Nicolas Berkouk

Personal Informations

Languages	French : Native, English : Fluent
GScholar	`https://scholar.google.com/citations?hl=fr&user=nxkO-kIAAAAJ`
Website	`https://nberkouk.github.io`

Education

10/16 - 09/20 **Ph.D., *Persistence and Sheaves : From Theory to Applications***
Under the supervision of Steve Oudot at INRIA Saclay
Viva voce defense date : 24th of September 2020

09/15 - 08/16 **M.Sc. of Pure Mathematics, Imperial College, London, U.K.**
Master thesis under the direction of Ambrus Pàl : *Is the property of being formal axiomatisable in the first order theory of A_∞-algebras ?*

03/15 - 09/15 **Research Internship at the Centre de Sociologie des Organisations (CSO, Sc. Po.), Paris, France.**
Six months research intership supervised by Pierre François, where I studied the social and gender filter operated by École polytechnique's competitive entrance exam.

08/12 - 08/15 ***École Polytechnique*, Palaiseau, France**
Major in pure mathematics

09/10 - 07/12 ***Classe Préparatoire MP**, Lycée Saint-Louis, Paris, France**

Employment History

10/20 - Now **Post-doctoral Researcher, Laboratory for Topology and Neuroscience, EPFL, Lausanne, Switzerland**
Advisor : Kathryn Hess. Funded by Innosuisse in collaboration with the start-up L2F SA until 09/22, and by the group's funding from 09/22.

02/19 - 11/19 **Data Scientist at the French Ministry of Finances**
I have joined the highly selective program « Entrepreneurs d'intérêt général » during my gap year, that aims at developing high impact IT projects in the French Administration. NLP and graph analysis in Python for fraud detection.

09/12 - 04/13 **Teaching Assistant at Lycée Le Corbusier, Aubervilliers, France**
As part of my curriculum at École polytechnique, I have been supporting the teaching team of Lycée Le Corbusier, which is situated in a highly socially disavantaged Paris' suburb.

Supervision of Students

09/22 - 02/23 **Kelu Huang (Bachelor Student)**
Subject : To be determined.

03/22 - 08/22 **Dan Meller (Master Student)**
Singular value representation of neural networks

09/21 - 07/22 **Pierre Jaillot (Master Student)**
Semester project : *Persistence and sheaves*

08/21 - 07/22 **Luca Nyckees (Master Student)**
Scientific internship : *Computing the level-sets persistence of PL maps through extended persistence*

02/21 - 06/21 **Marie Abadie (Bachelor Student)**
Semester Project : *On the completeness of the interleaving distance in locally persistent categories*

Teaching Activities

09/22 - 02/23 **Principal Teaching assistant at EPFL**
Course *Linear Algebra* given by David Candil

09/21 - 02/22 **Teaching assistant at EPFL**
Course *Algebraic Structures* given by Patakfalvi Zsolt

09/18 - 01/19 **Teaching assistant at École polytechnique's bachelor**
Course *Linear Algebra 2* given by Damian Brotbeck

09/17 - 01/18 **Teaching assistant at École polytechnique's bachelor**
Course *Linear algebra 1* given by Stéphane Bijakowski

09/16 - 07/17 **Oral examiner in « classe préparatoire » at Lycée Saint-Louis, Paris**
MPSI Lycée Saint-Louis

Reviewing activities and Membership in panels

10/20 - Now **Reviewer for the following journals**
Bulletin of the London Mathematical Society, Theory and Applications of Categories, Journal of Applied and Computational Topology, Foundations of Computational Mathematics

10/20 - Now **Reviewer for the following Symposium**
International Symposium on Symbolic and Algebraic Computations 21'
International Symposium on Computational Geometry 22'

Organizing activities

Since 04/22	**AI4Science@EPFL Associate** Initiative created to foster the development of machine learning methods for scientific research at EPFL, `https://www.epfl.ch/research/domains/cis/ai4science/`.
Since 11/21	**Co-Organizer of the international online seminar *Persistence, Sheaves and Homotopy Theory* (PSHT)** Co-organizing with Damien Calaque, François Petit and Luis Scoccola `https://psht-seminar.github.io/index.html`
08/21	**Co-organizer of a Mini-Symposium at SIAM Conference on Applied Algebraic Geometry** With François Petit, title : *Sheaves and Homotopical Methods for Topological Data Analysis*, `https://meetings.siam.org/sess/dsp_programsess.cfm?SESSIONCODE=71570`
10/21 - Now	**Co-Organizer of EPFL's applied topology reading group**

Visiting positions

Nov. 2022	**Center for Advanced studies, Norwegian Academy of Science and Letters, Oslo.** Invited researcher for the thematic semester « Representation Theory : Combinatorial Aspects and Applications »
June 2018	**Politecnico di Torino, Torino Italy** Short-term visitor in Francesco Vaccarino's research group
March 2018	**Luxembourg University, Luxembourg** Short-term visitor in François Petit's research group I gave a 10 hours course for the doctoral school of mathematics together with Steve Oudot : « Theoretical foundations of persistence theory »
Sept. 2017	**Hausdorff Research Institute for Mathematics , Bonn, Germany** Special Hausdorff Program on « Applied and Computational Algebraic Topology »

Presentations at Conferences and Seminars

Nov. 2022	**Online workshop on computational persistence**, Purdue University, US « Projected Barcodes and Integral Sheaf Metrics »
Oct. 2022	**ETH Seminar of Mathematics**, Zurich, Switzerland « K-theory of sheaves and persistence »
Jul. 2022	***AI and Health : Interdisciplinary Approaches* Colloquium, Lebesgue Center for Mathematics, Nantes, France** « The field of explainable AI : designing machines to explain machines ? »
Jun. 2022	***ATMCS10 Conference*, Oxford, United Kingdom** « Projected Barcodes and Integral Sheaf Metrics »

Jun. 2022 ***Oxford Topological Data Analysis Seminar*, United Kingdom**
« Projected Barcodes and Integral Sheaf Metrics »

Feb. 2022 ***AlToGeLis Online Seminar***
« Persformer : A Transformer Architecture for Topological Machine Learning », joint with Raphael Reinauer.

Feb. 2022 ***DataShape Seminar*, INRIA, France**
« Persformer : A Transformer Architecture for Topological Machine Learning », joint with Raphael Reinauer.

Feb. 2022 ***COSTECH Seminar, UTC*, Compiègne, France**
« The birth of Explainable AI : designing machines to explain machines ? »

Feb. 2022 ***Science Technology and Society seminar of UNIL*, Lausanne, Switzerland**
« The birth of Explainable AI »

Jan. 2022 ***Inter-ENS day on social diversity*, Palaiseau, France**
« Are competitive exams neutral ? »

Oct. 2021 ***Responsible Use of Algorithms in the Public Sector*, Sciences Po. Paris, France**
Invited speaker in a Public Affairs Master Course

July 2021 ***TDA seminar of Montpellier University*, Montpellier, France**
« Persistence and sheaves »

May 2021 ***Applied Machine Learning Days*, Lausanne, Switzerland**
Invited online talk : « Level-sets persistence and sheaf theory »

Apr. 2021 ***IMSI workshop on Topological Data Analysis*, Chicago, USA**
Contributed online talk : « Ephemeral persistence modules and distance comparisons »

Jun. 2020 ***EPFL Applied Topology Seminar*, Lausanne, Switzerland**
Invited online talk : « Sheaves as computable and stable desciptors of data »

Jun. 2020 ***AATRN online seminar*, Online**
« Sheaves as computable and stable desciptors of data », video available at `https://www.youtube.com/watch?v=qv0LRiDW5O4`

Jun. 2020 ***Representation theory seminar*, Bielefeld, Germany**
Invited online talk : « Derived methods for persistence »

Jan. 2019 ***Workshop on Applied Topology 2019*, Kyoto, Japan**
Contributed talk : « A derived isometry theorem for constructible sheaves over $\mathbb{R}$ »

May 2018 ***Bridging statistics and sheaves*, IMA, Minneapolis, USA**
Joint talk with Anthea Monod : « Connecting measures with sheaves »
Poster : « A derived isometry theorem for constructible sheaves over $\mathbb{R}$ »

March 2018 **Luxembourg University, Luxembourg**
10 hours course for the doctoral school of mathematics together with Steve Oudot : « Theoretical foundations of persistence theory »

Feb. 2018 ***Linking Topology to Algebraic Geometry and Statistics*, MPI Leipzig, Germany**
Poster : « Computing the convolution distance for constructible sheaves over $\mathbb{R}$ »

Dec. 2017 ***Journées de Géométrie Algorithmique*, Aussois, France**
Talk : « Stable resolutions of multi-parameter persistence modules »

Aug. 2017 ***Developing abstract foundations for TDA*, Banff Center, Canada**
Talk : « Stable resolutions of multi-parameter persistence modules »

March 2017 ***Persistent homology* working group, IHP, Paris, France**
Talk : « Stable resolutions of multi-parameter persistence modules »