

# Vivek Venkatachalam

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## Employment

Northeastern University Department of Physics

Assistant Professor ..... 2017 –

Harvard University Department of Physics and Center for Brain Science

Research Associate ..... 2015 – 2017

NSF Postdoctoral Fellow ..... 2013 – 2015

Postdoctoral Fellow ..... 2012 – 2013

## Education

Ph.D. Physics, Harvard University, May 2012.

Thesis: *Single Electron Probes of Fractional Quantum Hall States*, advised by Amir Yacoby.

S.B. Electrical Science and Engineering, Massachusetts Institute of Technology, June 2006.

S.B. Physics, Massachusetts Institute of Technology, June 2006.

## Preprints and publications

1. (PREPRINT) Corollary Discharge Promotes a Sustained Motor State in a Neural Circuit for Navigation. N. Ji, **V. Venkatachalam**, H. Rodgers, W. Hung, T. Kawano, C.M., Clark, M. Lim, M.J. Alkema, M. Zhen, A.D.T. Samuel. *bioRxiv*. <https://doi.org/10.1101/861559>. Posted online December 3, 2019.
2. (PREPRINT) NeuroPAL: A Neuronal Polychromatic Atlas of Landmarks for Whole-Brain Imaging in *C. elegans*. E. Yemini, A. Lin, A. Nejatbakhsh, E. Varol, R. Sun, G. E. Mena, A.D.T. Samuel, L. Paninski, **V. Venkatachalam**, O. Hobert. *bioRxiv*. <https://doi.org/10.1101/676312>. Posted online June 20, 2019.
3. Gap junctions and NCA cation channels are critical for developmentally-timed sleep and arousal in *C. elegans*. H. Huang, D. Hayden, C. Zhu, H. Bennett, **V. Venkatachalam**, L. Skuja, A. Hart. *Genetics*. **210** (4) 1369-1381 (2018). <https://doi.org/10.1534/genetics.118.301551>.
4. Pan-neuronal Imaging in Roaming *C. elegans*. **V. Venkatachalam\***, N. Ji\*, X. Wang, J. Mitchell, M. Klein, C. J. Tabone, C. M. Clark, J. S. F. Greenwood, A. Chisholm, J. Srinivasan, M. J. Alkema, M. Zhen, A. D. T. Samuel. *PNAS*, **113** (8) E1082-E1088 (2016). (\* co-first-authors) <https://doi.org/10.1073/pnas.1507109113>.
5. Contrasting responses within a single neuron class enable sex-specific attraction in *C. elegans*. A. Narayan, **V. Venkatachalam**, O. Durak, N. Bose, F. C. Schroeder, A. D. T. Samuel, J. Srinivasan, P. W. Sternberg, *PNAS*, **113** (10) E1392-E1401 (2016). <https://doi.org/10.1073/pnas.1600786113>.

6. Bidirectional thermotaxis in *Caenorhabditis elegans* is mediated by distinct sensorimotor strategies driven by the AFD thermosensory neurons. L. Luo, N. Cook, **V. Venkatachalam**, L. A. Martinez-Velazquez, X. Zhang, A. C. Calvo, J. Hawk, B. L. MacInnis, M. Frank, J. H. R. Ng, M. Klein, M. Gershow, M. Hammarlund, M. Goodman, D. A. Colón-Ramos, Y. Zhang, and A. D. T. Samuel. *PNAS*, **111** (7) 2776-2781 (2014). <https://doi.org/10.1073/pnas.1315205111>.
7. Local compressibility measurement of the  $\nu_{\text{tot}} = 1$  quantum Hall state in a bilayer electron system. D. Zhang, S. Schmult, **V. Venkatachalam**, W. Dietsche, A. Yacoby, K. von Klitzing, and J. Smet. *Phys Rev B* **87**, 205304 (2013). <https://doi.org/10.1103/PhysRevB.87.205304>
8. Local thermometry of neutral modes on the quantum Hall edge. **V. Venkatachalam\***, S. Hart\*, A. Yacoby, L. Pfeiffer, and K. West. *Nature Physics* **8**, 676-681 (2012). (\* co-first-authors) <https://doi.org/10.1038/nphys2384>.
9. Local charge of the  $\nu = 5/2$  fractional quantum Hall state. **V. Venkatachalam**, A. Yacoby, L. Pfeiffer, and K. West. *Nature* **469**, 185-188 (2011). <https://doi.org/10.1038/nature09680>.

## Academic honors and grants

Burroughs Wellcome Fund Career Award at the Scientific Interface (\$500k), 2015 – 2020.

National Science Foundation Postdoctoral Research Fellowship in Biology (\$138k), 2013 – 2015.

Gertrude and Maurice Goldhaber Prize, Harvard University Physics, 2011.

Awarded to one outstanding experimentalist and one outstanding theorist annually.

Harvard University Bok Center Certificate of Distinction in Teaching, 2011.

National Science Foundation Graduate Research Fellowship, 2007 – 2009, 2010 – 2011.

Gates Cambridge Fellowship (declined for NSF), 2006.

Hertz Foundation Fellowship Finalist, 2006.

Phi Beta Kappa, Massachusetts Institute of Technology, 2006.

Josephine de Karman Fellowship; 1 of 10 nationally, 2005.

Barry Goldwater Scholarship, 2004.

Intel Science Talent Search, 9th place, 2002.

## Talks

Nov 2019: Clark University Physics Department colloquium  
Imaging and identifying neurons in naturally behaving *C. elegans*

Apr 2019: NSF Imaging in the Behaving Brain Workshop  
Imaging and identifying neurons in naturally behaving *C. elegans*

Apr 2019: Mind, Brain, and Behavior Mini-Conference for Young Investigators  
Brain Imaging in Behaving *C. elegans*

Dec 2017: Neural Information Processing Systems (NIPS) 2017  
Multi-neuronal Imaging of *C. elegans* Courtship and Mating

Nov 2017: Society for Neuroscience (SfN) 2017  
Brainwide imaging in mating *C. elegans*

- Mar 2017: Department of Biology, Boston University  
Pan-neuronal Imaging in Behaving *C. elegans*
- Feb 2017: Department of Physics, Pennsylvania State University  
Pan-neuronal Imaging in Behaving *C. elegans*
- Feb 2017: Department of Biomedical Engineering, Boston University  
Pan-neuronal Imaging in Behaving *C. elegans*
- Feb 2017: Department of Physics, Washington University in St. Louis  
Pan-neuronal Imaging in Behaving *C. elegans*
- Jan 2017: Department of Neuroscience, Yale University  
Pan-neuronal Imaging in Behaving *C. elegans*
- Oct 2016: Department of Physics CIRCS Seminar, Northeastern University  
Whole-brain Imaging in Freely Moving *C. elegans*
- Mar 2016: Boston University School of Medicine  
Pan-neuronal imaging in roaming animals
- Feb 2016: Department of Physics Biophysics Seminar, Yale University  
Pan-neuronal imaging in roaming animals
- Feb 2016: Systems Biology Institute Seminar, Yale University  
Pan-neuronal imaging in roaming animals
- Feb 2016: Joint ECE and BioSciences Seminar, Rice University  
Pan-neuronal imaging in roaming animals
- Nov 2015: Emerging Tools for Whole-Brain Functional Data, Janelia Research Campus  
Pan-neuronal imaging in roaming animals
- Sept 2015: Cambridge-Area Worm Meeting  
Pan-neuronal imaging with cell identification in roaming animals
- June 2015: *C. elegans* International Meeting  
Pan-neuronal imaging in roaming animals
- June 2014: Cambridge-Area Worm Meeting  
Pan-neuronal calcium imaging in *C. elegans*
- Apr 2013: Cambridge-Area Worm Meeting  
Watching a Single Neuron Learn
- Mar 2012: Harvard Condensed Matter Theory Kids' Seminar  
The Fractional Quantum Hall Edge at  $\nu = 1$
- Feb 2012: American Physical Society March Meeting  
Conductance of the Quantum Spin Hall Edge
- Feb 2012: Mauterndorf Winterschool, Austria (Invited Talk)  
Single Electron Probes of Fractional Quantum Hall States
- Jan 2012: MIT Condensed Matter Seminar  
Single Electron Probes of Fractional Quantum Hall States
- Jun 2011: Emergent Phenomena in Quantum Hall Systems (EPQHS4), Beijing, China (Invited Talk)  
Local Thermometry of the Quantum Hall Edge
- Mar 2011: American Physical Society March Meeting (Invited Talk)  
Local Charge of Fractional Quantum Hall States

Mar 2011: Harvard Center for Ultracold Atoms Seminar Talk  
Local Charge of Fractional Quantum Hall States

Nov 2010: Harvard Condensed Matter Theory Seminar  
Local Charge of the  $\nu = 5/2$  Quantum Hall State

Jul 2010: ETH Zürich  
Single Electron Probes of Fractional Quantum Hall States

Jul 2010: Max-Planck Institute für Festkörperforschung  
Single Electron Probes of Fractional Quantum Hall States

Mar 2010: APS March Meeting  
Local Charge of the  $\nu = 5/2$  Quantum Hall State

Oct 2008: Harvard Center for Ultracold Atoms Seminar Talk  
Charging of Localized Quantum Hall States

May 2008: Boston Area Hbar Meeting  
Charging of Localized Quantum Hall States

## Teaching

Instructor, Physics for Life Sciences 1 (PHYS 1145), Northeastern University, 2017-2019.  
Prepared lectures, held office hours, and advanced learning technology for a large lecture class.

Chief Science Officer, SchoolYourself.org. 2012-2015.  
Developed tools to provide automated and personalized math lessons at scale; authored the AlgebraX and GeometryX courses on MIT and Harvard's edX platform.

Teaching Fellow, Quantum Mechanics (Physics 143a), Harvard College, Fall 2010.  
CUE guide score 4.64/5.00

Teaching Assistant, Precalculus (Math E-10), Harvard Extension School, Spring 2009, Spring 2010, Spring 2011.

Nonresidential Tutor, Cabot House, Harvard College, 2010 – present  
Assisted undergraduates with course selection, coursework, and fellowship applications

Teaching Assistant, Electricity and Magnetism (8.02), MIT, Fall 2005  
Overall rating 6.1/7.0 (Excellent)

Head Teaching Assistant, Research Science Institute, MIT, Summer 2005  
Summer research program for high school students

Teaching Assistant, Research Science Institute, MIT, Summer 2004

Counselor, Research Science Institute, MIT, Summer 2003  
Organized activities for rising high school seniors

## Advising

GradPhi (Graduate Students in Physics at Northeastern) Faculty Advisor, 2017 – .

Mentor, Research Science Institute, 2017 - 2019.

## Refereeing

*Biomedical Optics Express, Cell Reports, eLife, Journal of Visualized Experiments, Nature, Neuron, Philosophical Transactions B, PLOS Computational Biology, Scientific Reports*

## Computing

Matlab, C, Python