

# Silvio Fanzon

*Curriculum Vitæ*

## Lecturer in Applied Mathematics

Department of Mathematics, University of Hull

### Address

Office 104a  
Larkin Building  
University of Hull  
Hull HU6 7RX  
United Kingdom

✉ [S.Fanzon@hull.ac.uk](mailto:S.Fanzon@hull.ac.uk)  
🌐 [silviofanzon.com](http://silviofanzon.com)  
🏠 [Homepage @ Hull](#)  
🔍 [Google Scholar](#)  
📄 [57193380703](#)  
🆔 [0000-0003-1974-1434](#)

## Academic Profile

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I am a Lecturer in Applied Mathematics at the University of Hull, with a research and teaching role. My research is at the interface of *Inverse Problems*, *Optimization*, *Statistics* and *PDEs*. I have also experience in *Optimal Transport*, *Calculus of Variations*, *Measure Theory* and *Numerical analysis* in infinite-dimensional spaces. I am interested in applications to *Materials Science*, *Mathematical Imaging*, *Statistical Models for Sports* and *Machine Learning*. I have taught a diverse range of courses in the areas of *Analysis*, *Geometry*, *Probability*, *Statistics* and *Numerical Analysis*, at both the Undergraduate and Master levels.

## Education

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|-------------|---|---|
| 2014 – 2018 | <b>PhD in Mathematics</b> , University of Sussex, UK<br>Thesis: <i>Geometric patterns and Microstructures in the study of Material Defects and Composites</i><br>Grade: Pass with no corrections, Advisor: Prof. Mariapia Palombaro |  |
| 2012 – 2014 | <b>MSc in Mathematics</b> , Sapienza University, Italy<br>Thesis: <i>A variational approach to topological singularities in two-dimensions</i><br>Grade: 110/110 Cum Laude, Advisor: Prof. Marcello Ponsiglione                     |  |
| 2008 – 2011 | <b>BSc in Mathematics</b> , Sapienza University, Italy<br>Thesis: <i>The isoperimetric problem</i><br>Grade: 110/110 Cum Laude, Advisor: Prof. Annalisa Malusa  |  |













## Academic Positions

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|---------------|---|
| 04/23 – Now   | <b>Lecturer in Applied Mathematics</b><br>Department of Mathematics<br>University of Hull, UK                                   |
| 06/22 – 03/23 | <b>Faculty member (University Assistant)</b><br>Department of Mathematics & Scientific Computing<br>University of Graz, Austria |
| 04/18 – 10/21 | <b>Postdoctoral Researcher</b><br>Department of Mathematics & Scientific Computing<br>University of Graz, Austria               |
| 09/14 – 03/18 | <b>Associate Tutor</b><br>Department of Mathematics<br>University of Sussex, UK   |

## Top 4 Publications

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- [1] *Asymptotic linear convergence of Fully–Corrective Generalized Conditional Gradient methods*  
MATHEMATICAL PROGRAMMING, Online First, 2023  
K. Bredies, M. Carioni, **S. Fanzon**, D. Walter   
- [2] *A Generalized Conditional Gradient Method for Dynamic Inverse Problems with Optimal Transport Regularization*  
FOUNDATIONS OF COMPUTATIONAL MATHEMATICS, 23:833–898, 2023  
K. Bredies, M. Carioni, **S. Fanzon**, F. Romero   
- [3] *A superposition principle for the inhomogeneous continuity equation with Hellinger–Kantorovich-regular coefficients*  
COMMUNICATIONS IN PARTIAL DIFFERENTIAL EQUATIONS, 47(10):2023–2069, 2022  
K. Bredies, M. Carioni, **S. Fanzon**   
- [4] *Derivation of Linearized Polycrystals from a Two-Dimensional System of Edge Dislocations*  
SIAM JOURNAL ON MATHEMATICAL ANALYSIS, 51(5):3956–3981, 2019  
**S. Fanzon**, M. Palombaro, M. Ponsiglione   






















## List of Publications










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I have authored 10 Peer-Reviewed Journal Articles, 1 Book and 3 Theses

### Peer-Reviewed Journal Articles







Authors are in alphabetical order, unless marked by #

- [15] *Faster identification of faster Formula 1 drivers via time-rank duality*  
ECONOMICS LETTERS, 237:111671, 2024  
J. Fry, T. Brighton, **S. Fanzon**   
- [14] *Asymptotic linear convergence of Fully–Corrective Generalized Conditional Gradient methods*  
MATHEMATICAL PROGRAMMING, Online First, 2023  
K. Bredies, M. Carioni, **S. Fanzon**, D. Walter   
- [13] *A Generalized Conditional Gradient Method for Dynamic Inverse Problems with Optimal Transport Regularization*  
FOUNDATIONS OF COMPUTATIONAL MATHEMATICS, 23:833–898, 2023  
K. Bredies, M. Carioni, **S. Fanzon**, F. Romero   
- [12] *A superposition principle for the inhomogeneous continuity equation with Hellinger–Kantorovich-regular coefficients*  
COMMUNICATIONS IN PARTIAL DIFFERENTIAL EQUATIONS, 47(10):2023–2069, 2022  
K. Bredies, M. Carioni, **S. Fanzon**   
- [11] *On the extremal points of the ball of the Benamou–Brenier energy*  
BULLETIN OF THE LONDON MATHEMATICAL SOCIETY, 53(5):1436–1452, 2021  
K. Bredies, M. Carioni, **S. Fanzon**, F. Romero   
- [10] *An optimal transport approach for solving dynamic inverse problems in spaces of measures*  
ESAIM: MATHEMATICAL MODELLING AND NUMERICAL ANALYSIS, 54(6):2351–2382, 2020  
K. Bredies, **S. Fanzon**   
- [9] *Uniform distribution of dislocations in Peierls–Nabarro models for semi-coherent interfaces*  
CALCULUS OF VARIATIONS AND PARTIAL DIFFERENTIAL EQUATIONS, 59(4):141, 2020  
**S. Fanzon**, M. Ponsiglione, R. Scala   

- [8] *Derivation of Linearized Polycrystals from a Two-Dimensional System of Edge Dislocations*  
SIAM JOURNAL ON MATHEMATICAL ANALYSIS, 51(5):3956–3981, 2019  
S. Fanzon, M. Palombaro, M. Ponsiglione   
- [7] *Optimal lower exponent for the higher gradient integrability of solutions to two-phase elliptic equations in two dimensions*  
CALCULUS OF VARIATIONS AND PARTIAL DIFFERENTIAL EQUATIONS, 56(5):137, 2017  
S. Fanzon, M. Palombaro   
- [6] *A Variational Model for Dislocations at Semi-coherent Interfaces*  
JOURNAL OF NONLINEAR SCIENCE, 27(5):1435–1461, 2017  
S. Fanzon, M. Palombaro, M. Ponsiglione   







## Miscellaneous

Authors are in alphabetical order, unless marked by #

- [5] # *Optimal Transport Based Convex Hybrid Image and Motion-Field Reconstruction*  
2021 ISMRM & SMRT ANNUAL MEETING & EXHIBITION, 15-20 May 2021, Vancouver, Canada  
I. Middelhoff, M. Schlögl, A. M. Fernández, S. Fanzon, K. Bredies, R. Stollberger 
- [4] *Geometric patterns and microstructures in the study of material defects and composites*  
DOCTORAL THESIS (PHD), University of Sussex, 2018  
- [3] *A variational approach to topological singularities in two-dimensions (in Italian)*  
MASTER THESIS, Sapienza University, 2014 
- [2] *Lecture Notes on Ordinary Differential Equations (in Italian)*  
BOOK, ISBN: 8890734175, Edizioni LaDotta, 2013  
S. Fanzon, A. Malusa  
- [1] *The isoperimetric problem (in Italian)*  
BACHELOR THESIS, Sapienza University, 2011 

## Research Impact: Projects & Funding

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|---------|---|
| 2020/21 | Participation in FWF Research Project P29192 led by K. Bredies (€ 231k)<br>Project title: <i>Regularization Graphs for Variational Imaging</i>            |
| 2019/21 | Participation in FWF Research Project P28858 led by K. Bredies (€ 221k)<br>Project title: <i>Solving bilinear inverse problems by tensorial lifting</i>   |
| 2018/20 | Participation in FWF Research Project PIR-27 led by K. Bredies (€ 234k)<br>Project title: <i>Mathematical methods for motion-aware medical imaging</i>    |
| 2014/18 | Full-time PhD Studentship for 3.5 Years from the University of Sussex (£ 49k)<br>Project title: <i>Rigidity problems and Microstructures in Materials Science</i>   |
| 2014/18 | PhD Fees Waiver for 3.5 Years from the University of Sussex (£ 14k)   |
| 2014/18 | Research Grant from the University of Sussex (£ 5.8k)   |
| 2014/17 | Travel support from Carnegie Mellon University (US), Oxford University (UK),<br>SISSA (Italy), Warwick University (UK), National Research Council of Italy (total £ 4k)   |

## Teaching Experience










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I have taught 15 courses, including 7 as Lecturer and 8 as Teaching Assistant

### Lecturer

2023/24	 	STATISTICAL MODELS, Y2 BSc Math	University of Hull, UK
	 	NUMBERS, SEQUENCES AND SERIES, Y1 BSc Math	
	 	DIFFERENTIAL GEOMETRY, Y3 BSc Math	
2022/23	 	ANALYSIS 3 (EXERCISE COURSE), Y2 BSc Math	University of Graz, Austria
	 	INVERSE PROBLEMS (EXERCISE COURSE), Y2 MSc Math	
2020/21	 	CALCULUS OF VARIATIONS, Y1 MSc Math	
2019/20	 	ADVANCED FUNCTIONAL ANALYSIS (EXERCISE COURSE), Y1 MSc Math	


### Teaching Assistant

2017/18		GEOMETRY 1, Y1 BSc Math	University of Sussex, UK
2016/17		ANALYSIS 1, Y1 BSc Math	
		INTRODUCTION TO PROBABILITY, Y1 BSc Math	
		MATHEMATICS DEMYSTIFIED, Y1 BSc Math	
2015/16		PROBABILITY AND STATISTICS, Y2 BSc Math	
		INTRODUCTION TO PROBABILITY, Y1 BSc Math	
2014/15		PROBABILITY AND STATISTICS, Y2 BSc Math	
2012/13	 	ORDINARY DIFFERENTIAL EQUATIONS, Y2 BSc Math	Sapienza University, Italy

## Academic Supervision



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### Master Students

2023		DAVID AWUKU, MSc Mathematics Thesis: <i>The Isoperimetric Problem</i>	University of Hull, UK
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## Professional Qualifications & Memberships

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Start 09/23	Enrolled in the Postgraduate Certificate in Academic Practice (PCAP) programme at the University of Hull. This comprises 3 modules over one year, and leads to a Postgraduate Certificate qualification and a Fellowship of the Higher Education Academy (FHEA)	
Since 2023	Member of the <i>Inverse Problems International Association (IPIA)</i>	




## Technical Skills



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Coding	Python, Matlab, R, C, Mathematica
Teaching	LaTeX, Quarto, Canvas, Panopto, MS Office, MS Teams, Moodle
Web	Git, HTML, CSS, JavaScript, Jekyll, Liquid, YAML, Markdown

## Reviewer Activity

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SIAM Journal on Mathematical Analysis   
SIAM Journal on Imaging Sciences   
Mathematics in Engineering 

Numerische Mathematik   
Inverse Problems and Imaging 

## Research Stays

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2022	UNIVERSITY OF SUSSEX, UK, 1–22 Jul and 27 Oct–5 Nov	Filippo Cagnetti
	HERIOT-WATT UNIVERSITY, UK, 12–16 Sep	Panagiota Birmpa
2019	SAPIENZA UNIVERSITY, Italy, 15–19 Apr and 8–17 Jul	Marcello Ponsiglione
2018	SAPIENZA UNIVERSITY, Italy, 17–21 Dec	Marcello Ponsiglione
	UNIVERSITY OF GRAZ, Austria, 31 Jan–2 Feb	Kristian Bredies

## Communication

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I have given 15 presentations, including 12 oral presentations (11 invited) and 3 poster presentations (1 invited)







### Oral Presentations

 Denotes invited presentation

2023	 AIP 2023: 11TH APPLIED INVERSE PROBLEMS CONFERENCE University of Göttingen, Germany, 4–8 Sep 2023	 
2022	 SUSSEX MATHEMATICS SEMINAR University of Sussex, UK, 3 Nov 2022	 
	 SEMINAR, DEPARTMENT OF MATHEMATICS Heriot-Watt University, UK, 13 Sep 2022	 
	 SEMINAR, DEPARTMENT OF MATHEMATICS & SCIENTIFIC COMPUTING University of Graz, Austria, 18 Feb 2022	 
2021	 SIMAI 2020-2021 PARMA University of Parma, Italy, 30 Aug - 3 Sep 2021	 
2019	 M.A.G.A. DAYS (MONGE-AMPÈRE ET GÉOMÉTRIE ALGORITHMIQUE) Laboratoire de mathématiques d'Orsay, France, 20–21 Nov 2019	 
	 1ST AUSTRIAN CALCULUS OF VARIATIONS DAY University of Vienna, Austria, 17–18 Oct 2019	 
	 ICCOPT: 6TH INTERNATIONAL CONFERENCE ON CONTINUOUS OPTIMIZATION Technical University Berlin, Germany, 3–8 Aug 2019	 
2018	 TOPICS IN NONLINEAR ANALYSIS: CALCULUS OF VARIATIONS AND PDES University of Lisbon, Portugal, 10–12 Oct 2018	 
	 SEMINAR, DEPARTMENT OF MATHEMATICS & SCIENTIFIC COMPUTING University of Graz, Austria, 31 Jan 2018	 
2017	XXVII NATIONAL MEETING OF CALCULUS OF VARIATIONS Levico Terme, Italy, 6–10 Feb 2017	 
2016	 WORKING SEMINAR ON CALCULUS OF VARIATIONS Sapienza University, Italy, 19 Dec 2016	

## Poster Presentations

✉ Denotes invited presentation

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| 2021 | ✉ ITN TRADE-OPT WINTER SCHOOL<br>Online, 15-19 Feb 2021  |   |
| 2016 | HYSTERESIS, AVALANCHES AND INTERFACES IN SOLID PHASE TRANSFORMATIONS<br>University of Oxford, UK, 19-21 Sep 2016 |   |
|      | PIRE-CNA. NEW FRONTIERS IN NONLINEAR ANALYSIS FOR MATERIALS<br>Carnegie Mellon University, US, 2-10 Jun 2016     |   |