

Cheng Lyu (Lv)

Stanford University
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EDUCATION

The Rockefeller University, New York (2015 – 2021)

Ph.D. in Neuroscience

Peking University, Beijing, China (2008 – 2015)

Master of Science in Systems Biology (2012 – 2015)

Bachelor of Science in Physics (2008 – 2012)

RESEARCH EXPERIENCE

Stanford University

Oct 2021 – now

Postdoctoral researcher in the Biology Department. Advisor: Dr. Liqun Luo, HHMI investigator

- Studying the molecular mechanisms of neural circuit wiring in the olfactory system of *Drosophila melanogaster*.

The Rockefeller University

Sep 2015 – Oct 2021

Graduate Fellow in Laboratory of Integrative Brain Function. Advisor: Dr. Gaby Maimon, HHMI investigator

- Discovered neural signals in the *Drosophila* central brain that explicitly track the fly's allocentric traveling direction, using two-photon imaging, patch clamp recordings, and neuronal activity perturbations in tethered walking and flying flies.
- Discovered a neuronal circuit that constructs the traveling direction signal via anatomical and physiological analyses.
- Characterized the underlying computation performed by the traveling-direction circuit as a two-dimension vector addition process, in collaboration with Larry Abbott.
- Designed and built behavioral rigs to develop behavioral paradigms for studying path integration in flies.

Peking University

Sep 2012 – Jul 2015

Master's Student in the Department of Physics. Advisor: Dr. Fangting Li

- Developed a computational method based on Large Deviation Theory to analyze the metastability of gene regulatory networks and applied the method to an E. Coli gene expression system and a budding yeast cell cycle system.
- Built a mathematical model in collaboration with an experimental group to help guide precise design of genetic circuits in *E. Coli*

PUBLICATIONS (published)

1. **Lyu, C.**, Abbott, L. F., & Maimon, G. Building an allocentric travelling direction signal via vector computation. *Nature*, 601(7891), 92-97 (2022).
2. Lu, J., Behbahani*, A.H., Hamburg*, L., Westeinde*, E.A., Dawson, P.M., **Lyu, C.**, Maimon, G., Dickinson, M.H., Druckmann, S. and Wilson, R.I. Transforming representations of movement from body-to world-centric space. *Nature*, 601(7891), 98-104 (2022). *Equal contribution
3. Li, W., Wang, Z., Syed, S., **Lyu, C.**, Lincoln, S., O'Neil, J., Nguyen, A., Feng, I. and Young, M.W. Chronic social isolation signals starvation in the *Drosophila* brain and reduces sleep. *Nature* 597, 239–244 (2021).

4. **Lyu, C.**, Abbott, L. F., & Maimon, G. A neuronal circuit for vector computation builds an allocentric traveling-direction signal in the *Drosophila* fan-shaped body. *bioRxiv* (2020).
 5. Kim*, A. J., Fenk*, L. M., **Lyu, C.**, and Maimon, G. Quantitative predictions orchestrate visual signaling in *Drosophila*. *Cell* 168(1-2), 280-294. (2017). *Equal contribution
 6. Zong*, Y., Zhang*, H. M., **Lyu, C.**, Ji, X., Hou, J., Guo, X., et al, and Lou, C. Insulated transcriptional elements enable precise design of genetic circuits. *Nature communications* 8(1), 52. (2017). *Equal contribution
 7. Chen, Y., **Lv, C.**, Li, F., and Li, T. Distinguishing the rates of gene activation from phenotypic variations. *BMC systems biology* 9(1), 29. (2015).
 8. **Lv†, C.**, Li, X., Li, F., and Li, T. Energy landscape reveals that the budding yeast cell cycle is a robust and adaptive multi-stage process. *PLoS computational biology* 11(3), e1004156. (2015).
 9. **Lv*†, C.**, Li*, X., Li, F., and Li, T. Constructing the energy landscape for genetic switching system driven by intrinsic noise. *PLoS one* 9(2), e88167. (2014). *Equal contribution
- †Note that "Lv" rather than "Lyu" was my initially used last name in English.

SCHOLARSHIPS AND AWARDS

Stanford Science Fellows (2022)

Kavli NSI Pilot Grant (2019)

National Scholarship, Peking University (2014)

Meritorious Winner of the Mathematical Contest in Modeling (MCM) (2009)

First Prize in China Physics Olympiad (2007)

TEACHING EXPERIENCE

Teaching Assistant at course Neural Systems & Behavior, Marine Biological Laboratory (2018)

Teaching Assistant at course Membrane Biophysics, Rockefeller University (2018)

Teaching Assistant at course General Physics Lab, Peking University (2013)

Teaching Assistant at course Introduction to Biophysics, Peking University (2012)

SELECTED PRESENTATIONS

Building an allocentric travelling direction signal via vector computation. An invited talk to *NeuroChats* at UTSW, July 2022

How brains add vectors. An invited talk to the laboratory of Guangyu Robert Yang, MIT, August 2021

How brains add vectors. An invited talk to the laboratory of Andrew Straw, University of Freiburg, February 2021

A multimodal forward speed signal in the Drosophila central complex. The Structure and Function of the Insect Central Complex conference, Janelia Research Campus, October 2018