Kenneth Loi

Doudna Lab, UC Berkeley | kenjmloi@berkeley.edu | kennethloi.com

Education

Ph.D., Biophysics 2026–present
University of California, Berkeley

B.A., Molecular and Cell Biology 2024
University of California, Berkeley

Research Interests

RNA-guided systems; phage defense; biomolecular evolution; CRISPR biology; structural bioinformatics; AI for biology

Research Experience

Graduate Researcher 2026–present
Doudna Lab, UC Berkeley

Previously undergraduate researcher and research technician *2023–2026*

- Co-first author of the VIPR discovery study, published in Science (2026); identified a phage-encoded RNA-guided DNA recognition system with a noncontiguous targeting code.
- Used genomic language models and small RNA sequencing to discover a novel guide RNA for VIPR.
- Developed structural bioinformatics and comparative genomics pipelines to identify divergent RNA-guided systems and infer their evolutionary relationships.
- Designed and executed plasmid-based functional assays for programmable repression, phage-defense genetics, and guide-target specificity.

Undergraduate Researcher 2021–2023
Murthy Lab, UC Berkeley

- Tested lipid nanoparticle (LNP) formulations for nucleic acid delivery.
- Investigated mRNA chemical modifications to enhance transcript stability and translation efficiency.
- Collaborated on projects delivering gene editing effectors to target tissues.

Summer Undergraduate Researcher (SR-EIP) 2021
Jones Lab, Brown University

- Helped develop the Human Neocortical Neurosolver (HNN): a software for biophysical modeling of MEG/EEG potentials of neural circuits
- Leveraged HNN to study possible mechanisms driving Alzheimer's-associated MEG/EEG readings

Publications

- Yoon PH, **Loi KJ**, Zhang ZT, Docter TA, Lopez SC, Langeberg CJ, Ur-Rehman MM, Vohra K, Zhou Z, Esain-Garcia I, et al. A noncontiguous code for RNA-guided DNA recognition at the origin of CRISPR-Cas. *Science* 393(6817):1230–1235, 2026. doi: 10.1126/science.aei0498. **Co-first author**.
- Yoon PH, Docter TA, Zhang ZT, **Loi K**, Lopez SC, Valentin-Alvarado LE, Tuck OT, Brohawn SG, Doudna JA. VIPR RNA-guided DNA recognition by noncontiguous geometric triplex formation. *Science* 393(6817):1236–1240, 2026. doi: 10.1126/science.aei3472.
- Lopez SC, Mayor EBT, **Loi KJ**, Armbruster EG, Yen E, Yoon PH, Doudna JA. Competition among viral elements for VIPR RNA-directed genome silencing. *bioRxiv* preprint, posted October 16, 2026. doi: 10.64898/2026.10.15.759431.
- Valentin-Alvarado LE, Yoon PH, Lopez SC, Shulgina Y, Langeberg C, Armbruster E, Ur-Rehman MM, **Loi K**, Taveneau C, Esain-Garcia I, et al. tRNA-derived second messengers confer bacterial immunity. *bioRxiv* preprint, posted October 9, 2026. doi: 10.64898/2026.10.06.756102.
- Skopintsev P, Esain-Garcia I, DeTurk EC, Yoon PH, Zhou Z, Weiss T, Kamalu M, Chamraj A, **Loi KJ**, Langeberg CJ, et al. Structure and evolution-guided design of minimal RNA-guided nucleases. *Science* 393(6808):313–318, 2026. doi: 10.1126/science.aed6123.

- Tuck OT, Hu JJ, Lopez SC, Adler BA, O'Brien CE, Hsieh K, Meredith C, **Loi KJ**, Yoon PH, Doherty EE, et al. Recurrent acquisition of nuclease-protease pairs in antiviral immunity. *Science* 391(6781):195–201, 2026. doi: 10.1126/science.aea8769.
- Doherty EE, Adler BA, Yoon PH, Hsieh K, **Loi K**, Armbruster EG, Lahiri A, Bolling CS, Wilcox XE, Akkati A, et al. A miniature CRISPR–Cas10 enzyme confers immunity by inhibitory signalling. *Nature* 647(8091):997–1004, 2025. doi: 10.1038/s41586-025-09569-9.
- Yoon PH, Zhang Z, **Loi KJ**, Adler BA, Lahiri A, Vohra K, Shi H, Rabelo DB, Trinidad M, Boger RS, et al. Structure-guided discovery of ancestral CRISPR-Cas13 ribonucleases. *Science* 385(6708):538–543, 2024. doi: 10.1126/science.adq0553.
- Yoon PH, Skopintsev P, Shi H, Chen L, Adler BA, Al-Shimary M, Craig RJ, **Loi KJ**, DeTurk EC, Li Z, et al. Eukaryotic RNA-guided endonucleases evolved from a unique clade of bacterial enzymes. *Nucleic Acids Research* 51(22):12414–12427, 2023. doi: 10.1093/nar/gkad1053.
- Jas M, Thorpe R, Tolley N, Bailey C, Brandt S, Caldwell B, Cheng H, Daniels D, Pujol CF, Khalil M, Kanekar S, Kohl C, Kolozsvári O, Lankinen K, **Loi K**, et al. HNN-core: A Python software for cellular and circuit-level interpretation of human MEG/EEG. *Journal of Open Source Software* 8(92):5848, 2023. doi: 10.21105/joss.05848.
- Sharma R, William BE, **Loi K**, Murthy N. Efficient delivery of nucleic acids by lipid nanoparticles to the liver, spleen, and brain. *Molecular Therapy* 31(4):286, 2023.

Presentations & Posters

A noncontiguous code at the origin of CRISPR 2026
CRISPR 2026 — Selected oral presentation, New Haven, CT *June 10*

Scalable Structural Homology Pipeline Reveals Hidden Protein Relationships 2025
Cold Spring Harbor Genome Engineering Meeting — Poster

Structure-guided discovery of ancestral Cas13s 2024
Sternberg Lab Seminar; Columbia University — Talk

Biophysical modeling of Alzheimer's disease mediated changes in MEG alpha oscillations 2021
Annual Biomedical Research Conference for Minority Students — Poster

Awards & Fellowships

NSF Graduate Research Fellowship Program 2026
Honorable Mention

UC Berkeley Rose Hills Fellow 2022

The Leadership Alliance Summer Research - Early Identification Program 2021

Teaching & Mentorship

SPLASH: Molecular Matrix: Weaving Biology and Machine Learning Together 2024
Taught high school students about applications of machine learning in biology.

SPLASH: Gene editing for human health. A CRISPR view and beyond 2022
Taught high school students how CRISPR is impacting human health

Technical Skills

Wet-lab: Molecular cloning, protein purification, mammalian cell culture (transfection, maintenance), plate-reader assays.
Bioinformatics: HMMER, IQ-TREE, AlphaFold, Foldseek
Programming: Python, Bash, LaTeX.