Penghao **Xu**

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Education

Georgia Institute of Technology — *Atlanta, GA*

Ph.D. Student In Bioinformatics Advisor: Dr. Francesca Storici — *Aug. 2017 - Dec. 2022*

M.S. in Computational Science & Engineering — *Aug. 2018 - Dec. 2019*

Fudan University — *Shanghai, China*

B.S. in Biological Science
Minor in Jurisprudence — *Sep. 2013 - Jun. 2017*

Research Topics

Ribonucleotide incorporation characteristics in human mitochondrial DNA — *2021 - present*

- Revealed rNMP incorporation prevalence on the non-template strand of CDS.
- Identified rNMP incorporation composition and patterns in mtDNA of multiple human cell lines.
- Discovered the potential association between rNMP incorporation and DNA replication and transcription.

Reveal the DNA polymerase division of labor using rNMP incorporation characteristics in yeast — *2019 - 2021*

- Revealed the DNA pol delta contribution in early-stage leading strand synthesis in wild-type *S. cerevisiae*.
- Discoved the unique rNMP incorporation pattern of main replicative polymerases.
- Built a novel model of rNMP incorporation rate change in DNA replication process.
- Published in *Nucleic Acids Research*.

RESCOT: Optimization of Restriction Enzyme Usage in Ribose-seq Technique — *2017 - 2021*

- Designed the RESCOT software to optimize restriction enzyme (RE) usage in ribose-seq.
- Applied simulated annealing and stochastic tunneling to increase the rNMP coverage from 40.41% to 95.84%.
- Published in *Theoretical Computer Science*.

Publications

Underlined if first author

- **Xu, P.** and Storici, F. Frequency and patterns of ribonucleotide incorporation around autonomously replicating sequences in yeast reveal the division of labor of replicative DNA polymerases. *Nucleic Acids Research*, 49(18), 10542–10557.(2021)
- **Xu, P.** and Storici, F. RESCOT: Restriction enzyme set and combination optimization tools for rNMP capture techniques. *Theoretical Computer Science.* (2021)
- **Xu, P.*** and Storici, F. RibosePreferenceAnalysis: Analyzing the preference of rNMPs embedded in genomic DNA. *Software Impacts*, 10, 100149. (2021) (*Corresponding author)
- El-Sayed, W. M. M., Gombolay, A. L., **Xu, P.**, Yang, T., et al. Disproportionate presence of adenosine in mitochondrial and chloroplast DNA of Chlamydomonas reinhardtii. *IScience*. (2021).

- Balachander, S.*, Gombolay, A.L.*, Yang, T.*, **Xu, P.*** et al. Ribonucleotide incorporation in yeast genomic DNA shows preference for cytosine and guanosine preceded by deoxyadenosine. *Nat. Commun.* 11, 2447 (2020).(Co-first author; *equal contribution)
- **Xu, P.**, Yang, T., Kundnani, D. et al. Features and patterns of ribonucleotides embedded in human mitochondrial DNA. (In preparation)

Presentations

Poster presentation, "Ribonucleotide Incorporation Characteristics in Human Mitochondrial DNA and Relationship to Gene Size" — *Aug. 2022*
ICEM 2022 — *Ottawa, ON, Canada*

Oral presentation, "Frequency and position of ribonucleotide incorporation reveal the division of labor of replicative DNA polymerases" — *Mar. 2022*
SERYM 2022 — *Online*

Oral presentation, "Applying the Ribose-seq Technique to Analyze Characteristics of Ribonucleotides Embedded in Human Mitochondrial DNA" — *Oct. 2021*
NATCORE Meeting 2021 — *Online*

Oral presentation, "Ribonucleotide incorporation around autonomously replicating sequences (ARSs) reveals thedivision of labor of replicative DNA polymerases" — *Sep. 2021*
Molecular BioMedical (MBM) Research Group Seminar Series — *Atlanta, GA*

Oral presentation, "Ribose-switch at the replication fork" — *June 2021*
Dmitry Gordenin's scientific family reunion 2021 — *Online*

Oral presentation, "Different labor division of DNA polymerases shapes ribonucleotide incorporation characteristics around the yeast autonomously replicating sequences." — *May 2021*
RNA2021, 26th annual meeting of RNA society — *Online*

Oral presentation, "Ribonucleotide incorporation characteristics in human mitochondrial DNA" — *Mar 2021*
Georgia Tech School of Biological Sciences 2021 Trainee Talk days — *Atlanta, GA*

Oral presentation, "Ribonucleotide incorporation shows specific preferences around ARS's in different yeast genotypes" — *May 2020*
Emory - Georgia Tech Yeast Meeting — *Atlanta, GA*

Poster presentation, "Ribonucleotide incorporation characteristics around the yeast ARS sequences reveal the labor division of replicative DNA polymerases." — *May 2020*
RNA2020, 25th annual meeting of RNA society — *Online*

Oral presentation, "Ribonucleotide incorporation characteristics around yeast ARS region." — *Oct. 2019*
4th International Conference on Molecular Biology & Nucleic Acids — *Chicago, IL*

Poster presentation, "Ribonucleotide incorporation characteristics around yeast ARS region." — *Oct. 2019*
4th International Conference on Molecular Biology & Nucleic Acids — *Chicago, IL*

Poster presentation, "Ribonucleotide incorporation characteristics in yeast genome." — *Apr. 2019*

26th Annual Southeastern Regional Yeast Meeting (SERYM 2019) — *Atlanta, GA*

Poster presentation, "Ribonucleotide incorporation characteristics in yeast genome." — *Jan. 2019*

Career, Research, and Innovation Development Conference (CRIDC). — *Atlanta, GA*

Poster presentation, "Preference of ribonucleotides incorporation around yeast autonomously replicating regions." — *Jan. 2019*

1st Southeast Center for Mathematics and Biology (SCMB) annual Symposium — *Atlanta, GA*

Oral presentation, "Ribose-seq and Ribose-Map: Characterization of ribonucleotide incorporation in yeast genomic DNA" — *Jan. 2019*

Emory - Georgia Tech Yeast Meeting — *Atlanta, GA*

Poster presentation, "Dinucleotide analysis of ribose-seq data" — *Aug. 2018*

Georgia Tech School of Biological Sciences Biannual Scientific Retreat — *Helen, GA*

Honors & Awards

2022 **Mark Borodovsky Prize in the College of Sciences**, Georgia Tech — *USA*

2022 **2nd place in The F.L. "Bud" Suddath Memorial Award**, Georgia Tech — *USA*

2022 **Recognition of outstanding contributions**, SERYM 2022 — *USA*

2021 **NSF Conference Award**, RNA 2021 — *USA*

Mentoring

Prediction of yeast autonomous replication sequence location using rNMP incorporation data — *Aug 2021 - Present*

Mo Sun, Ph.D. Student in Biology — *Georgia Institute of Technology*

Effect of sequence read numbers on rNMP incorporation data — *May 2020 - Dec. 2020*

Jordan D. Pieratti, B.S. in Biology — *Georgia Institute of Technology*

Location of yeast autonomous replication sequence using rNMP incorporation data — *Aug. 2019 - Dec. 2019*

Paarth J. Parekh, M.S. in Bioinformatics — *Georgia Institute of Technology*

Prediction of yeast autonomous replication sequence firing time using rNMP incorporation data — *Aug. 2019 - Dec.2019*

Xin Hang, M.S. in Bioinformatics — *Georgia Institute of Technology*

Identification of unique rNMP incorporation characteristics in yeast genome repeat region — *Aug. 2019 - Dec. 2019*

Zachary B. Mudge, B.S. in Computer Science — *Georgia Institute of Technology*

Featrues enhancement with filter and deduplication of rNMP incorporation data *May. 2019 - Aug. 2019*

Zachary B. Mudge, B.S. in Computer Science *Georgia Institute of Technology*