

Curriculum vitae
Jakub Skrzeczkowski

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(a) Interest statement

I am broadly interested in partial differential equations and their connections with analysis and probability theory. I am currently involved in research activities on the following topics:

1. transport equation (structured population models) in spaces of measures,
2. PDEs and calculus of variations in non-standard growth setting (Musielak-Orlicz spaces),
3. reaction-diffusion systems and their singular limits,
4. bayesian approach to inverse problems in PDEs.

(b) Research experience

01.2022–02.2023: Sorbonne University, visiting PhD student, hosted by Benoît Perthame

03.2020–08.2020: Sorbonne University, visiting PhD student, hosted by Benoît Perthame

10.2019–09.2023: Institute of Mathematics (Polish Academy of Sciences) and University of Warsaw, PhD student, supervised by Piotr Gwiazda

03.2019–05.2019: Heidelberg University, visiting MSc student, hosted by Anna Marciniak-Czochra

(c) Education

since 10/2019 PhD in Mathematics under supervision of Piotr Gwiazda, Institute of Mathematics (Polish Academy of Sciences) and University of Warsaw, PL

10.2017-08.2018 Erasmus Exchange MSc student, Hausdorff Center for Mathematics, Bonn, DE

10.2017-09.2019 MSc in Mathematics, specialization in PDEs and analysis, University of Warsaw, PL

10.2014-09.2017 BSc in Mathematics (interdisciplinary degree, 250 ECTS in Mathematics, Physics, Chemistry and Biology), University of Warsaw (MISMaP), PL;

09.2010-05.2013 Academic High School, Nicolaus Copernicus University in Toruń, PL

(d) Publications

1. M. Bulíček, P. Gwiazda, J. Skrzeczkowski. On a range of exponents for absence of Lavrentiev phenomenon for double phase functionals. Preprint on *arXiv:2110.13945*.
2. C. Düll, A. Marciniak–Czochra, P. Gwiazda, J. Skrzeczkowski. Measure Differential Equation with a nonlinear growth/decay term. Preprint on *arXiv:2109.14987*.
3. P. Gwiazda, B. Miasojedow, J. Skrzeczkowski, Z. Szymańska. Convergence of EBT method for a non-local model of cell proliferation with discontinuous interaction kernel. Accepted in *IMA Journal of Numerical Analysis*, preprint on *arXiv:2106.05115*.
4. Z. Szymańska, J. Skrzeczkowski, B. Miasojedow, P. Gwiazda. Bayesian inference of a non-local proliferation model. *Royal Society Open Science* 8: 211279, 2021.

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5. J. Skrzeczkowski. Fast reaction limit and forward-backward diffusion: a Radon-Nikodym approach. Accepted in *Comptes Rendus Mathématique*, preprint on *arXiv:2105.11218*.
 6. B. Perthame, J. Skrzeczkowski. Fast reaction limit with nonmonotone reaction function. Accepted in *Communications on Pure and Applied Mathematics*, preprint on *arXiv:2008.11086*.
 7. C. Düll, A. Marciniak–Czochra, P. Gwiazda, J. Skrzeczkowski. Spaces of measures and their applications to structured population models. *Cambridge Monographs on Applied and Computational Mathematics*, ISBN: 9781316519103, Cambridge University Press, 2021.
 8. M. Bulíček, P. Gwiazda, J. Skrzeczkowski. Parabolic equations in Musielak – Orlicz spaces with discontinuous in time N -function. *Journal of Differential Equations*, 290, 17-56, 2021.
 9. A.S. Ackleh, N. Saintier, J. Skrzeczkowski. Sensitivity equation for measure-valued solutions to transport equations. *Mathematical Biosciences and Engineering*, 17(1), 514-537, 2020.
 10. J. Skrzeczkowski. Measure solutions to perturbed structured population models - differentiability with respect to perturbation parameter. *Journal of Differential Equations*, 268 (8), 4119-4182, 2020.
 11. M. Merski, J. Skrzeczkowski, J.K. Roth, M.W. Górna. A Geometric Definition of Short to Medium Range Hydrogen-Mediated Interactions in Proteins. *Molecules*, 25 (22), 5326, 2020.
 12. M. Merski, K. Młynarczyk, J. Ludwiczak, J. Skrzeczkowski, S. Dunin-Horkawicz, M.W. Górna. Self-analysis of repeat proteins reveals evolutionarily conserved patterns. *BMC Bioinformatics*, 21, 179, 2020.

(e) Principal investigator in research projects

- 03.2022–02.2023: *Singular limits in parabolic equations*, Bekker 2021, cost: 115k PLN, funded by National Agency for Academic Exchange (Poland)
- 06.2020–05.2023: *Transport equation in modern theory of partial differential equations*, Preludium 18, cost: 90k PLN, funded by National Science Center (Poland)

(f) Selected honors

- 12/2021: Scholarship of the President of the Polish Academy of Sciences for outstanding academic achievements (only 10 such scholarships are awarded among PhD students in all disciplines represented in the Academy)
- 04/2020: Special Prize in competition for best student thesis in mathematics *Step towards the future* funded by mBank (Poland)
- 02/2020: First Award in LIII Competition for best student paper in probability and applied mathematics, Polish Society of Mathematics
- 08/2019: Eugeniusz Fidelis First Prize for best work presented by young mathematicians on 48th National Conference of Applied Mathematics
- 2012, 2013: Laureate title in 58th and 59th National Chemistry Olympiad

(g) Shorter academic visits

- 24-29.10.2021: Heidelberg University, DE, collaboration with A. Marciniak-Czochra, seminar talk
- 4-16.07.2021: Heidelberg University, DE, collaboration with A. Marciniak-Czochra, seminar talk
- 28.06-3.07.2020: Heidelberg University, DE, collaboration with A. Marciniak-Czochra, lecture

24-28.02.2020: Heidelberg University, DE, collaboration with A. Marciniak-Czochra
30.09-02.10.2019: Charles University in Prague, CZ, collaboration with M. Bulíček

(h) Participation in conferences, workshops, schools

10-15/10/2021: Non-local Models Arising from Biology, CIRM, Marseille, FR, poster
19-25/09/2021: XII Forum on PDEs, Będlewo, PL, talk
22-27/11/2020: Multiscale Models for Complex Fluids: Modeling and Analysis (BIRS Workshop, on-line), invited talk
11-14/12/2019: SIAM Conference on Analysis of PDEs (PD19), La Quinta, US, invited talk at the session *Transport Equations - Mathematical Biology and Other Applications*
25-29/11/2019: Winter School Gradient Flows and Variational Methods in PDEs, Ulm, DE, short talk
9-16/09/2019: XLVIII Conference of Applied Mathematics, Zakopane, PL, talk
2-7/09/2019: 100th Congress of Polish Mathematics, Cracow, PL, invited talk at PDE session
10-15/06/2019: Function Spaces, Differential Operators and Nonlinear Analysis, Turku, FI, talk
27-31/05/2019: Mathematical Aspects of Fluid Flows, Kacov, CZ, short presentation
12-14/02/2019: Workshop Transport, Mixing and Fluids, Muenster, DE, short talk
3-7/12/2018: Workshop Mathematical Modelling with Measures, Lorentz Center, Leiden, NE, talk
21-22/10/2018: Workshop HydroPDE, Imperial College, London, UK, short talk
24-26/09/2018: Meeting Young Women in Mathematical Physics, HCM, Bonn, DE, participation
3-7/09/2018: MathFlows 2018 (conference on fluid dynamics), Porquerolles, FR, participation

(i) Teaching (at University of Warsaw)

Student evaluations at <https://students.mimuw.edu.pl/~js357970/teaching.html>

WS + SS 21/22: Interdisciplinary Seminar on PDEs (seminar, jointly with A. Świerczewska-Gwiazda)
WS + SS 20/21: Interdisciplinary Seminar on PDEs (seminar, jointly with A. Świerczewska-Gwiazda)
SS 20/21: Introduction to PDEs (tutorials, course for 3rd year students)
WS 20/21: Hyperbolic Conservation Laws (tutorials, course for 4-5th year and PhD students)
WS 20/21: Functional Analysis (tutorials, course for 3rd year students)
WS 19/20: Functional Analysis (tutorials, course for 3rd year students)