CURRICULUM VITAE

PERSONAL INFORMATION

Name: Primoz Skraba
Website: http://pskraba.org
Date of birth: 20.11.1980
Email: p.skraba@qmul.ac.uk

EDUCATION

Stanford University – Ph.D. *2009*
Dept. of Electrical Engineering
Title: Topology in Sensor Networks
Advisor: Leonidas Guibas

Stanford University – Masters of Science 2004
Dept. of Electrical Engineering

Princeton University – Bachelors in Science & Engineering 2002
Dept. of Electrical Engineering

CURRENT POSITIONS

Professor *2024 –*
School of Mathematical Sciences
Queen Mary University of London

Scientific Councillor (Znanstveni Svetnik) – 20% *2024 –*
Department for Artificial Intelligence
Jožef Stefan Institute

PREVIOUS POSITIONS

Reader *2021 – 2024*
School of Mathematical Sciences
Queen Mary University of London

Senior Lecturer *2018 – 2021*
School of Mathematical Sciences
Queen Mary University of London

Senior Scientific Associate (Višji znanstveni sodelavec) – 20% *2021 – 2024*
Department for Artificial Intelligence
Jožef Stefan Institute

Fellow *2018 – 2021*
Alan Turing Insitute

Scientific Associate (Znanstveni sodelavec) – (20% from 2018 onward) *2011 – 2021*
Artificial Intelligence Laboratory
Jožef Stefan Institute

Assistant Professor (Docent) *2014 – 2018*
Faculty of Mathematics, Natural Sciences and Information Technologies (FAMNIT)
University of Primorska

Adjunct Professor of Mathematics *2016 – 2018*
School of Science
University of Nova Gorica

Postdoctoral Researcher *2009 – 2010*
Geometrica Group
INRIA-Saclay, France
Advisor: Frederic Chazal

Research Assistant *2005 – 2008*
Geometric Computing Group
Stanford University

Intern *2007*
Research and Technology Center
Robert Bosch LLC, USA

Intern *2004*
Intel Research, USA

RESEARCH HIGHLIGHTS

Areas of Interest

Applied and computational topology, stochastic topology, algorithms & data structures, machine learning/AI, statistics, geometry processing

Publication Statistics

Google Scholar: H-index: 25, Citations: 2382 (Google Scholar)

Sicris: H-index: 16, WoS 437/403, Scopus 730/694

Selected Publications

O. Bobrowski, **P. Skraba**. "*A universal null-distribution for topological data analysis*," Scientific Reports, 13.1 (2023): 12274.

O. Bobrowski, **P. Skraba**, "*Homological Percolation: The Formation of Giant k-Cycles*," International Mathematics Research Notices, 2020

A. Poulenard, **P. Skraba**, M. Ovsjanikov, "*Topological Function Optimization for Continuous Shape Matching*", Computer Graphics Forum (Proceeding of the Symposium of Geometry Processing), 2018

O. Bobrowski, M. Kahle, and **P. Skraba**, "*Maximally Persistent Cycles in Random Geometric Complexes*," vol. 27, no. 4, Annals of Applied Probability, 2017.

P. Skraba, B. Wang, G. Chen, P. Rosen, "*2D Vector Field Simplification based on Robustness*," 7th Pacific Visualization Symposium, March 4-7, 2014, Yokohama, Japan. (Best Paper Award)

F. Chazal, L. Guibas, S. Oudot, **P. Skraba**, "*Persistence-Based Clustering in Riemannian Manifolds*," Journal of the ACM, vol. 60, no. 6, Article 10, 2013

N. Milosavljevic, D. Morozov, **P. Skraba**, "*Computing Zig-Zag Persistence in Matrix Multiplication Time*," Symposium of Computational Geometry 2011, Paris France

Best Paper Awards

Pacific Visualization Symposium *2013, 2015*

NORDIA-CVPR Workshop on Deformable Shape Analysis 2010

RELEVANT GRANTS

Universality in Topological Data Analysis *2024 – 2027*
Leverhulme Grant – £330k

An Erlangen Programme for AI *2024 – 2029*
EPSRC – £1.2M (QMUL), £10M total

Host for Leverhulme Visiting Professor *2022 – 2023*
Amit Patel(Colorado State University) – £56k

Topological Data Analysis of Maritime Data *2019 – 2021*
Alan Turing Institute/DSTL –£152k (QMUL), £305k total

Automated Analysis of Concrete *2019 – 2021*
NSERC(Canada) – 10k C$, 133k C$ total

Computing Persistence on Geometric Data *2018 – 2019*
ARRS – bilateral project with TU Graz, Austria

Learning Topological Representations *2016 – 2018*
ARRS – 200k€

Topological Complex Systems TOPOSYS – (Coordinator) 2012 – 2015
FP7 FET Proactive EU Grant – 642k€, 2.6M€ total

SELECTED INVITED TALKS

Workshop on Randomness in Topology and its Applications 2023
Institute for Mathematical and Statistical Innovation, University of Chicago

Workshop on Applied, Combinatorial and Toric Topology (online) 2022

SIAM Conference on Computational Science and Engineering 2021
Emerging Directions in Computational Topology (online)

Symposium of Geometry Processing 2020

LMS workshop on Applied Topology, London, UK 2019

Royal Statistical Society Meeting Probability for Topological Data Analysis, London, UK 2019

TAGS - Linking Topology to Algebraic Geometry and Statistics 2018
Max Planck Institute for Mathematics in the Sciences

TDART: Topological Data Analysis and Related Topics, Tohoku University, Sendai, Japan 2017

Topological Data Analysis: Developing Abstract Foundations, BIRS, Banff, Canada 2017

Topological Data Analysis, Hausdorff Research Institute for Mathematics, Bonn 2017

Workshop on Multidimensional Persistence, EPFL, Switzerland 2016

Workshop on Applied Topology, Institute of Mathematics Sciences, Singapore 2015

Applications of Algebraic Topology in Computer Science and Data Analysis (GETCO) 2015

Dynamics, Topology and Computations, Bedlewo, Poland 2015

Sheaves and Category Theory 2015
CG-Week Symposium of Computational Geometry, Eindhoven, Netherlands

Functoriality in Geometric Data 2015
Institute of Advanced Study, Hong Kong University of Science and Technology

Topological Systems: Communication, Sensing, & Actuation 2014
Institute of Mathematics & Applications

Annual Meeting of the Israeli Statistical Association 2014

AMS-MAA Joint Meeting Special Session on Applied Topology, Boston, USA, 2012

Applied and Computational topology: ATMCS 5 2012

This represents a sample of invited talks at workshops. It does not include invited seminars at universities, presentations based on contributions or visits to Dagstuhl, Oberwolfach, etc.

REVIEWER (SHORT LIST)

Geometry and Topology, Journal of Applied and Computational Topology, Algebraic Topology and Geometry, Annals of Applied Probability, Stochastic Processes and their Applications, Journal of Machine Learning Research, Journal of Computational Geometry, Discrete and Computational Geometry, Foundations of Computational Mathematics, Computational Geometry: Theory and Applications, SIAM Journal on Applied Algebra and Geometry, Symposium of Geometry Processing, Symposium of Computational Geometry, Eurographics, Pacific Graphics.

SUPERVISION OF PHDS AND POST-DOCTORAL RESEARCHERS

Post-doctoral researchers

Parker Duncan – Universality in Topological Data Analysis *2024 –*

Uzu Lim – Universality in Topological Data Analysis *2024 –*

Eng-Jon – An Erlangen Programme for AI *2024 –*

Leon Lampret – Topological data analysis of maritime date *2020 – 2021*

Ganna Kudryavtseva – Semigroup theory *2014 – 2015*

Mikael Vejdemo-Johannson – Applied topology *2013 – 2014*

Joao Pita Costa – Topos foundations of persistent homology *2012 – 2016*

Doctoral Students

Adam Onus – QMUL – Periodic Cellular Complexes (expected 2025) *2021 –*

Jasna Urbančič – QMUL – Topological Optimization *2019 – 2024*

Gabriele Beltramo – QMUL – Persistent homology for texture recognition *2018 – 2021*

Luka Stopar – (JSI - MPŠ/IPS) – Visualization and analysis of multivariate time-series *2014 – 2018*

Dejan Govc – (FMF) – Persistence & the unimodal category *2013 – 2017*

TEACHING

Programming in Python II (undergraduate) *2025*
QMUL

Optimisation for Business Processes (postgraduate) *2023*
QMUL

Storing, Manipulating, and Visualising Data (postgraduate) *2020 – 2022*
QMUL *2023*

Introduction to Applied Topology (PhD level) London Taught Course Centre	*2019*
Discrete Mathematics (undergraduate) QMUL	*2018 – 2020*
Calculus/Analysis I (undergraduate) University of Nova Gorica	*2014 – 2017*
Dynamic Systems (postgraduate) FAMNIT, University of Primorska	*2015 – 2018*
Discrete Mathematics (undergraduate) FAMNIT, University of Primorska	*2015 – 2018*
Computational Topology (PhD level) FMF & FRI, University of Ljubljana	*2013*
Introduction to Topological Data Analysis – Tutorial – *International Conference on Machine Learning*	*2012*

COMMISSIONS OF TRUST

Deputy Head of the Centre for Data Science, Statistics, and Probability	*2023 –*
Maths lead for Artificial Intelligence and Machine Learning in Science MSc Joint Programme – Physics and Mathematics	*2023 –*
Co-lead (with Jacek Brodzki) – Geometry and Topology of Data Interest Group Alan Turing Institute	*2022 –*
Program Committee – ATMCS 10	*2022*
Editor for special issue on Topological Methods – Foundations of Data Science (with Gunnar Carlsson, Kathryn Hess, Facundo Mémoli, Raul Rabadan)	*2021*
Editorial Board – International Journal of Computational Geometry and Applications	*2021 –*
Academic Lead for Coursera Applied Data Analytics Masters	*2021 – 2022*
Leadership Team for Science and Engineering Research Themes – QMUL	*2020 – 2021*
Program Committee – Symposium of Computational Geometry	*2020*
Education Committee	*2018 – 2022*
Post Graduate Staff-Student Liason Committee	*2018 – 2022*
MSc Dissertation (Co)-coordinator (QMUL)	*2020 – 2022*
Program Director Data Analytics Msc (QMUL)	*2018 – 2022*
Program Committee – Eurographics	*2015*
(Co-organizer) Summer School on Applied Topology, Ljubljana, Slovenia	*2013, 2015*
(Co-organizer) Topological Methods in Complexity Science Workshop – European Conference on Complexity Science	*2013*
Program Committee – Symposium of Geometry Processing	*2013*
EU FET project Sophocles Advisory Board (project number: FP7 – 317534)	*2013 – 2016*
Coordinator for EU FET project TOPOSYS (project number: FP7 – 318493) (JSI)	*2012 – 2015*

LANGUAGES

English (native), Slovene (native)

PUBLICATIONS

Submitted

[1] A. Patel and P. Skraba, "Möbius homology," *submitted to Transactions of the AMS*, [Online]. Available: https://arxiv.org/abs/2307.01040.

[2] R. Andreeva, J. Ward, P. Skraba, J. Gao, and R. Sarkar, "Approximating metric magnitude of point sets," *submitted to AAAI 2025*, [Online]. Available: https://arxiv.org/abs/2409.04411.

[3] O. Bobrowski and P. Skraba, "Weak universality in random persistent homology and scale-invariant functionals," *submitted to Inventiones Mathematicae*, [Online]. Available: https://arxiv.org/abs/2406.05553.

[4] A. Onus and P. Skraba, "Computing 1-periodic persistent homology with finite windows," *submitted to Journal of Applied and Computational Topology*, [Online]. Available: https://arxiv.org/abs/2312.00709.

[5] P. Skraba and K. Turner, "Wasserstein stability for persistence diagrams," *submitted to Algebraic and Geomtric Topology*, [Online]. Available: https://arxiv.org/abs/2008.02071.

2024

[6] P. Skraba and Y. D., "Central limit theorem for euclidean minimal spanning acycles," *Journal of Topology and Analysis*, pp. 1–37, 2024. [Online]. Available: https://doi.org/10.1142/S1793525323500590.

[7] Á. J. Alonso, M. Kerber, and P. Skraba, "Probabilistic analysis of multiparameter persistence decompositions into intervals," in *40th International Symposium on Computational Geometry (SoCG 2024)*, 2024. [Online]. Available: https://doi.org/10.4230/LIPIcs.SoCG.2024.6.

2023

[8] O. Bobrowski and P. Skraba, "Cluster persistence for weighted graphs," *Entropy*, vol. 25, no. 12, p. 1587, 2023. [Online]. Available: https://www.mdpi.com/1099-4300/25/12/1587.

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2022

[10] O. Bobrowski and P. Skraba, "Homological percolation: The formation of giant k-cycles," *International Mathematics Research Notices*, no. 8, pp. 6186–6213, 2022. [Online]. Available: https://doi.org/10.1093/imrn/rnaa305.

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2020

[13] O. Bobrowski and P. Skraba, "Homological percolation and the euler characteristic," *Physical Review E*, vol. 101, no. 3, p. 032 304, 2020. [Online]. Available: https://doi.org/10.1103/PhysRevE.101.032304.

[14] P. Skraba, G. Thoppe, and D. Yogeshwaran, "Randomly weighted d−complexes: Minimal spanning acycles and persistence diagrams," *Electronic Journal of Combinatorics*, vol. 27, no. 2, pp. 11–47, 2020. [Online]. Available: https://doi.org/10.37236/8679.

[15] R. Brüel-Gabrielsson, B. Nelson, A. Dwaraknath, P. Skraba, L. Guibas, and G. Carlsson, "A topology layer for machine learning," in *AISTATS 2020*, Corresponding issue in Proceeding of machine learning research, 2020. [Online]. Available: https://proceedings.mlr.press/v108/gabrielsson20a.html.

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2019

[17] B. Wang, R. Bujack, P. Rosen, P. Skraba, H. Bhatia, and H. Hagen, "Interpreting galilean invariant vector field analysis via extended robustness," *Topological Methods in Data Analysis and Visualization V*, 2019, short version appeared at TopoinVis 2017. [Online]. Available: https://doi.org/10.1007/978-3-030-43036-8_14.

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2018

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2017

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2016

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2015

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2014

[34] M. Vejdemo-Johansson and P. Skraba, "Algebraic and topological perspectives on semi-supervised clustering," in *European Conference on Complexity Science*, 2014.

[35] J. P. Costa and P. Skraba, "A topological data analysis approach to epidemiology," in *European Conference on Complexity Science*, 2014.

[36] P. Skraba and R. Adler, "Topological detection of heavy tailed distributions," in *European Conference on Complexity Science*, 2014.

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2013

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2012

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[47] V. de Silva, P. Skraba, and M. Vejdemo-Johansson, "Topological analysis of recurrent systems," in *NIPS 2012, Neural Information Processing Systems Workshop*, December 7-8, 2012, Lake Tahoe, Nevada, 2012.

[48] J. Rupnik, A. Muhic, and P. Skraba, "Cross-lingual document retrieval through hub languages," in *NIPS 2012, Neural Information Processing Systems Workshop*, December 7-8, 2012, Lake Tahoe, Nevada, 2012.

[49] J. Rupnik, A. Muhic, and P. Skraba, "Spanning spaces: Learning cross-lingual similarities," in *NIPS 2012, Neural Information Processing Systems Workshop*, December 7-8, 2012, Lake Tahoe, Nevada, 2012.

[50] A. Muhic, J. Rupnik, and P. Skraba, "Cross-lingual document similarity," in *34rd International Conference on Information Technology Interfaces, ITI 2012*, June 25-28, 2012, Dubrovnik, Croatia, 2012.

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2011

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2010

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2009

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2008

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– 2007

[59] P. Skraba and L. Guibas, "Energy efficient intrusion detection in camera sensor networks," in *DCOSS 2007*, Santa Fe, New Mexico, 2007. [Online]. Available: https://doi.org/10.1007/978-3-540-73090-3_21.

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