Chunyin, SIU (Alex)

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Education

Cornell University, Ithaca, NY *2019 – present*
PhD Applied Mathematics; supervised by Prof Gennady Samorodnitsky

The Chinese University of Hong Kong (CUHK), Hong Kong *2017 – 2019*
MPhil Mathematics; supervised by Prof Ronald Lui

The Chinese University of Hong Kong (CUHK), Hong Kong *2013 – 2017*
BSc Mathematics; Minor in Economics

Research Interests

Random Topology, Topological Data Analysis, Network Analysis, Computational Geometry

Professional Experiences

Lawrence Berkeley National Laboratory *Summer 2023*
build a neural network to learn the adsorption values of zeolite crystals from their topological features partially verify a conjecture on the universality of a topological quantity on these datasets.

Publications

** denotes entries with alphabetically listed authors. Authors are superscripted by their career stages when the paper was uploaded to arXiv. UG, GS, and P mean undergraduate, graduate student and professor respectively.*

C. Siu [GS], G. Samorodnitsky [P], C. Yu [P], and R. He [UG]. "The Asymptotics of the Expected Betti Numbers of Preferential Attachment Clique Complexes". Submitted.

C. Siu [GS], G. Samorodnitsky [P], C. Yu [P], and A. Yao [UG]. "Detection of Small Holes by the Scale-Invariant Robust Density-Aware Distance (RDAD) Filtration". Submitted.

* C. Siu [GS], and R. Strichartz [P]. "Geometry and Laplacian on Discrete Magic Carpets". *Journal of Fractal Geometry*, 2023.

H. Law [GS], C. Siu [GS], and R. Lui [P]. "Decomposition of Longitudinal Deformations via Beltrami Descriptors". *Journal of Scientific Computing*, 2021.

C. Siu [GS], H.L. Chan [GS], and R. Lui [P] "Image Segmentation with Partial Convexity Shape Prior Using Discrete Conformality Structures". *SIAM Journal on Imaging Sciences*, 2020.

* J. Li [UG], and C. Siu [UG]. "An Elementary Approach on Left-Orderability, Cables of Torus Knots and Dehn Surgery". Preprint.

Select Awards and Honors

Croucher Scholarship for Doctoral Study *2019/2020*
Annually, 9 – 16 Hong Kong scholars pursuing overseas doctoral degrees in science are selected.

Sir Edward Youde Memorial Fellowship (for Postgraduate Research Students) *2017/2018*
Annually, 3 – 5 Hong Kong fellows are selected among nominees from local institutions.

Best Teaching Assistant Award at CUHK Math *2018/2019*
Annually, 3 teaching assistants in the Department of Mathematics at CUHK receive this awarded.

Invited Talks

"The Expected Betti Numbers of Preferential Attachment Clique Complexes". Applied Topology Seminar. Oxford University, Britain (Virtual), Nov 2023.

"The Asymptotics of the Expected Betti Numbers of Preferential Attachment Clique Complexes". Applied Algebraic Topology Research Network (AATRN) Online Seminar. Virtual, Nov 2023.

"The Topology of Preferential Attachment Graphs". Probability and Statistical Physics Seminar. Chicago University, IL, Oct 2023.

"The Topology of Preferential Attachment Graphs". Probability Seminar. Purdue University, IN, Sep 2023.

"The Topology of Preferential Attachment". Seminario Doctorado, Actividad del Programa de Doctorado "Mathematicas". University of Seville, Spain, Sep 2023.

"The Topology of Preferential Attachment Graphs". Probability and Applications Seminar. Queen Mary University of London, Britain, Sep 2023.

"Detection of Small Topological Features by the Scale-Invariant Robust Density-Aware Distance (RDAD) Filtration". CUHK, Hong Kong, Jan 2023.

Contributed Presentations and Talks

"The Asymptotics of the Expected Betti Numbers of Preferential Attachment Clique Complexes – Theory and Computational Challenges". Computation Persistence Workshop. Purdue University, IN, Sep 2023.

"Discovery of Small Dense Topological Features from Datasets". Joint Statistical Meetings. Toronto, Canada, Aug 2023.

"The Many Holes of Preferential Attachment". Geometry and Topology meet Data Analysis and Machine Learning. Northeastern University, MA, Jun 2023.

"Betti Numbers of Preferential Attachment Complexes" (poster). Randomness in Topology and its Applications. The University of Chicago, IL, Mar 2023.

"Expected Betti Numbers of Preferential Attachment Complexes" Finger Lakes Probability Seminar. Binghamton University, NY, Feb 2023.

"Detection of Small Cycles in Data by the Scale-Invariant Robust Density-Aware Distance (RDAD) Filtration". Binghamton University Graduate Combinatorics, Algebra and Topology. Binghamton University, NY, Nov 2022.

"Detection of Small Cycles in Data by the Scale-Invariant Robust Density-Aware Distance (RDAD) Filtration". 3rd Upstate New York Topology Seminar. Syracuse University, NY, Oct 2022.

"Detection of Small Topological Features by the Scale-Invariant Robust Density-Aware Distance (RDAD) Filtration" (poster). Algebraic Topology, Methods, Computation and Science 10. Oxford University, Britain, Jun 2022.

"Antman Persistence: Detection of Small Holes with the Robust Density-Aware Distance (RDAD) Filtration" (poster). Bridging Applied and Quantitative Topology. Virtual, May 2022.

"All Holes Can Be Measured, But Some Holes Are Noisier Than Others" (poster). AATRN Poster Session. Virtual, Oct 2021.

Teaching Experiences

MATH 1920 Multivariable Calculus for Engineers, Cornell, head teaching assistant	*Spring 23*
MATH 1920 Multivariable Calculus for Engineers, Cornell, teaching assistant	*Fall 22*
MATH 2020 Advanced Calculus II, CUHK, teaching assistant	*Spring 19*
MATH 4060 Complex Analysis, CUHK, teaching assistant	*Fall 18*
EPYMT Number Theory and Cryptography, CUHK, teaching assistant	*Summer 18*
MATH 2010 Advanced Calculus I, CUHK, teaching assistant	*Spring 18*
MATH 1510 Calculus for Engineers, CUHK, teaching assistant	*Spring 18*
MATH 1540 University Mathematics for Financial Studies, CUHK, teaching assistant	*Fall 17*

Undergraduate Mentorship Experiences

Rongyi He, currently Cornell Master student — *Summer 22 – Summer 23*
Research Assistant, cosupervised by Gennady Samorodnitsky

Luis Hoderlein, currently Yale PhD student — *Spring 22 – Summer 22*
Directed Reading Program on dimension reduction and UMAP

James Zhang, currently Cornell undergraduate student — *Summer 22*
Directed Reading Program on Erdos-Renyi graphs

Tom Shi, currently Cornell undergraduate student — *Spring 22*
Directed Reading Program on ranking of graph data

Andrey Yao, currently Madison PhD student — *Fall 20 – Spring 22*
Directed Reading Program on computational topology
Research Assistant, cosupervised by Gennady Samorodnitsky

Professional Services

reviewer for *Homology, Homotopy and Applications*	*Fall 23*
student representative of the Colloquium Committee, CAM, Cornell	*Fall 23 – Spring 24*
officer of SIAM Student Chapter, Cornell	*Fall 22 – Spring 24*

Additional Information

Natural languages	English, Chinese (Cantonese, Mandarin)
Programing	MATLAB, Python, Bash, R