# Jessica Shi

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## EDUCATION

**Massachusetts Institute of Technology**
Ph.D. Candidate; Major: Computer Science (Advisor: Julian Shun)

**Princeton University** Graduated June 2018
A.B. with Highest Honors; Major: Mathematics; Minor: Computer Science (GPA 3.92/4.00)

## RESEARCH EXPERIENCE

**Department of Computer Science, MIT** Fall 2018 – present
*Parallel algorithms for butterfly computations* (Advisor: Julian Shun)
Designed a framework called PARBUTTERFLY that produces new parallel algorithms for butterfly counting and peeling, with tradeoffs between theoretical work-efficiency and empirical speedups. Strong theoretical guarantees on the algorithms were proven and significant parallel speedups were obtained.

**Princeton University, Mathematics Department** Fall 2017 – Spring 2018
*Dominating sets in graphs with no long induced paths* (Advisor: Maria Chudnovsky)
In the context of the 3-coloring problem, proved that there exist constant bounded dominating sets in $\{P_6$, triangle$\}$-free and $\{P_7$, triangle$\}$-free graphs and provided a semi-automatic proof for the latter case.

**Princeton University, Computer Science Department** Fall 2015 – Spring 2016
*Exponential bounds on graph enumerations from vertex incremental characterizations* (Advisor: Jérémie Lumbroso)
Published in Meeting on Analytic Algorithmics and Combinatorics 2018 (ANALCO18).
Developed a new methodology to enumerate graph classes, using their vertex incremental characterizations and analytic combinatorics. Established asymptotic upper bounds for two graph classes.

## WORK EXPERIENCE

**D.E. Shaw & Co.** Summer 2017
*Software Engineering Intern (Futures)*
Added features to their underlying array infrastructure, including sharding, extending axes, indexing with keys, and indexing with arrays and boolean masks. Investigated cache conflicts between using memory mapped arrays and IBM General Parallel File System (GPFS).

**Google** Summer 2016
*Software Engineering Intern (Fiber Ads)*
Built a system to continuously evaluate the quality in which TV ads are inserted over underlying network streams. Created a video alignment tool to verify where ads are injected into the stream, and collect associated stream data.

**Bloomberg L.P.** Summer 2015
*Software Development Intern (News)*
Overhauled legacy multimedia functions, specifically for video post-processing. Created two services: one extracts subtitles from fragmented-MP4 video containers and processes keywords for expanded search functionality, and the other extracts, processes, and stores thumbnails from videos.

## HONORS & AWARDS

National Science Foundation (NSF) Graduate Research Fellowship (2018)
Middleton Miller '29 Prize, Mathematics Department, Princeton University (2018)
Awarded for the best independent work in mathematics.
Phi Beta Kappa, Princeton University (2018)
Computing Research Association (CRA) Outstanding Undergraduate Researchers Honorable Mention (2017)
Computer Science Poster Winner, Computer Science Department, Princeton University (2015)
Outstanding Presentation Winner of the MAA Undergraduate Poster Session at JMM (2014)