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Born in 1979, Warsaw, Poland, <http://www.fuw.edu.pl/~wmpac/>



Education and scientific activity:

1998 - 2003 Master of Science at University of Warsaw, Faculty of Physics.
2003- 2007 PhD at Université Joseph Fourier (Grenoble) and University of Warsaw (these en cotutelle)
2008 - 2009 Post-doc at University of Bremen. Scholarships of DAAD, Humboldt F., Marie Curie.
2009 - Faculty position at University of Warsaw,
2010 - Head of new Molecular Beam Epitaxy lab.
2017 - Habilitation
2022 - Associate Professor

22 invited talks including:

- 2007, American Physical Society March Meeting, Denver, USA
- 2006 and 2014 Int. Conf. of Semiconducting Compounds, Jaszowiec, Poland.
- 2009, 2017, 2024 European Materials Research Society Fall Meeting, Warsaw, Poland
- 2014 The international society for optics and photonics (SPIE), San Diego, USA
- 2015 The 17th International Conference on II-VI Compounds, Paris, France.
- 2017 New Frontiers in 2D materials: Approaches & Applications, Villard de Lans, France
- 2018 11th International Conference on Nanophotonics, Wrocław, Poland
- 2020, 2025 Int. Workshop on Optical Properties of Nanostructures (OPON)
- 2020 Apropos 17, Vilnius, Lithuania
- 2023 PCSI-48, Los Angeles, USA
- 2023 EP2DS&MSS, Grenoble, France
- 2024 3rd OPERA COST Action International Training School, University of Cyprus

Mentoring:

Tutor of 4 defended PhD thesis (two as a main tutor, two as a co-tutor)
Tutor of 8 master theses, Tutor of 9 baccalaureate theses.

Managing research projects:

2011 - 2014 NCBiR research project Leader, *Microcavities for yellow optoelectronics*.
2016 - 2022 NCN research project Sonata Bis, *Semiconductor structures for modifying spin configurations of individual transition metal ions and for coherent single spin manipulation*.
2022 - 2027 NCN research project Opus, *Epitaxial low-dimensional heterostructures made of 2D and 3D chalcogenides*.

Research:

I am interested in nanotechnology and physics of condensed matter. Most of my research is devoted to design, fabrication, and low temperature magneto-optical spectroscopy of excitons in novel semiconductor nanostructures and materials. During PhD study in Grenoble (advisors D. Ferrand and J. Cibert) and Warsaw (advisors P. Kossacki and J. A. Gaj) I measured for the first time excitonic giant Zeeman effect in wide gap diluted magnetic semiconductors⁴ [(Zn,Co)O⁸, (Zn,Mn)O³, (Ga,Mn)N⁷, (Ga,Fe)N⁶]. During post-doc stage in Bremen, I learned molecular beam epitaxy (MBE) growth from C. Kruse and D. Hommel and I proposed and grew the first distributed Bragg reflector (DBR) lattice matched to ZnTe⁵, designed for study of microcavities with CdTe quantum dots embedded in ZnTe barrier^{2,15}. When I started work at University of Warsaw I launched molecular beam epitaxy lab for II-VI semiconductors, where we fabricated and observed (together with my PhD student J. Kobak) for the first time a QD with individual cobalt ion¹¹. This was very surprising because there was a common expectation that quenching in such systems precludes observation of excitonic emission, but later, by fabrication of CdSe QDs with individual Mn and Fe ions, we confirmed that

quenching is negligible in case of single magnetic dopants, even if energetically allowed^{10,11}. This opened possibility of several interesting experiments with my colleagues from Laboratory of Ultrafast Magneto-Spectroscopy (LUMS).

Important present activity originates from concept developed together with my PhD student J.G Rousset, namely semimagnetic microcavities, which we are studied now with B. Piętka and her co-workers.¹² Together with J. Suffczyński and his coworkers we are developing double microcavities.¹³ Recently, I am growing not only II-VI but also III-V semiconductors and additionally transition metal dichalcogenides, which thanks to atomically flat hBN substrate are for the first time of high optical quality just after growth¹, without mechanical processing. Structures grown in my MBE lab are studied in various labs. Recently I started growth of new epitaxial topological semimetals.

Major publications as the first and corresponding author:

1. "Narrow excitonic lines and large-scale homogeneity of transition metal dichalcogenide monolayer grown by MBE on hBN", W. Pacuski, M. Grzeszczyk, K. Nogajewski, A. Bogucki, K. Oreszczuk, J. Kucharek, K.E. Połczyńska, B. Seredyński, A. Rodek, R. Bożek, T. Taniguchi, K. Watanabe, S. Kret, J. Sadowski, T. Kazimierzczuk, M. Potemski, P. Kossacki, **Nano Letters** 20, 3058 (2020).
2. „Micropillar cavity containing a CdTe quantum dot with a single manganese ion” W. Pacuski, T. Jakubczyk, C. Kruse, J. Kobak, T. Kazimierzczuk, M. Goryca, A. Golnik, P. Kossacki, M. Wiater, P. Wojnar, G. Karczewski, T. Wojtowicz, D. Hommel, *Crystal Growth & Design* 14, 988 (2014).
3. "Influence of *s,p-d* and *s-p* exchange couplings on exciton splitting in (Zn,Mn)O", W. Pacuski, J. Suffczyński, P. Osewski, P. Kossacki, A. Golnik, J. A. Gaj, C. Deparis, C. Morhain, E. Chikoidze, Y. Dumont, D. Ferrand, J. Cibert, T. Dietl, *Phys. Rev. B* 84, 035214 (2011);
4. W. Pacuski (single author), "Optical Spectroscopy of Wide-Gap Diluted Magnetic Semiconductors", chapter in "Introduction to the Physics of Diluted Magnetic Semiconductors" edited by Jan A. Gaj and Jacek Kossut, Springer Series in Materials Science Vol. 144, p. 37-63 (2010).
5. "High-reflectivity broadband distributed Bragg reflector lattice matched to ZnTe", W. Pacuski, C. Kruse, S. Figge, and D. Hommel, *Applied Physics Letters* 94, 191108 (2009).
6. „Observation of strong-coupling effects in a diluted magnetic semiconductor Ga_{1-x}Fe_xN” W. Pacuski, P. Kossacki, D. Ferrand, A. Golnik, J. Cibert, M. Wegscheider, A. Navarro-Quezada, A. Bonanni, M. Kiecana, M. Sawicki, and T. Dietl, **Physical Review Letters** 100, 037204 (2008).
7. "Excitonic giant Zeeman effect in GaN:Mn³⁺", W. Pacuski, D. Ferrand, J. Cibert, J. A. Gaj, A. Golnik, P. Kossacki, S. Marcet, E. Sarigiannidou, and H. Mariette, *Physical Review B* 76, 165304 (2007).
8. "Effect of the *s,p-d* exchange interaction on the excitons in (Zn,Co)O epilayers", W. Pacuski, D. Ferrand, J. Cibert, C. Deparis, J. A. Gaj, P. Kossacki, and C. Morhain; *Physical Review B* 73, 035214 (2006).

Major publications as the last author:

9. WSe₂ Monolayers Grown by Molecular Beam Epitaxy on hBN", J. Kucharek, M. Raczynski, R. Bozek, A. Kaleta, B. Kurowska, M. Bilska, S. Kret, T. Taniguchi, K. Watanabe, P. Kossacki, M. Goryca, W. Pacuski, **Nano Letters** 25, 17275 (2025).
10. "Magnetic Ground State of an Individual Fe²⁺ Ion in Strained Semiconductor Nanostructure", T. Smoleński, T. Kazimierzczuk, J. Kobak, M. Goryca, A. Golnik, P. Kossacki, W. Pacuski, **Nature Commun.** 7, 10484 (2016)
11. "Designing quantum dots for solotronics" J. Kobak, T. Smoleński, M. Goryca, M. Papaj, K. Gietka, A. Bogucki, M. Koperski, J.-G. Rousset, J. Suffczyński, E. Janik, M. Nawrocki, A. Golnik, P. Kossacki, W. Pacuski, **Nature Communications** 5, 3191 (2014).

Other important publications:

12. "Neuromorphic binarized polariton networks", R. Mirek, A. Opala, P. Comaron, M. Furman, M. Król, K. Tyszka, B.j Seredyński, D. Ballarini, D. Sanvitto, T. C. H. Liew, W. Pacuski, J. Suffczyński, J. Szczytko, M. Matuszewski, B.Piętka, **Nano Letters** (2021).
13. "Polariton lasing and energy-degenerate parametric scattering in non-resonantly driven coupled planar microcavities", K. Sawicki, T. J. Sturges, M. Ściesiek, T. Kazimierzczuk, K. Sobczak, A. Golnik, W. Pacuski, J. Suffczyński, **Nanophotonics** 10, 2421 (2021).
14. "Ultra-long-working-distance spectroscopy of single nanostructures with aspherical solid immersion microlenses", A. Bogucki, Ł. Zinkiewicz, M. Grzeszczyk, W. Pacuski, K. Nogajewski, T. Kazimierzczuk, A. Rodek, J. Suffczyński, K. Watanabe, T. Taniguchi, P. Wasylczyk, M. Potemski, P. Kossacki, **Light: Science & Applications** 9, 48 (2020).
15. "Direct measurement of hyperfine shifts and radiofrequency manipulation of the nuclear spins in individual CdTe/ZnTe quantum dots", G. Raganathan, J. Kobak, G. Gillard, W. Pacuski, K. Sobczak, J. Borysiuk, M. S. Skolnick, E. A. Chekhovich, **Physical Review Letters**, 122, 096801 (2019),
16. "Inhibition and Enhancement of the Spontaneous Emission of Quantum Dots in Micropillar Cavities with Radial Distributed Bragg Reflectors", T. Jakubczyk, H. Franke, T. Smoleński, M. Ściesiek, W. Pacuski, A. Golnik, R. Schmidt-Grund, M. Grundmann, C. Kruse, D. Hommel, P. Kossacki, **ACS Nano** 8, 9970 (2014).
17. "Magnetization Dynamics Down to a Zero Field in Dilute (Cd,Mn)Te Quantum Wells", M. Goryca, D. Ferrand, P. Kossacki, M. Nawrocki, W. Pacuski, W. Maślana, J. A. Gaj, S. Tatarenko, J. Cibert, T. Wojtowicz, G. Karczewski, **Physical Review Letters** 102, 046408 (2009).