Zeqian Li

zeqianli.chicago@gmail.com

https://zeqianli.me/

Education

- **University of Chicago** — Chicago, IL
  Research Assistant (Seppe Kuehn lab) — *Aug 2020 – Aug 2023 (expected)*
  - **Machine learning predicts microbial metabolic traits from genomes:** We studied the essential evolutionary determinants of microbial carbon metabolism. We showed that phylogeny strongly predicted microbial carbon utilization and large datasets would enable machine learning models to make mechanistic predictions.
  - **Multi-omics patterns in the Yellowstone hot spring microbial mats:** Using metagenome, metatranscriptome and single-cell amplified genome data, we showed that genome organization in the Yellowstone microbial mats is constrained by co-expression and is connected to extensive recombination.
  - **Other Kuehn Lab projects:** An innovative way to quantify microbial respiration and photosynthesis (de Jesus Astacio et al, PNAS 2021), predicting media buffering capacity (Gopalakrishnappa et al, in preparation), and evolutionary structures of the denitrification pathway (Crocker et al, in preparation).
- **University of Illinois at Urbana-Champaign** — Champaign, IL
  Ph.D in Physics candidate — *Aug 2018 – Aug 2023 (expected)*
- **Hong Kong Baptist University** — Hong Kong
  B.S in Physics (minor in Applied Mathematics) — *Sep 2014 – July 2018*

  I studied various biological systems (reservoir computing, biological neural network, C. elegans) using computational neuroscience, machine learning and statistical physics.

Experience

- **Upward Farms** — Brooklyn, NY
  Microbial Research Associate — *May 2022 - Aug 2022*
  - **Improve hydroponic crop yields through microbial transplanting:** I led a research project on microbial association with hydroponic plants. Using 16S sequencing, we showed that microbial composition strongly correlated with plant growth. We identified potential growth-promoting microbes through statistical modeling.
  - **Two production-level software prototypes:** A Snakemake pipeline to streamline NGS sequencing data analysis and a web-based R&D experiment management portal. Both will be incorporated into production.
  - **Other wet lab experiments:** Nanopore sequencing, crop phenotyping, and sample collection.
- **The Abdus Salam International Centre for Theoretical Physics** — Trieste, Italy
  Spring College on the Physics of Complex Systems — *Mar 2018*

  Completed five graduate courses with grade E (Excellent) in statistical physics and reinforcement learning.

Publications

- **Zeqian Li**, Ahmed Selim, Seppe Kuehn. "Predict microbial metabolic traits from genomes." *In preparation* (2023).
- Chandana Gopalakrishnappa, **Zeqian Li**, Seppe Kuehn. "Environmental modulators of algae-bacteria interactions at scale." *In preparation* (2023).
- Luis Miguel de Jesús Astacio*, Kaumudi H. Prabhakara*, **Zeqian Li**, Harry Mickalide, Seppe Kuehn. "Closed microbial communities self-organize to persistently cycle carbon." *Proceedings of the National Academy of Sciences* 118, no. 45 (2021): e2013564118.

Awards and honors

- **Center for Physics of Living Cells (CPLC) Fellow** — UIUC, 2018-2020
- **HKSAR Government Scholarship** — Hong Kong, 2015-2018

Skills

- **Computation:** Machine learning, bioinformatics (metagenomics, 16S, transcriptomics, single-cell), deep learning.
- **Experiments:** NGS sequencing, nanopore sequencing, microbiology wet lab.
- **Software:** Python, Snakemake, MongoDB, Git, Bash, Linux, Javascript, Java, LaTeX.