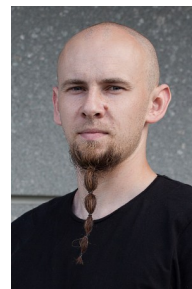


CURRICULUM VITAE

Michał Piotr Nowak
Date of birth: 6 May 1984
URL for the web site: mpnowak.org
Email: mpnowak@agh.edu.pl
Phone: +48 12 617 20 73
Address:
AGH University of Science and Technology,
Academic Centre for Materials and Nanotechnology,
al. Mickiewicza 30, 30-059 Kraków



EMPLOYMENT

- 01/01/2020 – present: **Professor**
Theory of Quantum Systems Group, Academic Centre for Materials and Nanotechnology, AGH University of Science and Technology, Krakow (Poland).
- 01/10/2017 – 31/12/2019: **Assistant professor**
Quantum Systems and Modeling Group, Academic Centre for Materials and Nanotechnology, AGH University of Science and Technology, Krakow (Poland).
- 01/01/2015 – 31/12/2016: **PostDoc researcher**
QuTech and Kavli Institute of Nanoscience, Delft University of Technology, Delft (The Netherlands)
- 01/10/2013 – 30/09/2017: **Research assistant**
Theory of Nanostructures and Nanodevices Group at the Faculty of Physics and Applied Computer Science, AGH University of Science and Technology, Krakow (Poland).

EDUCATION AND SCIENTIFIC DEGREES

- 18/11/2019: **Habilitation.**
Based on the achievement entitled: "*Spin effects and induced superconductivity in semiconducting nanostructures*".
- 01/10/2008 – 28/10/2013: **PhD cum laude.**
"*Electronic structure of artificial atoms and molecules: spin-orbit coupling effects*". Joint PhD of Faculty of Physics and Applied Computer Science, AGH University of Science and Technology, Krakow (Poland) and Department of Physics of the University of Antwerp (Belgium) under supervision of Prof. Bartłomiej Szafran and Prof. Francois Peeters.
- 01/09/2003 – 26/06/2008: **Master of Science**
MSc in Technical Physics, Faculty of Physics and Applied Computer Science, AGH University of Science and Technology, Krakow (Poland).

INTERNSHIPS AND SCIENTIFIC VISITS ABROAD

- 01/08/2019 – 28/08/2019
Visiting researcher at Technical University Delft, Quantum tinkerer group, Quantum Nanoscience Department and QuTech. Collaboration with Prof. Anton Akhmerov and Prof. Michael Wimmer.
- 01/10/2010 – 30/09/2011
Internship at University of Antwerp, Condensed Matter Theory Group, Department of Physics of University of Antwerp (Belgium) under supervision of Prof. Francois Peeters and Prof. Bart Partoens.

- 10/05/2008 – 24/05/2008
Internship at University of Antwerp, Condensed Matter Theory Group, Department of Physics of University of Antwerp (Belgium) under supervision of Prof. Francois Peeters.

SUPERVISION OF GRADUATE STUDENTS AND PHD STUDENTS

- 01/04/2018 – 11/09/2019: supervisor of MSc student Daniel Gut
Thesis title: "*Properties of monolayer transition metals dichalcogenides: electronic transport*". Faculty of Faculty of Materials Science and Ceramics, AGH University of Science and Technology, Krakow (Poland).
- 01/04/2018 – 11/07/2019: supervisor of MSc student Michał Prokop
Thesis title: "*Electronic transport simulations in transition metal dichalcogenide monolayers: Scanning Gate Microscopy*". Faculty of Metals Engineering and Industrial Computer Science, AGH University of Science and Technology, Krakow (Poland).
- 01/11/2013 – 31/09/2015: assistant supervisor of PhD student Wojciech Pasek
Thesis title: "*Properties of hole systems in quantum dots: valence band mixing, optical and spin properties*". Faculty of Physics and Applied Computer Science, AGH University of Science and Technology, Krakow (Poland).

GRANTS AND PROJECTS

- 17/07/2017 – present
Leader of National Science Centre grant SONATA "*Transport properties of Josephson junctions and quantum interferometers defined in semiconductor-superconductor hybrid nanostructures.*"
- 01/01/2018 – 28/02/2019
Leader of HOMING project "*Electronic transport in semiconducting and superconducting monolayer transition metal dichalcogenide nanodevices*" funded by Foundation for Polish Science (FNP).
- 01/01/2015 – 31/12/2016
Executor of Synergy Grant "*Quantum Computer Lab*". Role: modeling of quantum transport in nanowire hybrid structures. Project funded by European Research Council.
- 01/02/2014 – 31/12/2014
Executor of "*NanoEIS: Nanotechnology Education for Industry and Society*" grant. Role: development of model curricula for BSc and MSc courses. Project funded by the European Union under Framework Programme 7 for Research and Technology Development.
- 01/04/2012 – 01/04/2014
Leader of grant Iuventus 2011 funded by Ministry of Science and Higher Education (MNiSW), Title of the project: "*Electrical manipulation and filtering of electron spin in semiconductor nanostructures*".
- 01/01/2013 – 01/12/2013
Executor of Opus grant founded by the National Science Centre (NCN), Title of the project: "*Modelling of the charge transport in semiconductor nanostructures with the scanning gate*". Role: Study of spin-orbit interaction effects on the conductance maps probed by scanning gate microscopy.
- 01/10/2008 – 30/09/2013
Executor of Krakow Interdisciplinary PhD-Project in Nanoscience and Advanced Nanostructures founded by Polish Science Foundation (FNP) co financed under Framework Programme 7 for European Union Innovative Economy Programme.

FELLOWSHIPS, PRIZES and AWARDS

- 2018
Prof. Zbigniew Engel prize for young researchers
- 01/01/2018 – present
Scholarship of Minister of Science and Higher Education for outstanding young researchers
- 2014
Award of Minister of Science and Higher Education for scientific achievements underlying the PhD degree for academic teachers.
- 2014
Polish Physical Society award for the best PhD thesis
- 13/08/2014
Award for the best PhD thesis realized using Cyfronet AGH computational center.
- 28/10/2013
Dissertation awarded with distinction by the Faculty of Physics and Computer Science, AGH University of Science and Technology.
- 2012, 2013
Consecutive START Scholarships for outstanding young researchers from Foundation for Polish Science.
- 01/01/2013 – 31/12/2013
Scholarship of Minister of Science and Higher Education for outstanding scientific achievements for PhD students.
- 2008 – 2015
Successive Distinctions of AGH University of Science and Technology Rector for scientific achievements.
- 2008 – 2013
PhD realized within PhD program: “*Krakow Interdisciplinary PhD-Project in Nanoscience and Advanced Nanostructures*” with *MPD* fellowship financed by the Foundation for Polish Science under Framework Programme 7.

OTHER

- Fortran, Python programmer; fluent in English; experience in teaching physics and computational methods. Permanent referee of Physical Review Letters, Physical Review B, Physica B, Physics Letters A, New Journal of Physics and Journal of Applied Physics.

SCIENTIFIC INTEREST

- Physics of semiconductor and superconductor nanostructures. Computer modeling.

PUBLICATION and PREPRINTS (as of 14 September 2020)

Total number of citations: 559 (1001), h-index: 12 (15) after ISI Web of Science (Google Scholar)

- [1] F. Borsoi, G. P. Mazur, N. van Loo, **M. P. Nowak**, L. Bourdet, K. Li, S. Korneychuk, A. Fursina, E. Memisevic, G. Badawy, S. Gazibegovic, K. van Hoogdalem, E. P. A. M. Bakkers, L. P. Kouwenhoven, S. Heedt, M. Quintero-Pérez, *Single-shot fabrication of semiconducting-superconducting nanowire devices*, arXiv:2009.06219 (2020).

- [2] S. Heedt, M. Quintero-Pérez, F. Borsoi, A. Fursina, N. van Loo, G. P. Mazur, **M. P. Nowak**, M. Ammerlaan, K. Li, S. Korneychuk, J. Shen, M. A. Y. van de Poll, G. Badawy, S. Gazibegovic, K. van Hoogdalem, E. P. A. M. Bakkers, L. P. Kouwenhoven, "*Shadow-wall lithography of ballistic superconductor-semiconductor quantum devices*", arXiv:2007.14383 (2020).
- [3] D. Sticlet, P. Wójcik, **M. P. Nowak**, "*SQUID pattern disruption in transition metal dichalcogenide Josephson junctions due to non-parabolic dispersion of the edge states*", arXiv:2006.03517 (2020).
- [4] D. Gut, M. Prokop, D. C. Sticlet, **M. P. Nowak**, "*Valley polarized current and resonant electronic transport in a non-uniform MoS2 zigzag nanoribbon*", Phys. Rev. B 101, 085425 (2020).
- [5] M. Prokop, D. Gut, **M. P. Nowak**, "*Scanning gate microscopy mapping of edge current and branched electron flow in a transition metal dichalcogenide nanoribbon and quantum point contact*", Journal of Physics: Condensed Matter 32, 205302 (2020). (2020).
- [6] P. Wójcik, **M. P. Nowak**, M. Zegrodnik, "*Superconducting dome in doped 2D superconductors with broken inversion symmetry*", Physica E 118, 113893 (2020).
- [7] P. Wójcik, **M. P. Nowak**, M. Zegrodnik, "*Intersubband pairing induced Fulde-Ferrell phase in metallic nanofilms*", Phys. Rev. B 100, 045409 (2019).
- [8] **M. P. Nowak**, M. Wimmer, A. R. Akhmerov, "*Supercurrent carried by non-equilibrium quasiparticles in a multiterminal Josephson junction*", Phys. Rev. B 99 075416 (2019).
- [9] **M. P. Nowak**, P. Wójcik, "*Probing Andreev reflection reach in semiconductor-superconductor hybrids by Aharonov-Bohm effect*", Appl. Phys. Lett. 114, 043104 (2019).
- [10] F. K. de Vries, J. Shen, R. J. Skolasinski, **M. P. Nowak**, D. Varjas, L. Wang, M. Wimmer, J. Ridderbos, F. A. Zwanenburg, A. Li, S. Koelling, M. A. Verheijen, E. P. A. M. Bakkers, L. P. Kouwenhoven, "*Spin-orbit interaction and induced superconductivity in an one-dimensional hole gas*", Nano Lett. 18, 6483 (2018).
- [11] P. Wójcik, **M. P. Nowak**, "*Durability of the superconducting gap in Majorana nanowires under orbital effects of a magnetic field*", Phys. Rev. B 97, 235445 (2018).
- [12] R. Ferdous, E. Kawakami, P. Scarlino, **M. P. Nowak**, D. R. Ward, D. E. Savage, M. G. Lagally, S. N. Coppersmith, M. Friesen, M. A. Eriksson, L. M. K. Vandersypen, R. Rahman, "*Valley dependent anisotropic spin splitting in silicon quantum dots*", npj Quantum Information 4, 26 (2018).
- [13] **M. P. Nowak**, P. Wójcik, "*Renormalization of the Majorana bound state decay length in a perpendicular magnetic field*", Phys. Rev. B 97, 045419 (2018).
- [14] J. Kammhuber, M. C. Cassidy, F. Pei, **M. P. Nowak**, A. Vuik, D. Car, S. R. Plissard, E. P. A. M. Bakkers, M. Wimmer, and L. P. Kouwenhoven, "*Conductance through a helical state in an InSb nanowire*", Nat. Commun. 8, 478 (2017).
- [15] H. Zhang, Ö. Gül, S. Conesa-Boj, **M. P. Nowak**, M. Wimmer, K. Zuo, V. Mourik, F. K. de Vries, J. van Veen, M. W. A. de Moor, J. D. S. Bommer, D. J. van Woerkom, D. Car, S. R. Plissard, E.P.A.M. Bakkers, M. Quintero-Pérez, M. C. Cassidy, S. Koelling, S. Goswami, K. Watanabe, T. Taniguchi, L. P. Kouwenhoven, "*Ballistic superconductivity in semiconductor nanowires.*" Nat. Commun. 8, 16025 (2017).
- [16] M. Kjaergaard, H. J. Suominen, **M. P. Nowak**, A. R. Akhmerov, J. Shabani, C. J. Palmstrøm, F. Nichele, C. M. Marcus, "*Transparent Semiconductor-Superconductor Interface and Induced Gap in an Epitaxial Heterostructure Josephson Junction*", Phys. Rev. Applied 7, 034029 (2017).
- [17] Ö. Gül, H. Zhang, F. K. de Vries, J. van Veen, K. Zuo, V. Mourik, S. Conesa-Boj, **M. P. Nowak**, D. J. van Woerkom, M. Quintero-Pérez, M. C. Cassidy, A. Geresdi, S. Kölling, D. Car, S. R. Plissard, E. P. A. M. Bakkers, L. P. Kouwenhoven, "*Hard superconducting gap in InSb nanowires*", Nano. Lett., 17, 2690 (2017).

- [18] H. Zhang, Ö. Gül, S. Conesa-Boj, K. Zuo, V. Mourik, F. K. de Vries, J. van Veen, D. J. van Woerkom, **M. P. Nowak**, M. Wimmer, D. Car, S. Plissard, E. P. A. M. Bakkers, M. Quintero-Pérez, S. Goswami, K. Watanabe, T. Taniguchi, L. P. Kouwenhoven, "*Ballistic Majorana nanowire devices*", arXiv:1603.04069 (2016).
- [19] M. Kjaergaard, F. Nichele, H. J. Suominen, **M. P. Nowak**, M. Wimmer, A. R. Akhmerov, J. A. Folk, K. Flensberg, J. Shabani, C. J. Palmstrøm, C. M. Marcus, "*Quantized conductance doubling and hard gap in a two-dimensional semiconductor-superconductor heterostructure*", Nat. Commun. 7, 12841 (2016).
- [20] W. J. Pasek, **M. P. Nowak** and B. Szafran, "*Valence band mixing versus higher harmonic generation in electric-dipole spin resonance*", Semicond. Sci. Technol. 30, 055017 (2015).
- [21] **M. P. Nowak** and B. Szafran, "*Single-electron shell occupation and effective g-factor in few-electron nanowire quantum dots*", Phys. Rev. B 91, 085102 (2015).
- [22] K. Kolasinski, B. Szafran, and **M. P. Nowak**, "*Imaging of double slit interference by scanning gate microscopy*", Phys. Rev. B 90, 165303 (2014).
- [23] W. J. Pasek, **M. P. Nowak**, and B. Szafran, "*Spin exchange energy for a pair of valence band holes in artificial molecules*", Semicond. Sci. Technol. 29, 115022 (2014).
- [24] **M. P. Nowak**, K. Kolasinski, B. Szafran, "*Signatures of spin-orbit coupling in scanning gate conductance images of electron flow from quantum point contacts*", Phys. Rev. B 90, 035301 (2014).
- [25] W. J. Pasek, **M. P. Nowak** and B. Szafran, "*Optical signatures of valence-band mixing in positive trion recombination spectra of double quantum dots*", Phys. Rev. B 89, 245303 (2014).
- [26] **M. P. Nowak** and B. Szafran, "*Spontaneous and resonant lifting of the spin blockade in nanowire quantum dots*", Phys. Rev. B 89, 205412 (2014).
- [27] B. Szafran, **M. P. Nowak**, E. Wach, D. P. Żebrowski, "*Interaction effects near constriction of a quasi two-dimensional electron system: an exact diagonalization study*", Phys. Lett. A 378, 1036 (2014).
- [28] **M. P. Nowak**, B. Szafran, "*Spin current source based on a quantum point contact with local spin-orbit interaction*", Appl. Phys. Lett. 103, 202404 (2013).
- [29] E. N. Osika, B. Szafran, and **M. P. Nowak**, "*Simulations of electric-dipole spin resonance for spin-orbit coupled quantum dots in the Overhauser field: Fractional resonances and selection rules*", Phys. Rev. B 88, 165302 (2013).
- [30] **M. P. Nowak** and B. Szafran, "*Spin-polarization anisotropy in a narrow spin-orbit-coupled nanowire quantum dot*", Phys. Rev. B 87, 205436 (2013).
- [31] **M. P. Nowak**, B. Szafran, and F. M. Peeters, "*Resonant harmonic generation and collective spin rotations in electrically driven quantum dots*", Phys. Rev. B 86, 125428 (2012).
- [32] **M. P. Nowak**, B. Szafran, and F. M. Peeters, "*Fano resonances and electron spin transport through a two-dimensional spin-orbit-coupled quantum ring*", Phys. Rev. B 84, 235319 (2011).
- [33] **M. P. Nowak**, B. Szafran, F. M. Peeters, B. Partoens, and W. J. Pasek, "*Tuning of the spin-orbit interaction in a quantum dot by an in-plane magnetic field*", Phys. Rev. B 83, 245324 (2011).
- [34] **M. P. Nowak** and B. Szafran, "*Singlet-triplet avoided crossings and effective g factor versus spatial orientation of spin-orbit-coupled quantum dots*", Phys. Rev. B 83, 035315 (2011).
- [35] **M. P. Nowak** and B. Szafran, "*Time-dependent configuration-interaction simulations of spin swap in spin-orbit-coupled double quantum dots*", Phys. Rev. B 82, 165316 (2010).
- [36] **M. P. Nowak** and B. Szafran, "*Coupling of bonding and antibonding electron orbitals in double quantum dots by spin-orbit interaction*", Phys. Rev. B 81, 235311 (2010).

- [37] **M. P. Nowak** and B. Szafran, "*Spin-orbit coupling effects in two-dimensional circular quantum rings: Elliptical deformation of confined electron density*", Phys. Rev. B 80, 195319 (2009).
- [38] B. Szafran, **M. P. Nowak**, S. Bednarek, T. Chwiej, and F. M. Peeters, "*Selective suppression of Dresselhaus or Rashba spin-orbit coupling effects by the Zeeman interaction in quantum dots*", Phys. Rev. B 79, 235303 (2009).
- [39] **M. P. Nowak**, B. Szafran, F. M. Peeters, "*Manipulation of two-electron states by the electric field in stacked self-assembled dots*", J. Phys.: Condens. Matter 20, 395225 (2008).

CONFERENCE PRESENTATIONS

- [1] 13 - 18 September 2019, 45. Congress of Polish Physicists 2019, Kraków (Poland), **Invited talk**: "*Andreev enhanced conductance of superconducting nanostructures*".
- [2] 25 - 28 June 2019, Graphene 2019, Rome (Italy), **Poster**: "*Valley current polarization and disorder probing in gated MoS₂ nanoribbons*".
- [3] 8 - 14 June 2019, 48th International School and Conference on the Physics of Semiconductors "Jaszowiec 2019", Szczyrk (Poland), **Poster**: "*Resonant states and valley current polarization in gated MoS₂ nanoribbons*".
- [4] 11 - 12 April 2019, 3rd INTERDISCIPLINARY FNP CONFERENCE, Warszawa (Poland), **Poster**: "*Understanding electronic transport properties of transition metal dichalcogenide nanodevices*".
- [5] 26 - 27 February 2019, Majorana Modes and Beyond, Warszawa (Poland), **Invited talk**: "*Multiple Andreev reflections: characterization of hybrid nanostructures and novel supercurrent*".
- [6] 16 - 22 June 2018, 2018 International Conference on Nanoscience + Technology, Brno (Czech Republic) **Poster**: "*Valley-polarized current-carrying states in gated MoS₂ nanoribbons*".
- [7] 16 - 22 June 2018, 47th International School and Conference on the Physics of Semiconductors "Jaszowiec 2018", Szczyrk (Poland), **Contributed talk**: "*Stabilization of Majorana bound states by the orbital effects of a magnetic field*".
- [8] 5 January 2018, Symposium on the physics of Majorana bound states, Warszawa (Poland), **Contributed talk**: "*Renormalization of Majorana bound state decay length due to orbital effects of a magnetic field*".
- [9] 8-13 October 2017, National Superconductivity Conference, Krynica-Morska (Poland), **Contributed talk**: "*Andreev-reflection-enhanced conductance of semiconductor-superconductor hybrid nanodevices*".
- [10] 5-9 September 2016, Topological States of Matter, San Sebastian (Spain), **Poster**: "*Subband-mixing signatures in Andreev-reflection-enhanced conductance of a quantum point contact*".
- [11] 8-9 February 2016, Numerics for Quantum Computing, ETH Zurich (Switzerland). **Contributed talk**: "*Modeling of nanowire NS junction*".
- [12] 1-6 September 2014, SSPCM 2014, The Eleventh International School on Theoretical Physics, Symmetry and Structural Properties of Condensed Matter, Rzeszów (Poland), **Poster**: "*Spin polarization without magnetic field in a spin-orbit-coupled quantum point contact*".
- [13] 6 June – 12 June 2014, 43rd "Jaszowiec" International School and Conference on the Physics of Semiconductors, Wisła (Poland), **Contributed talk**: "*Scanning gate microscopy of electron flow from a spin-orbit-coupled quantum point contact*".
- [14] 29 July – 2 August 2013, Spintech 7, 7th International School and Conference on Spintronics and Quantum Information Technology, Chicago (USA), **Poster**: "*Spin relaxation versus spin rotation in electric dipole spin resonance in nanowire quantum dots*".

- [15] 1-5 July 2013, EP2DS-MSS, 20th International Conference on Electronic Properties of Two-Dimensional Systems, 16th International Conference on Modulated Semiconductor Structures, Wrocław (Poland), **Contributed talk:** “*Spin blockade lifting due to phonon mediated spin relaxation and electric dipole spin resonance in nanowire quantum dots*”.
- [16] 21-22 February 2013, Transdisciplinary Cooperation and Applications of Nanoscience, Krakow (Poland), **Contributed talk:** “*Simulations of Pauli blockade lifting by electric-dipole spin resonance*”.
- [17] 8-15 June 2012, 41st "Jaszowiec", International School and Conference on the Physics of Semiconductors, Krynica-Zdrój (Poland), **Poster:** “*Two-electron electric dipole spin resonance in coupled quantum dots*”.
- [18] 1-5 August 2011, Spintech 6, 6th International School and Conference on Spintronics and Quantum Information Technology, Matsue (Japan), **Poster:** “*Spin-orbit coupling anisotropy and avoided-crossings in energy spectra of a quantum dot in an in-plane magnetic field*”.
- [19] 19-24 June 2010, XXXIX „Jaszowiec”, International School and Conference on the Physics of Semiconductors, Krynica-Zdrój (Poland), **Poster:** “*Time Dependent Configuration Interaction Study of Anisotropic Spin Exchange in Laterally Coupled Quantum Dots*”.
- [20] 7-11 July 2009, Spintech, Fifth International School and Conference on Spintronics and Quantum Information Technology, Krakow (Poland), **Poster:** “*Purification of the spin-orbit coupling type by the Zeeman effect in quantum dots*”.

WORKSHOPS AND TRAININGS

- [1] 1-5 June 2015, Villar de Lans (France), “*Kwant Workshop*”.
- [2] 26-27 March 2014, Warsaw (Poland), “*Self presentation and public speaking*”, Skills Project, Foundation for Polish Science.
- [3] 15 March 2011, Leuven la Neuve (Belgium), “*IAP WP3 Workshop on Semiconductor Quantum Dots and Nanowires*”.