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

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

Professional Experiences

Lawrence Berkeley National Laboratory *Summer 2023*
build a neural network to predict the adsorption loadings of zeolite crystals with their topological features
verify a conjecture on the universality of a topological statistic of scientific datasets.

Publications

Authors in entries with an ◇ are listed alphabetically. The superscripts indicate the authors career stages (UnderGraduate, Graduate Student, or Professor) at the time.

- 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

"Detecting Weak Topological Signals in Noisy Environments". Hot Topics in Data Science. University at Buffalo, NY (Virtual), Feb 2024.

"Homology and Homotopy Properties of Scale-Free Networks". University of Florida Topological Data Analysis conference. University of Florida, FL, Feb 2024.

"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

Homology of Preferential Attachment Clique Complexes

- Northeast Probability Seminar, New York University, NY, Nov 2023
- Binghamton University Graduate Combinatorics, Algebra and Topology. Binghamton University, NY, Nov 2023.
- Computation Persistence Workshop. Purdue University, IN, Sep 2023.
- Geometry and Topology meet Data Analysis and Machine Learning. Northeastern University, MA, Jun 2023.
- Randomness in Topology and its Applications (poster). The University of Chicago, IL, Mar 2023.
- Finger Lakes Probability Seminar. Binghamton University, NY, Feb 2023.

Detecting Weak Topological Signals in Noisy Environment

- Joint Statistical Meetings. Toronto, Canada, Aug 2023.
- Binghamton University Graduate Combinatorics, Algebra and Topology. Binghamton University, NY, Nov 2022.
- 3rd Upstate New York Topology Seminar. Syracuse University, NY, Oct 2022.
- Algebraic Topology, Methods, Computation and Science 10 (poster). Oxford University, Britain, Jun 2022.
- Bridging Applied and Quantitative Topology (poster). Virtual, May 2022.
- AATRN Poster Session. Virtual, Oct 2021.

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*

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

Additional Information

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