Louis Kang

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Position

University of California, Berkeley, USA 2017–2020
Miller Postdoctoral Fellow
Host departments: Physics and Helen Wills Neuroscience Institute
Host faculty: Mike DeWeese

Research Interests

Human cognition ultimately emerges from sophisticated computations performed by networks of neurons. I use and develop tools from theoretical physics to investigate how our brains make sense of and respond to our dynamic environments. Theoretical neuroscience forms one part of my overall mission to better understand human biology and pathology through quantitative analysis.

Education

University of Pennsylvania, Philadelphia, USA
MD, Perelman School of Medicine 2017
Research elective with Vijay Balasubramanian in theoretical neuroscience
PhD, Department of Physics & Astronomy 2015
Thesis advisor: Tom Lubensky
Thesis title: *Chirality and its spontaneous symmetry breaking in two liquid crystal systems*

Harvard University, Cambridge, USA
AB in Chemistry and Physics and Mathematics *summa cum laude* 2009

Publications *equal contribution

6. **Kang L**, Lubensky TC. Chiral twist drives raft formation and organization in membranes composed of rod-like particles. *Proc Natl Acad Sci USA* 114, E19 (2017). arXiv:1608.07331.
5. **Kang L**, Gibaud T, Dogic Z, Lubensky TC. Entropic forces stabilize diverse emergent structures in colloidal membranes. *Soft Matter* 12, 386 (2016). arXiv:1507.00746.
4. Davidson ZS*, **Kang L***, Jeong J*, Still T, Collings PJ, Lubensky TC, Yodh AG. Chiral structures and defects of lyotropic chromonic liquid crystals induced by saddle-splay elasticity. *Phys Rev E* 91, 050501 (2015). arXiv:1504.03619.
3. Jeong J*, **Kang L***, Davidson ZS, Collings PJ, Lubensky TC, Yodh AG. Chiral structures from achiral liquid crystals in cylindrical capillaries. *Proc Natl Acad Sci USA* 112, E1837 (2015).

2. Idema T, Dubuis JO, **Kang L**, Manning ML, Nelson PC, Lubensky TC, Liu AJ. The syncytial *Drosophila* embryo as a mechanically excitable medium. *PLOS ONE* 8, e77216 (2013). arXiv:1304.4025.

1. Heo M, **Kang L**, Shakhnovich EI. Emergence of species in evolutionary "simulated annealing". *Proc Natl Acad Sci USA* 106, 1869 (2009). arXiv:0810.1765.

Awards and Honors

Travel Award 2018
Computational Neuroscience Meeting (CNS*2018)

Miller Research Fellowship 2017–2020
University of California, Berkeley

Mary Ellis Bell Prize 2016
University of Pennsylvania, Perelman School of Medicine
"This prize is given to a student in the School of Medicine who is engaged in noteworthy research in any field related to medicine."

Werner Teutsch Memorial Prize 2012
Univeristy of Pennsylvania, Department of Physics & Astronomy
"Awarded annually to the graduate student who, by his or her performance in the first year courses, shows the most promise for outstanding achievement in research."

Medical Scientist Training Program 2009–2017
National Institutes of Health

Phi Beta Kappa 2009
Harvard University

Conference Talks *poster

Bernstein Conference, Berlin, Germany 2018
Replay arises naturally as a traveling wavefront in an entorhinal attractor network

Computational Neuroscience Meeting (CNS*2018), Seattle, USA 2018
Self-organization of entorhinal grid modules through commensurate lattice relationships

American Physical Society March Meeting, Los Angeles, USA 2018
Self-organization of entorhinal grid modules through commensurate lattice relationships

Computational and Systems Neuroscience (Cosyne), Denver, USA 2018
*Self-organization of entorhinal grid modules through commensurate lattices**

American Physical Society March Meeting, New Orleans, USA 2017
Membrane rafts stabilized by chiral liquid crystal correction to bare interfacial tension

Computational and Systems Neuroscience (Cosyne), Salt Lake City, USA 2017
*Coupling between attractor networks naturally generates a discrete grid cell hierarchy**

Gordon Research Conference & Seminar on Liquid Crystals, Biddeford, Maine, USA 2015

Roles of entropy and chirality in depletion-induced colloidal membranes

American Chemical Society Colloid & Surface Science Symposium, Philadelphia, USA 2014
A theory for depletion-induced colloidal membranes

American Physical Society March Meeting, Denver, USA 2014
A theory for depletion-induced colloidal membranes

IAS Program on Frontiers of Soft Matter Physics, Hong Kong 2014
*A theory for depletion-induced colloidal membranes**

American Physical Society March Meeting, Baltimore, USA 2013
Mitotic wavefronts mediated by mechanical signaling in early Drosophila *embryos*

External Seminars

Ludwig-Maximilians-Universität München, Germany 2018
Bernstein Center for Computational Neuroscience Munich
Modules (and phase precession and replay) in continuous attractor models of grid cells

University College London, UK 2018
Institute for Behavioural Neuroscience
Replay arises naturally as a traveling wavefront in an entorhinal attractor network

École Normale Supérieure, Paris, France 2017
Group for Neural Theory
Self-organization of entorhinal grid modules through commensurate lattice relationships

Institut Curie, Paris, France 2017
Pierre Sens Group
Chiral twist drives raft formation and organization in membranes composed of rod-like particles

University College London, UK 2016
Gatsby Computational Neuroscience Unit
Coupling between attractor networks naturally generates a discrete grid cell hierarchy

University of California, Los Angeles, USA 2016
Center for Biological Physics
Chiral twist drives raft formation and organization in membranes composed of rod-like particles

Teaching

Teaching Assistant 2011–2015
University of Pennsylvania
Modern physics, wave phenomena, electromagentism, physics laboratory

Teaching Assistant 2006–2007
Harvard University
Organic chemistry, linear algebra

References

Mike DeWeese
Postdoc advisor
University of California, Berkeley
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Tom Lubensky
PhD advisor
University of Pennsylvania
Department of Physics & Astronomy
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Vijay Balasubramanian
Research mentor
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Zvonimir Dogic
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