

# Louis Kang

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## POSITION

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**University of California, Berkeley, USA**

2017–2020

Miller Postdoctoral Fellow

Host departments: Physics and Helen Wills Neuroscience Institute

Host faculty: Mike DeWeese

## RESEARCH INTERESTS

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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

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**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

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\*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.

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 AWARDS AND HONORS

<b>Miller Research Fellowship</b> University of California, Berkeley	2017–2020
<b>Medical Scientist Training Program</b> National Institutes of Health	2009–2017
<b>Mary Ellis Bell Prize</b> 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.”	2016
<b>Werner Teutsch Memorial Prize</b> University 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.”	2012
<b>Phi Beta Kappa</b> Harvard University	2009

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 CONFERENCE TALKS \*poster

<b>American Physical Society March Meeting</b> , New Orleans, USA <i>Membrane rafts stabilized by chiral liquid crystal correction to bare interfacial tension</i>	2017
<b>Computational and Systems Neuroscience (Cosyne)</b> , Salt Lake City, USA <i>Coupling between attractor networks naturally generates a discrete grid cell hierarchy*</i>	2017
<b>Gordon Research Conference &amp; Seminar on Liquid Crystals</b> , Biddeford, Maine, USA <i>Roles of entropy and chirality in depletion-induced colloidal membranes</i>	2015
<b>American Chemical Society Colloid &amp; Surface Science Symposium</b> , Philadelphia, USA <i>A theory for depletion-induced colloidal membranes</i>	2014
<b>American Physical Society March Meeting</b> , Denver, USA <i>A theory for depletion-induced colloidal membranes</i>	2014
<b>IAS Program on Frontiers of Soft Matter Physics</b> , Hong Kong <i>A theory for depletion-induced colloidal membranes</i>	2014
<b>American Physical Society March Meeting</b> , Baltimore, USA <i>Mitotic wavefronts mediated by mechanical signaling in early Drosophila embryos</i>	2013

EXTERNAL SEMINARS

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- 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

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- Teaching Assistant** 2011–2015  
 University of Pennsylvania  
 Modern physics, wave phenomena, electromagnetism, physics laboratory
- Teaching Assistant** 2006–2007  
 Harvard University  
 Organic chemistry, linear algebra

REFERENCES

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**Mike DeWeese**  
*Postdoc advisor*  
 University of California, Berkeley  
 Redwood Center for Theoretical Neuroscience  
 deweese@berkeley.edu

**Vijay Balasubramanian**  
*Research mentor*  
 University of Pennsylvania  
 Department of Physics & Astronomy  
 vijay@physics.upenn.edu

**Tom Lubensky**  
*PhD advisor*  
 University of Pennsylvania  
 Department of Physics & Astronomy  
 tom@physics.upenn.edu

**Zvonimir Dogic**  
*Research collaborator*  
 University of California, Santa Barbara  
 Department of Physics  
 zdogic@physics.ucsb.edu