# Tyler Chen

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https://chen.pw

## Academic/Industry Positions

**University of Washington** ..... *2017 - Present*

Ph.D. in Applied Mathematics

- My research is focused on the design and analysis of conjugate gradient and Lanczos type algorithms in exact and finite precision arithmetic.

**Baidu Research** ..... *2021 - Present*

Research Intern at Cognitive Computing Laboratory

## Education

**University of Washington** ..... *2017 - 2019*

M.Sc.

**Tufts University** ..... *2013 - 2017*

B.S. Summa Cum Laude in Mathematics and Physics; Minor in Studio Art

## Publications

[3] Anne Greenbaum, Hexuan Liu, and Tyler Chen. *On the Convergence Rate of Variants of the Conjugate Gradient Algorithm in Finite Precision Arithmetic*. 2019. arXiv: 1905.05874 [cs.NA]. [intro]

[2] Tyler Chen, Thomas Trogdon, and Shashanka Ubaru. "Analysis of stochastic Lanczos quadrature for spectrum approximation". In: *Proceedings of the 37th International Conference on Machine Learning*. Proceedings of Machine Learning Research. PMLR, 2021. arXiv: 2105.06595 [cs.DS]. [intro]

- selected for long presentation

[1] Tyler Chen and Erin C. Carson. "Predict-and-recompute conjugate gradient variants". In: *SIAM Journal on Scientific Computing* 42.5 (Jan. 2020), A3084–A3108. DOI: 10.1137/19m1276856. arXiv: 1905.01549 [cs.NA]. [intro]

- abridged version was Student Paper Competition winner at 16th Copper Mountain Conference on Iterative Methods

## In progress/submission

[2] Tyler Chen, Anne Greenbaum, Cameron Musco, and Christopher Musco. *Error bounds for Lanczos-based matrix function approximation*. 2021.

[1] Tyler Chen. *Random variables in finite precision*. 2021. arXiv: 2007.11041 [math.ST]. [intro]

## Talks and Posters

[7] *Analysis of stochastic Lanczos quadrature for spectrum approximation*. July 2021.

[6] *Concentration in the Lanczos Algorithm*. Presentation at SIAM Linear Algebra 21. May 2021. [pdf]

[5] *Analysis of stochaschastic Lanczos quadrature for spectrum approximation*. Presentation at at Baidu Research. Mar. 2021.

[4] *Analyzing the Effects of Local Roundoff Error on Predict-and-Recompute Conjugate Gradient Variants*. Poster at Householder Symposium (Cancelled). June 2020.

[3] *Predict-and-recompute conjugate gradient variants*. Presentation at Copper Mountain Student Paper Award Session (Cancelled). Mar. 2020.

[2] *Predict-and-recompute conjugate gradient variants*. Presentation at SIAM Parallel Processing. Feb. 2020. [pdf]

[1] *Symmetric Preconditioner Refinement Using Low Rank Approximations*. Presentation at Baidu Research. Feb. 2019.

## Teaching

Instructor, Applied Linear Algebra and Numerical Analysis (UW AMATH 352) ..... *Spring 2021*
Instructor, Interdisciplinary Writing/Natural Science (UW ENGL 199) ..... *Winter 2021*
Instructor, Interdisciplinary Writing/Natural Science (UW ENGL 199) ..... *Autumn 2020*
TA, Probability and Statistics for Computational Finance (UW CFRM 410) ..... *Winter 2019*
TA, Calculus with Analytic Geometry I (UW MATH 124) ..... *Autumn 2018*
TA, Calculus with Analytic Geometry II (UW MATH 12) ..... *Winter 2018*
TA, Calculus with Analytic Geometry II (UW MATH 125) ..... *Autumn 2017*
Lab TA, Electronics (Tufts PHY 41) ..... *Spring 2017*
Lab TA, Electronics (Tufts PHY 41) ..... *Spring 2016*
Grader, Discrete Mathematics (Tufts MATH 61) ..... *Spring 2016*
Grader, Calculus III (Tufts MATH 42) ..... *Fall 2015*
Grader, Differential Equations (Tufts MATH 51) ..... *Spring 2015*
Grader, Calculus III (Tufts MATH 42) ..... *Fall 2014*

## Awards & Honors

Boeing Research Award (UW Department of Applied Mathematics) ..... *2020*
Student Paper Competition winner (Copper Mountain Conference on Iterative Methods) ..... *2020*
Graduate Research Fellowship (NSF) ..... *2019*
Top Scholars Fellowship (UW) ..... *2017*
The Audrey Butvay Gruss Science Award (Tufts) ..... *2017*
The Howard Sample Prize Scholarship in Physics (Tufts) ..... *2015*

## Service and Outreach

**Minisymposium Organizer** ..... *May 2021*
Random matrices and numerical linear algebra (at SIAM Linear Algebra 21, co-organized with Thomas Trogdon [program])

**Graduate Student Representative** ..... *2019 - 2020*
Represent interests of graduate students to the department

**Minisymposium Organizer** ..... *Feb. 2020*
High performance Krylov subspace methods: Theory, Implementation, and Application (at SIAM Parallel Processing 20) [program]

**Diversity Committee Departmental Climate Orientation** ..... *Oct. 2019*
Pannelist for event focused on building an inclusive department culture

**Washington Directed Reading Program** ..... *Autumn 2019*
Mentor undergraduate student in independent reading project

**Numerical Analysis Research Club** ..... *2019-2020*
Organize and plan weekly meetings for NARC

**SIAM UW Mental Health Conversation and Resources** ..... *Oct. 2018*
Organize and facilitate a discussion about mental health in grad school

## Software

**PETSc** (`https://www.mcs.anl.gov/petsc/`)
Contribute `PIPEPRCG`. This method can be used by with the flag `-ksp_type pipeprcg`.

## Professional

**Tufts Conference and Events Services** ..... *2014 - 2017*
*Reservations Manager, Registrar, Facilitator*
Oversee all housing reservations at Tufts University during the summer conference season; Coordinate and assist clients with logistical details relating to conferences; perform supervisory role overseeing and training new staff; schedule employee shifts (implemented a VBA/excel system to automate much of this process); prepare individualized printed materials for upcoming conferences.

**Tisch Library Digital Design Studio** ..... *2014 - 2017*
*Student Supervisor*
Provide supervision to student workers; staff front desk at the Digital Design Studio; assist patrons with large format printing, recording, digitization equipment, and software.