

# Wojciech Górny

## Curriculum Vitæ

Faculty of Mathematics  
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## Education

2016-2020 **Ph.D.**, *University of Warsaw*, Poland, Graduated with distinction.

2014-2016 **Mag.Sc.**, *University of Warsaw*, Poland, Graduated with distinction.

## Employment

2022-now **Senior postdoc**, *University of Vienna*, Faculty of Mathematics.

2020-2022 **Postdoc/University assistant**, *University of Vienna*, Faculty of Mathematics.

2020-2022 **University assistant (unpaid leave)**, *University of Warsaw*, Faculty of Mathematics, Informatics and Mechanics.

## Research interests

**Main research fields:** Calculus of Variations, Partial Differential Equations, Geometric Measure Theory, Analysis on Metric Spaces.

**Keywords:** Nonlinear and singular PDEs, 1-Laplacian, Least gradient problem, Optimal transport, Gradient flows, Minimal surfaces, Anisotropy,  $\Gamma$ -convergence, Relaxation, Functionals with linear growth, Conductivity imaging, Free material design, Crystallisation, Discretisation.

## 5 Most Important Publications

Link to all published publications: <https://www.mat.univie.ac.at/~wgorny/listofpublications.pdf>

1. W. Górny, P. Rybka, A. Sabra, *Special cases of the planar least gradient problem*, *Nonlinear Anal.* **151** (2017), pp. 66-95, [doi.org/10.1016/j.na.2016.11.020](https://doi.org/10.1016/j.na.2016.11.020).
2. W. Górny, *Planar least gradient problem: existence, regularity and anisotropic case*, *Calc. Var. Partial Differential Equations* **57** (4) (2018), Art. 98, [doi.org/10.1007/s00526-018-1378-y](https://doi.org/10.1007/s00526-018-1378-y).
3. W. Górny, *Bourgain-Brezis-Mironescu approach in metric spaces with Euclidean tangents*, *J. Geom. Anal.* **32** (4) (2022), Art. 128, [doi.org/10.1007/s12220-021-00861-4](https://doi.org/10.1007/s12220-021-00861-4).
4. W. Górny, J.M. Mazón, *On the  $p$ -Laplacian evolution equation in metric measure spaces*, *J. Funct. Anal.* **283** (2022), 109621, [doi.org/10.1016/j.jfa.2022.109621](https://doi.org/10.1016/j.jfa.2022.109621).
5. W. Górny, J.M. Mazón, *Functions of Least Gradient*, accepted for publication in the Birkhäuser series "Monographs in Mathematics", 358pp., to appear in 2024, [link to publisher's website](#).

## Received grants and awards

1. [Kazimierz Kuratowski award](#), 2021.
2. [Polish Mathematical Society award for young mathematicians](#), 2020.
3. Principal investigator in the grant [ESP 88 ESPRIT-Programm](#) funded by the Austrian Science Fund, title: "Inhomogeneous-growth problems including a linear-growth term", 2022-2025.
4. Principal investigator in the grant [2017/27/N/ST1/02418 \(PRELUDIUM\)](#) funded by the National Science Centre, Poland, title: "Anisotropic least gradient problem", 2018-2022.
5. [Distinction in the Juliusz Schauder Prize for young mathematicians](#), 2022.
6. [Distinction in the International Stefan Banach Prize](#), 2021.
7. [2nd distinction in the Juliusz Schauder Prize for young mathematicians](#), 2020.
8. [1st place in the competition "Krok w przyszłość"](#) (best master's thesis in mathematics, organised by the mBank Foundation), 2016.

## Invited talks

1. *A double-bubble problem for the  $\ell_1$  anisotropy* at the "3rd Austrian Calculus of Variations Day", Vienna, 23-24 November 2023.
2. *Weak solutions to gradient flows in metric measure spaces* at "Nonlinear Partial Differential Equations 2023", conference on the occasion of J.M.Mazón's 70th birthday, València, 24-26 October 2023.
3. *Duality methods for gradient flows of linear growth functionals* at the "10th International Congress on Industrial and Applied Mathematics" (ICIAM 2023), minisymposium "Frontiers of gradient flows: well-posedness, asymptotics, singular limits", Tokyo, 20-25 August 2023.
4. *Geometric aspects of the planar least gradient problem* at "International Banach Prize Mini-Conference", Banach Center, Warsaw, 18-19 May 2023.
5. *A new notion of solutions to gradient flows in metric measure spaces* at "Nonuniformly elliptic problems", Banach Center, Warsaw, 5-9 September 2022.
6. *Weak solutions to gradient flows in metric measure spaces* at the "92nd Annual Meeting of the International Association of Applied Mathematics and Mechanics" (GAMM Annual Meeting 2022), minisymposium "Evolution equations with gradient flow structure", Aachen, 15-19 August 2022.
7. *Weak solutions to the total variation flow in metric measure spaces* at the "XXVII Congress of differential equations and applications / XVI Congress of applied mathematics" (XXVII CEDYA/XVII CMA), minisymposium "New trends on the 1-Laplacian", Zaragoza, 18-22 July 2022.
8. *Zagadnienie najmniejszego gradientu* at the "Polish Mathematical Society Mini-Conference", Banach Center, Warsaw, 2-3 June 2022.
9. *Geometric aspects of the 1-Laplacian* at the "XII Forum of Partial Differential Equations", Banach Center, Będlewo, 19-25 September 2021.
10. *Least gradient problem and minimal surfaces* at the "Juliusz Schauder Medal Awarding Ceremony", Toruń (online), 18 June 2021.

11. *Optimal transport methods in the least gradient problem* at the "Nonlocal diffusion problems, nonlocal interface evolution", Banach Center, Warsaw (online), 1-3 October 2020.
12. *The least gradient problem with respect to a non-smooth or non-strictly convex norm* at the "9th International Congress on Industrial and Applied Mathematics" (ICIAM 2019), minisymposium "A broad view of the least gradient problems", València, 15-19 July 2019.
13. *Hölder regularity of anisotropic least gradient functions* at "Variational Problems in Optical Engineering and Free Material Design", Banach Center, Warsaw, 7-9 June 2018.
14. *The issue of uniqueness of solutions in isotropic and anisotropic least gradient problem* at "Anisotropy 2017", Banach Center, Warsaw, 23-25 February 2017.

### Conference posters

1. *1-Laplacian on metric random walk spaces* at "Winterschool on Analysis and Applied Mathematics", Münster (online), 22-26 February 2021.
2. *Least gradient problem on unbounded domains* at "VII School of Analysis in memory of A. Pełczyński", Banach Center, Będlewo, 28-31 March 2019.
3. *Existence and regularity of minimizers in the anisotropic least gradient problem* at "Joint Meeting of UMI-SIMAI-PTM", Wrocław, 17-20 September 2018.
4. *(Non)uniqueness of minimizers in least gradient problem* at "Emerging issues in nonlinear elliptic equations: singularities, singular perturbations and non local problems", Banach Center, Będlewo, 18-24 June 2017.

### Invited seminar presentations

At Universität Wien, Faculty of Mathematics:

1. *Gradient flows of functionals with linear growth* at the PDE Afternoon, on 1 March 2023.
2. *A discrete double-bubble problem on  $\mathbb{Z}^2$*  at the Calculus of Variations seminar, on 24 March 2022.
3. *Linear structures and gradient flows in metric spaces* at the Calculus of Variations seminar, on 31 May 2021.
4. *Geometric aspects of the least gradient problem* at the PDE Afternoon, on 3 March 2021.
5. *The least gradient problem* at the Calculus of Variations seminar, on 15 January 2020.

At MIMUW, seminar of the Mathematical Physics Equations Group:

6. *Structure of solutions to the least gradient problem*, on 23 January 2020.
7. *Least gradient problem on unbounded domains*, on 21 March 2019.
8. *(Non)uniqueness of minimizers in the least gradient problem*, on 12 October 2017.
9. *Existence of solutions in the least gradient problem*, on 24 November 2016.

Other locations:

10. *A discrete version of the double-bubble problem* at the Universitat de València, Department of Mathematical Analysis, on 25 May 2022.
11. *Least gradient problem in 2D and optimal transport* at the Łódź University of Technology, Institute of Mathematics, on 16 November 2021 (online).

12. *A discrete double bubble problem on the square lattice* at the WEMM Seminar, Wien-Erlangen-München-Münster, on 9 November 2021 (online).
13. *Planar least gradient problem* at the American University of Beirut, Department of Mathematics, on 26 October 2021 (online).
14. *Least gradient problem for discontinuous boundary data* at the Universitat de València, Department of Mathematical Analysis, on 10 April 2019.

### Research visits

1. 1-week research visit at Universitat de València (Departamento de Análisis Matemático), 18-27 May 2022, cooperation with prof. José M. Mazón.
2. 4-week research visit at Scuola Normale Superiore di Pisa, 25 January - 22 February 2020, under the supervision of prof. Luigi Ambrosio.
3. 5-week research visit at Universitat de València (Departamento de Análisis Matemático), 8 April - 10 May 2019, cooperation with prof. José M. Mazón.

### Participation in research projects

1. Project participant in the OeAD-WTZ research project [CZ 01/2021](#), title: "Scales and Shapes in Continuum Thermomechanics", 2021-2022.
2. Project participant in the DFG-FWF international joint project [FR 4083/3-1/I4354](#), title: "Variational Modeling of Molecular Geometries", 2020-2022.
3. Project participant in the grant [SFB 65](#) (project part 11) funded by the Austrian Science Fund, title: "Taming complexity in partial differential equations", 2020.

### Teaching experience

1. A lecture mini-course "Functions of bounded variation and their applications" at the Vienna School of Mathematics (doctoral school), during the academic year 2023/24.
2. Exercises to lectures at the University of Vienna: in Partial Differential Equations, during the academic year 2021/22; in the course Introduction to Mathematics (2023/24).
3. Exercises to lectures at the University of Warsaw: in Measure Theory, during the academic years 2016/17 and 2017/18; in Ordinary Differential Equations (2017/18); in Analysis I (2018/19).
4. Classes in classical geometry in the XIV Secondary School in Warsaw (2017).
5. Several mini-courses for the Polish Children's Fund: in classical geometry, in projective geometry and in finite group theory (2012-2014).

### Organisational experience

1. Member of the organising committee of the conference "Variational Problems in Optical Engineering and Free Material Design", Banach Center, Warsaw, 6-9 June 2018.
2. Member of the organising committee of the conference "Pushing Frontiers of Analysis and PDE's, the Legacy of Marek Burnat", MIMUW, Warsaw, 6-7 May 2016.

3. Participation in the organisation of various science camps for the Polish Children's Fund (2011-2014).
4. Participation in the organisation of the Polish Mathematical Olympiad (2016, 2018).

### Review activity

1. Journal articles: Calc. Var. PDE; J. Eur. Math. Soc.; J. Funct. Anal.; J. Differ. Equ.; Nonlinear Anal.; Ann. Sc. Norm. Super. Pisa, Cl. Sci.; Adv. Math.; Commun. Anal. Geom.; Ann. Mat. Pura Appl.; Open Math.; Appl. Math. Optim.; Opuscula Math.; Discrete Comput. Geom.
2. Paweł Domański Competition for Students' Works in Mathematics.
3. zbMATH; MathRev.

### Spoken languages

English (CPE certificate), French (communicative), German (communicative).

### Education (full)

- 2016-2020 **PhD in mathematics**, *University of Warsaw*, Poland, Graduated with distinction. Thesis subject: [Anisotropic least gradient problems](#). Supervisor: prof. dr hab. Piotr Rybka. Reviewers: prof. Salvador Moll (University of València), [review](#), and prof. Matteo Novaga (University of Pisa), [review](#).
- 2014-2016 **Master of mathematics**, *University of Warsaw*, Poland, Graduated with distinction. Thesis: *Least gradient problems*. Supervisor: prof. dr hab. Piotr Rybka.
- 2011-2015 **Bachelor of physics**, *University of Warsaw*, Poland, Thesis: *Application of Dirac structures: RLC circuits as an example of a system with nonholonomic constraints*. Supervisor: dr hab. Katarzyna Grabowska.
- 2011-2014 **Bachelor of mathematics**, *University of Warsaw*, Poland, Thesis: *Classification of meromorphic linear differential equations. Stokes phenomenon*. Supervisor: dr hab. Marcin Bobieński.