NIKLAS HELLMER

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Dioscuri Centre for Topological Data Analysis ◇ Institute of Mathematics
Polish Academy of Sciences ◇ ul. Śniadeckich 8, 00-656 Warsaw, Poland

EDUCATION

Polish Academy of Sciences and University of Warsaw, Warsaw, PL
PhD in Mathematics — *Oct. 2020 – present*

Swansea University, Swansea, UK
PhD studies in Mathematics[1] — *Jan. 2020 – Sep. 2020*

University of Bonn, Bonn, DE
Master of Science in Mathematics — *Oct. 2017 – Sep. 2019*
Bachelor of Science in Mathematics — *Oct. 2014 – Sep. 2017*

AWARDS AND HONORS

PhD Scholarship, Swansea University, 2020.
PhD Scholarship, Doctoral School of Exact and Natural Sciences, Warsaw, 2020.
PhD Scholarship, Dioscuri Centre for Topological Data Analysis, Warsaw, 2020.
Stipend for internship abroad from Univesity of Warsaw's "Excellence Initiative – Research University" programme (IDUB - POB3), 2023.

PUBLICATIONS

Published Articles

[1] A. Mahdi, P. Błaszczyk, P. Dłotko, D. Salvi, T.-S. Chan, J. Harvey, D. Gurnari, Y. Wu, A. Farhat, N. Hellmer, A. Zarebski, B. Hogan, and L. Tarassenko, "OxCOVID19 Database, a multimodal data repository for better understanding the global impact of COVID-19," *Scientific Reports*, vol. 11, no. 1, pp. 1–11, 1 Apr. 29, 2021, ISSN: 2045-2322. DOI: 10.1038/s41598-021-88481-4.

[2] P. Dłotko and N. Hellmer, "Bottleneck Profiles and Discrete Prokhorov Metrics for Persistence Diagrams," *Discrete Comput Geom*, May 2023, ISSN: 1432-0444. DOI: 10.1007/s00454-023-00498-w.

[3] P. Dłotko, N. Hellmer, Ł. Stettner, and R. Topolnicki, "Topology-driven goodness-of-fit tests in arbitrary dimensions," en, *Stat Comput*, vol. 34, no. 1, p. 34, Nov. 2023, ISSN: 1573-1375. DOI: 10.1007/s11222-023-10333-0.

In Preparation

[4] N. Hellmer, J. Hebda-Sobkowicz, R. Zimroz, A. Wyłomańska, and P. Dłotko, "Damage identification in rolling element bearings using topological data analysis," 2023.

[5] N. Hellmer and J. Spaliński, "Multineighbor bifiltrations," *In preparation*, 2023.

[1] Withdrawn to move with supervisor Paweł Dłotko to his new position in Warsaw.

PRESENTATIONS

Talks

New Metrics for Persistence Diagrams. Second Symposium on Machine Learning and Dynamical Systems, online due to COVID-19, Fields Institute, Toronto, Sep 29, 2020.

A Discrete Prokhorov Metric for Persistence Diagrams. Asia Pacific Seminar on Applied Topology and Geometry, online due to COVID-19, Feb 26, 2021.

A Discrete Prokhorov Metric for Persistence Diagrams. Meeting of the Oxford-Liverpool-Swansea centre for TDA, online, 19 Mar, 2021.

A Discrete Prokhorov Metric for Persistence Module. Workshop on Metrics in Multiparameter Persistence, Lorentz Centre Leiden, online, 21 Jul, 2021.

A Discrete Prokhorov Metric for Persistence Module. Applied Topology in Będlewo, 8 July, 2022.

Topology of Random Geometric Complexes and Applications in Statistical Hypothesis Testing. 3rd Workshop on Topological Methods in Data Analysis, Heidelberg/online, 30 September, 2022.

Statistical hypothesis tests with Euler characteristic curves. Mathematics for Society, Gdańsk University of Technology, November 2022.

Damage identification in rolling element bearings using topological data analysis. Minisymposium on Topological Data Analysis at the 22nd ECMI Conference on Industrial and Applied Mathematics, Wrocław, 26-30 Jun, 2023.

Damage identification in rolling element bearings using topological data analysis. 51st Conference on Applications of Mathematics, Kościelisko, 10-16 Sep, 2023.

TDA meets Signal Processing. BIGS Young Researcher Networking: Meeting on Topology and Applications, Bielefeld, 18-22 Sep, 2023.

Topology-Driven Goodness-of-Fit Tests in Arbitrary Dimensions. Math and Statistics Colloquium University of Michigan, Dearborn. 23 Oct, 2023.

Topology-Driven Goodness-of-Fit Tests in Arbitrary Dimensions. Applied Topology Seminar, Technical University Munich. 7 Nov, 2023.

Topology-Driven Goodness-of-Fit Tests in Arbitrary Dimensions. Applied Algebraic Topology Research Network Seminar, online. 13 Dec, 2023.

Posters

A Discrete Prokhorov Metric for Persistence Diagrams. Workshop on Topological Data Analysis at IMSI, Chicago, online, April 2021.

A Discrete Prokhorov Metric for Persistence Diagrams. Young Topologists Meeting 2021, Stockholm, online, July 2021.

A Discrete Prokhorov Metric for Persistence Diagrams. Second Graduate Student Conference: Geometry and Topology meet Data Analysis and Machine Learning (GTDAML2021), online, July/August 2021.

Topology of Random Geometric Complexes with Applications to Statistical Hypothesis Testing. Young Topologists Meeting 2022, Copenhagen, 19 Jul, 2022.

EXTENDED SCIENTIFIC VISITS

Helmholtz-Zentrum, Munich, DE
AIDOS lab for AI and Health, hosted by Bastian Rieck *Sep. 2023 – Dec. 2023*

TEACHING

Teaching Assistant, Analysis I winter term 2016/17
University of Bonn

Graded homework and held biweekly recitation and problem classes for 20 students.

Teaching Assistant, Analysis II summer term 2018
University of Bonn

Graded homework and held weekly recitation and problem classes for 20 students.

Student Demonstrator, Matlab (MA-162) lent term 2020
Swansea University

Graded homework and held weekly Matlab tutorial classes for 80 students.

Group instructor, Mathematical Analysis 2 for Economists summer term 2021
University of Warsaw

Posed and graded homework; held biweekly online recitation and problem classes for 25 students.

Group instructor, Linear Algebra for Economists winter term 2021/22
University of Warsaw

Posed and graded tests; held biweekly recitation and problem classes for 20 students.

Group instructor, Invitation to TDA summer term 2022
University of Warsaw

Posed theoretical and programming homework; held weekly recitation and problem classes for 15 students.

Group instructor, Mathematical Analysis for Economists winter term 2022/23
University of Warsaw

Posed and graded homework; held biweekly online recitation and problem classes for 28 students.

SERVICE AND OUTREACH

Computing the Bottleneck Distance. Youtube tutorial contributed to the AATRN tutorial-athon, March 2021.

Refereeing Discrete & Computational Geometry, Foundations of Data Science

OTHER QUALIFICATIONS

Languages

English: C1

French: A1

Latin: Latinum

Programming

advanced: Python, LaTeX

basic: R, C-like languages, Matlab

libraries: numpy, pandas, scikit-learn, gudhi

OTHER ACTIVITIES AND NON-ACADEMIC POSITIONS

University Politics

Member of the student parliament of the University of Bonn 2016-2018

Member of the student parliament's budget committee 2017-2019

Head of the budget committee 2019

REFERENCES

Paweł Dłotko
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