini, D. Sanvitto, J. Szczytko, B. Piętka, "Energy-Efficient Neural Network Inference with Microcavity Exciton Polaritons", *Phys. Rev. Applied* **16**, 024045 (2021).
80. Galbadrakh Dagvadorj, Michał Kulczykowski, Marzena H. Szymańska, and Michał Matuszewski, "First-order dissipative phase transition in an exciton-polariton condensate", *Phys. Rev. B* **104**, 165301 (2021).
81. Mateusz Król, Katarzyna Rechcińska, Helgi Sigurdsson, Przemysław Oliwa, Rafał Mazur, Przemysław Morawiak, Wiktor Piecek, Przemysław Kula, Pavlos G. Lagoudakis, Michał Matuszewski, Witold Bardyszewski, Barbara Piętka, Jacek Szczytko, "Realizing Optical Persistent Spin Helix and Stern-Gerlach Deflection in an Anisotropic Liquid Crystal Microcavity", *Phys. Rev. Lett.* **127**, 190401 (2021).
82. R. Mirek, A. Opala, M. Furman, M. Król, K. Tyszka, B. Seredyński, W. Pacuski, J. Suffczyński, J. Szczytko, M. Matuszewski, and B. Piętka, "Neural Networks Based on Ultrafast Time-Delayed Effects in Exciton Polaritons", *Phys. Rev. Applied* **17**, 054037 (2022).
83. A. Opala, R. Panico, V. Ardizzone, B. Piętka, J. Szczytko, D. Sanvitto, M. Matuszewski, and D. Ballarini, "Training a Neural Network with Exciton-Polariton Optical Nonlinearity", *Phys. Rev. Applied* **18**, 024028 (2022).
84. Krzysztof Tyszka, Magdalena Furman, Rafał Mirek, Mateusz Król, Andrzej Opala, Bartłomiej Seredyński, Jan Suffczyński, Wojciech Pacuski, Michał Matuszewski, Jacek Szczytko, Barbara Piętka, "Leaky Integrate-and-Fire Mechanism in Exciton-Polariton Condensates for Photonic Spiking Neurons", *Laser and Photonics Reviews* **17**, 2100660 (2023).
85. R. Panico, P. Comaron, M. Matuszewski, A. S. Lanotte, D. Trypogeorgos, G. Gigli, M. De Giorgi, V. Ardizzone, D. Sanvitto, D. Ballarini, „Onset of vortex clustering and inverse energy cascade in dissipative quantum fluids”, *Nature Photonics* **17**, 451–456 (2023).
86. M. Furman, A. Opala, M. Król, K. Tyszka, R. Mirek, M. Muszyński, B. Seredyński, W. Pacuski, J. Szczytko, M. Matuszewski, and B. Piętka, "Inverted

- optical bistability and optical limiting in coherently driven exciton–polaritons", *APL Photonics* **8**, 046105 (2023).
87. R. Mirek, M. Furman, M. Król, B. Seredyński, K. Łempicka-Mirek, K. Tyszka, W. Pacuski, M. Matuszewski, J. Szczytko, and B. Piętka, "Spin polarization of exciton-polariton condensate in a photonic synthetic effective magnetic field", *Phys. Rev. B* **107**, 125303 (2023).
 88. Amir Rahmani, Mateusz Kędziora, Andrzej Opala, and Michał Matuszewski, "Non-Hermitian synthetic lattices with light-matter coupling", *Phys. Rev. B* **107**, 165309 (2023).
 89. A. Opala, M. Furman, M. Król, R. Mirek, K. Tyszka, B. Seredyński, W. Pacuski, J. Szczytko, M. Matuszewski, and B. Piętka, "Natural exceptional points in the excitation spectrum of a light–matter system", *Optica* **10**, 1111-1117 (2023).
 90. A. Opala and M. Matuszewski, "Harnessing exciton-polaritons for digital computing, neuromorphic computing, and optimization", *Optical Materials Express* **13**, 2674-2689 (2023).
 91. M. Matuszewski, A. Prystupiak, and A. Opala, "Role of all-optical neural networks", *Phys. Rev. Applied* **21**, 014028 (2024).
 92. Amir Rahmani, Andrzej Opala, and Michał Matuszewski, "Exceptional points and phase transitions in non-Hermitian nonlinear binary systems", *Phys. Rev. B* **109**, 085311 (2024).
 93. W. Verstraelen, P. Deuar, M. Matuszewski, and T.C.H. Liew, "Analog spin simulators: How to keep the amplitude homogeneous", *Phys. Rev. Applied* **21**, 024057 (2024).

Conference Papers:

1. P. Wasylczyk, W. Wasilewski, M. Matuszewski, M. Trippenbach, Czesław Radzewicz, "Nonlinear propagation of femtosecond laser pulses in dielectrics", *Proceedings of SPIE Vol. 5258*, 20-24 (2003).
2. Michał Matuszewski, Eryk Infeld, Boris A. Malomed, A. A. Skorupski, Marek Trippenbach, "Two- and three-dimensional light bullets in a Kerr medium with dispersion management", *Proceedings of SPIE Vol. 5949*, 24-34 (2005).
3. C. Rosberg, M. Matuszewski, D. Neshev, A. Sukhorukov, A. Mitchell, M. Trippenbach, M. Austin, W. Krolikowski, Y. Kivshar, "Discrete Self-Trapping vs Defocusing in Nonlinear Waveguide Arrays", *Proceedings of Conference on Lasers and Electro-Optics Quantum Electronics and Laser Science/Conference on Photonic Applications Systems and Technologies (CLEO/QELS)* (2006).
4. M. Matuszewski, W. Krolikowski, Y. Kivshar, "Soliton interactions and transformations in hard-sphere colloids", *Proceedings of European Conference on Lasers and Electro-Optics and the European Quantum Electronics Conference (CLEO/EQEC)* (2009).
5. M. Matuszewski, A. Sukhorukov, I. Garanovich, "Mobile light bullets in curved waveguide arrays", *Proceedings of European Conference on Lasers and Electro-*

- Optics and the European Quantum Electronics Conference (CLEO/EQEC) (2009).
6. M. Matuszewski, I. Garanovich, A. Sukhorukov, "Light Bullets in Nonlinear Curved Waveguide Arrays", Proceedings of Australasian Conference on Optics Lasers and Spectroscopy and the Australian Conference on Optical Fibre Technology in association with the International Workshop on Dissipative Solitons (ACOLS ACOFT) (2009).

Other:

1. P. Bajor, J. Fichna, M. Grabowski, B. Lis, M. Matuszewski, P. Oprocha "Jak napisać wniosek o finansowanie badań naukowych – poradnik Rady Młodych Naukowców", (2013).