VIJAY SINGH

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EDUCATION

2010-2015	Ph.D. (Physics)	Emory University, Atlanta, GA, USA. Thesis Advisor: Ilya Nemenman.
2008-2010	M.Sc. (Physics)	Indian Institute of Technology, Kanpur, India.
2005-2008	B.Sc. (Physics)	St. Stephen's College, Delhi University, India.

EMPLOYMENT

2015-2019	Postdoctoral Fellow (Independent Position) Computational Neuroscience Initiative & Department of Physics, University of Pennsylvania, Philadelphia, PA, USA.
2019-	Assistant Professor, Department of Physics, NC A&T State University, Greensboro, NC, USA.

TEACHING AND MENTORING

2020 Fall	Classical Mechanics	Teacher
2020 Fall	Biological Physics	Teacher
2020 Spring	Introduction to Computations in Physics	Teacher
2019 Fall	Classical Mechanics	Teacher
2017	Summer Undergraduate Research Experience	Co-Mentor
2016-17	Theoretical and Computational Neuroscience	Co-Teacher
2013	Summer Undergraduate Research Experience	Co-Mentor
2012	Introduction to Physics PHY 142	Teaching Assistant
2011	Introduction to Physics PHY 142	Laboratory Instructor
2010	Introduction to Physics PHY 141	Laboratory Instructor

HONORS AND AWARDS

2019	Sensing Chemical Spaces Travel Award	Princeton University
2015-19	Computational Neuroscience Initiative Postdoctoral Fellowship	University of Pennsylvania
2015	Shirley Chan Student Travel Award	American Physical Society
2014	Professional Development Training Award	Emory University
2014,15	SGA Travel Grant	Emory University
2014	Computational Neuroscience Travel Grant	Emory University
2012	ICAM Travel Grant	ICAM, Davis
2012-15	Professional Development Travel Award	Emory University
2009,10	50% Tuition Waiver	IIT, Kanpur, India
2009	Shrikant Mishra Memorial Scholarship	IIT, Kanpur, India
2008	Best Final Year Physics Student	St. Stephen's College, India
2006-08	Delhi University Science Fellowship	Delhi University, India
2006	Young Science Fellowship	IISc, Bangalore, India
2006	NIUS Scholarship	HBCSE, TIFR, India

SYNERGISTIC ACTIVITIES

2016-18	Computational regular office hours for the computational neuroscience community at University of Pennsylvania.
2015-18	Organizer, Computational Neuroscience Initiative Seminar Series, University of Pennsylvania.

2015, 2019	Session Chair, American Physical Society March Meeting, San Antonio, Texas.
2012-15	Organizer, Theoretical Biophysics Group Meetings, Emory University.
2012	Treasurer, Young Emory Physicists, Emory University.

ADDITIONAL TRAINING

2015	Methods in Computational Neuroscience (Summer School), Marine Biology Laboratories, Woods hole, USA.
2014	Winter School in Quantitative Systems Biology International Center for Theoretical Physics, Italy.
2014	Computational Approaches to Memory & Plasticity, (Summer School), National Center for Biological Sciences, India.
2013	Statistical physics, Optimization, Inference and Message-Passing algorithms, Ecole de Physique des Houches, France.
2012	Emergent Order in Biology, (Summer School), Institut d'études scientifiques de Cargèse, Cargese, France.

PROFESSIONAL MEMBERSHIPS

2011-	American Physical Society
2017 -	Society for Neuroscience
2019 -	Vision Science Society

PEER REVIEW

PLOS Computational Biology; Perception; Physiology and Behavior; Proceedings of the National Academy of Sciences; Journal of the Optical Society of America A

CONFERENCE ACTIVITY

June 2020	Equivalent Noise Characterization of Human Lightness Constancy, Virtual-VSS, Vision Science Society Annual Meeting, Online.
Dec 2019	(Invited) What the odor is not: Estimation by elimination, Sensing Chemical Spaces, Princeton University, New Jersey, NJ.
Apr 2019	(Invited) A Competitive Binding Model Predicts the Response of Mammalian Olfactory Receptors to Mixtures, Association for Chemoreception Sciences, Bonita Springs, Florida.
Mar 2018	(Invited) What the odor is not: Estimation by elimination. APS March Meeting, Boston, Massachusetts.
Mar 2018	Universal Properties of Estimating many Ligand Species Concentrations by many Cellular Receptor Types, APS March Meeting, Los Angeles, California.
Nov 2017	A Supervised Approach to Understanding Human Color Constancy for Naturalistic Scenes. Society for Neuroscience Annual Meeting, Washington, D.C.
Sep 2017	A Supervised Approach to Understand Human Color Constancy. Conference on Cognitive Computational Neuroscience, New York, New York.
Mar 2017	A Competitive Binding Model Predicts the Response of Mammalian Olfactory Receptors to Mixtures. APS March Meeting, New Orleans, Louisiana.
Aug 2015	Sensing Multiple Ligands with a Single Receptor. 9th q-bio Conference, Virginia Tech, Blacksburg, Virginia.
Mar 2015	Information Transmission by Receptors Correlated through Ligand Diffusion. STEM Symposium, Emory University, Atlanta, GA.
Mar 2015	Sensing Multiple Ligands with a Single Receptor. APS March Meeting, San Antonio, TX.
Aug 2014	Extrinsic and Intrinsic Correlations in Molecular Information Transmission. 8th q-bio Conference, Santa Fe, NM.
Mar 2014	Can Correlations Among Receptors Affect the Information About the Stimulus? APS March Meeting, Denver, CO.
Mar 2013	Continuum Neural Dynamics Models for Visual Object Identification. APS March Meeting, Baltimore, MD.
Mar 2012	Ordinary Percolation with Discontinuous Transitions. APS March Meeting, Boston, MA.

INVITED TALKS

2019 What the odor is not: Estimation by elimination, Flatiron Institute, New York, NY.
2019 What the odor is not: Estimation by elimination, John Carrol University, Cleveland, OH.
2019 What the odor is not: Estimation by elimination, Columbia University, New York, NY.
2015 Collective sensing in biological networks, University of Texas, Austin, TX.
2015 Collective sensing in biological networks, University of Pennsylvania, Philadelphia, PA.
2015 Collective sensing in biological networks, Simons Center for Data Science, New York, NY.
2015 Collective sensing in biological networks, University of California, Davis, CA.
2015 Continuum Model of Primary Visual Cortex for Contour Detection, Center for Brain Science, Harvard University, Boston, MA.

CAMPUS TALKS

2019 A computational approach to color constancy, University of Pennsylvania, Philadelphia, PA.
2018 What the odor is not: Estimation by elimination, University of Pennsylvania, Philadelphia, PA.
2017 Color constancy, University of Pennsylvania, Philadelphia, PA.
2015 Olfaction for dummies, University of Pennsylvania, Philadelphia, PA.
2015 Towards the understanding of network information processing in biology, Emory University, Atlanta, GA.
2011 Generating function approach to percolation on Hanoi networks, Emory University, Atlanta, GA.
2011 Model of Primary Visual Cortex for Contour Detection, Emory University, Atlanta, GA.

PUBLICATIONS

9. **V Singh**, I Nemanman. Universal Properties of Concentration Sensing in Ligand-Receptor Networks. *Physical Review Letters, 124*(2), 028101, 2020.
8. **V Singh**, N Murphy, V Balasubramanian, J Mainland. Competitive binding predicts nonlinear responses of olfactory receptors to complex mixtures. *Proceedings of the National Academy of Sciences*, *116*(19), 9598-9603, 2019.
7. **V Singh**, N Cotarris, B Heasly, D Brainard, J Burge. Computational Luminance Constancy from Naturalistic Images. *Journal of Vision*, **18**(19), 2018.
6. **V Singh**, I Nemenman. Simple Biochemical Networks allow Accurate Sensing of Multiple Ligands with a Single Receptor. *PLOS Computational Biology,* **13** (4), 2017.
5 **V Singh**, M. Tchernookov, I Nemenman. Effects of Receptor Correlations on Molecular Information Transmission. *Physical Review E* **94**, 022425, 2016.
4. **V Singh**, C T Brunson, S Boettcher. From Explosive to Infinite-Order Transitions on a Hyperbolic Network. *Physical Review E* **90**, 052119, 2014.
3. **V Singh**, M. Tchernookov, R Butterfield and I Nemenman. Director Field Model of the Primary Visual Cortex for Contour Detection. *PLOS ONE* **9,** e0108991, 2014.
2. **V Singh**, S Boettcher. Scaling of Clusters near Discontinuous Percolation Transitions in Hyperbolic Networks. *Physical Review E* **90**, 012117, 2014.
1. S Boettcher, **V Singh** and RM Ziff. Ordinary Percolation with Discontinuous Transitions. *Nature Communications* **3**, 787, 2012.

In Review

1. **V Singh**, M Tchernookov, V Balasubramanian. What the odor is not: Estimation by Elimination. bioRxiv: https://doi.org/10.1101/56862.