Curriculum Vitae
Aaditya V. Rangan

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- **Academic Affiliations and Professional Experience**
  - 2012-present: Courant Institute, NYU. Associate Professor
  - 2006-2012: Courant Institute, NYU. Assistant Professor
  - 2003-2006: Courant Institute, NYU. Postdoctoral Student
  - 1999-2003: University of California, Berkeley. Graduate Student

- **Education**
  - 2003: Ph.D. in Mathematics, University of California, Berkeley.
  - 1999: B.A. in Mathematics and Physics, Dartmouth College.

- **Research Interests**
  - Large-scale scientific modeling of physical, biological and neurobiological phenomena, and the development of efficient numerical methods and related analysis.
  - Large-scale analysis of genomic data, and the development of efficient methods for this analysis.
  - Computational tools for analyzing cryo-electron microscopy (Cryo-EM) data.

- **Grants and Awards:**
  - NIH grant U19 AG023122, $405,085, 2018-2023
  - NSF-NIH seed grant 24-74501-X0096-R9834: $24,696, 2016-2017.
  - NSF grant F7163: $355,580, 2012-2015.
  - NSF grant F6532: $270,000, 2009-2012.
  - Swartz Foundation: $54,000, 2006-2007.

- **Professional Associations**
  - 2018-present: Schork Lab, TGen, Affiliated Researcher
  - 2016-present: Flatiron Institute Center for Computational Mathematics, Consultant
  - 2015-present: NCBI dbGaP, Member
  - 2013-present: Psychiatric Genomics Consortium (PGC), Member

- **Professional Activities**
  - Advised Postdoctoral fellows Y. Sun, D. Zhou, D. Hu and J. Zhang
  - Advised Ph.D. thesis research of M. Patel (M.D. Ph.D. Student) and Zhongyi Wang.
  - Advised master's thesis research of Arjang Talattof, Brenda Jiminez, Rachid Ounit, Zuo Xi, Andrew Ronan, Sijing Shao, Quentin Chediak, Haosheng Zhao and Shreya Thirumalai.
  - Reviewer for various academic journals.
  - Grant Reviewer for DOE, NSF and NIH.

- **Publications**

- J.A. Elman, N.J. Schork, A.V. Rangan, the Alzheimer's Disease Neuroimaging Initiative. *Exploring the genetic heterogeneity of Alzheimer's disease: Evidence for genetic subtypes*. Journal of Alzheimer's Disease. accepted. medRxiv 2023.05.02.23289347; doi: https://doi.org/10.1101/2023.05.02.23289347. (2024).
- C. McGrouther, A.V. Rangan, A. Di Florio, J.A. Elman, N.J. Schork, J. Kelsoe, the Bipolar Disorder Working Group of the Psychiatric Genomics Consortium. *Heterogeneity analysis provides evidence for a genetically homogeneous subtype of bipolar-disorder.* PLoS Comput. Bio. (in submission). https://arxiv.org/abs/2405.00159 (2024).
- H. Zhou, W. Lin, S.R. Labra, S.A. Lipton, J.A. Elman, N.J. Schork, A.V. Rangan. *Detecting Boolean Asymmetric Relationships with a Loop Counting Technique and its Implications for Analyzing Heterogeneity within Gene Expression Datasets*. IEEE/ACM Transactions on Computational Biology and Bioinformatics. under revision. bioRxiv 2022.08.04.502792; doi: https://doi.org/10.1101/2022.08.04.502792. (2023).
- A.V. Rangan, L. Greengard. *Robust ab initio solution of the cryo-EM reconstruction problem at low resolution with small data sets*. J. Structural Biology. 215(3): 107994. (2023).
- A.V. Rangan, C. McGrouther, N. Bhadra, S. Venn-Watson, E.D. Jensen, N.S. Schork. *A time-series analysis of blood-based biomarkers within a 25-year longitudinal dolphin cohort*. PLoS Comput. Bio. 19(2): 10.1371/journal.pcbi.1010890. (2023).
- A.P. Chan, Y. Choi, A.V. Rangan, G. Zhang, A. Podder, M. Berens, S. Sharma, P. Pirrotte, S. Byron, D. Duggan, N.J. Schork. *Interrogating the Human Diplome: Computational Methods, Emerging Applications, and Challenges*. Methods Mol Biol. 2023;2590:1-30. doi: 10.1007/978-1-0716-2819-5_1. PMID: 36335489. (2022).
- A.V. Rangan., *Radial recombination for rigid rotational alignment of images and volumes*. Inverse Problems. 39(1): 10.1088/1361-6420/aca047. (2022).
- H. Tuckman, J. Kim, A.V. Rangan, H. Lei, M. Patel. *Dynamics of sensory integration of olfactory and mechanical stimuli within the response patterns of moth antennal lobe neurons*. J. Theoretical Biology. 509(21): 110510. (2021).
- M. Patel and A.V. Rangan. *Olfactory encoding within the insect antennal lobe: The emergence and role of higher order temporal correlations in the dynamics of antennal lobe spiking activity.* J. Theoretical Biology. 2021 Aug 7;522:110700. doi: 10.1016/j.jtbi.2021.110700. Epub 2021 Apr 2.
- L.S. Young, L. Tao, M. Shelley, R. Shapley, A.V. Rangan and D.W. McLaughlin. *The evolution of large-scale modeling of monkey primary visual cortex, V1: Steps towards understanding cortical function*. Commun. Math. Sci. 17(5): 1387-1406. (2019).
- A.V. Rangan, M. Spivak, J. Anden and A. Barnett, *Factorization of the translation kernel for fast rigid image alignment*. Inverse Problems. http://iopscience.iop.org/10.1088/1361-6420/ab4e66 (2019).
- J.W. Zhang, Y.X. Shao, A.V. Rangan, L. Tao, A coarse-graining framework for spiking neuronal networks: from strongly-coupled conductance-based integrate-and-fire neurons to augmented systems of ODEs. J. Comput. Neurosci. 46(2): 211-232. (2019).
- A.V. Rangan, C.C. McGrouther, J. Kelsoe, N. Schork, E. Stahl, Q. Zhu, A. Krishnan, V. Yao, O. Troyanskaya, S. Bilaloglu, P. Raghavan, S. Bergen, A. Jureus, M. Landen and the Bipolar Disorders Working Group of the Psychiatric Genomics Consortium, *A loop-counting method for covariate-corrected low-rank biclustering of gene-expression and genome-wide association study data*. PLoS Computational Biology. https://doi.org/10.1371/journal.pcbi.1006105 (2018).
- M. Patel, A.V. Rangan, *Role of the locus coeruleus in the emergence of power law wake bouts in a model of the brainstem sleep-wake system through early infancy*. J. Theoretical Biology. 426(7): 82-95 (2017).
- H. Lei, Y. Yu, S. Zhu, A.V. Rangan, *Intrinsic and network mechanisms constrain neural synchrony in the moth antennal lobe*. Frontiers in Physiology, doi: 10.3389/fphys.2016.00080 (2016).

- J. Zhang, A.V. Rangan, *A reduction for spiking integrate-and-fire network dynamics ranging from homogeneity to synchrony*. J. Comput. Neurosci. 38(2):355-404. doi: 10.1007/s10827-014-0543-3 (2015).
- J. Zhang, D. Zhou, D. Cai and A.V. Rangan, *A coarse-grained framework for spiking neuronal networks: between homogeneity and synchrony*. J. Comput. Neurosci. DOI 10.1007/s10827-013-0488-y (2013).
- A.V. Rangan, L.S. Young. *Emergent dynamics in a model of visual cortex.,* J. Comput. Neurosci. 35(2): 155-167 DOI: 10.1007/s10827-013-0445-9 (2013).
- D. Zhou, A.V. Rangan, D.W. McLaughlin and D. Cai, Spatiotemporal dynamics of neuronal population response in the primary visual cortex. Proc. Nat. Acad. Sci. (USA). 110(23): 9517-9522 (2013)
- J. Zhang, K.A. Newhall, D. Zhou and A.V. Rangan*, Distribution of correlated spiking events in a population-based approach for Integrate-and-Fire networks*. J. Comput. Neurosci. 10.1007/s10827-013-0472-6 (2013).
- A.V. Rangan, L.S. Young. *Dynamics of spiking neurons: between homogeneity and synchrony.* J. Comput. Neurosci. 34(3) 433-460 DOI: 10.1007/s10827-012-0429-1 (2013).
- M. Patel, A.V. Rangan, D. Cai. *Coding of odors by temporal binding within a model network of the locust antennal lobe*, Frontiers in Computational Neuroscience. 7(50) DOI: 10.3389/fncom.2013.00050. (2013).
- A.V. Rangan, *A simple filter for detecting low-rank submatrices,* J. Comput. Phys. 231(7): 2682-2690, (2012).
- A.V. Rangan, *Detecting low-rank clusters of vectors via random sampling,* J. Comput. Phys. 231(1): 215-222, (2012).
- D. Hu, D. Cai and A.V. Rangan, *Blood Vessel Adaptation with Fluctuations in Capillary Flow Distribution*. PLoS One. 7(9): e45444 (2012).
- A.V. Rangan, *Functional Roles for Synaptic-Depression within a Model of the Fly Antennal Lobe*, PLoS Comput. Bio. 8(8): e1002622. (2012).
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- A.V. Rangan, L. Tao, G. Kovacic, and D. Cai, *Large-Scale Computational Modeling of the Primary Visual Cortex*, In K. Josic, M.A. Matias, R. Romo, and J. Rubin, editors, *Coherent Behavior in Neuronal Networks*, volume 3 of *Springer Series in Computational Neuroscience*, Springer-Verlag, 263-296, (2009).
- A.V. Rangan, L. Tao, G. Kovacic, and D. Cai, *Multi-scale Modeling of the Primary Visual Cortex*, IEEE Engineering in Medicine and Biology Magazine, 28(3):19-24, (2009).
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- A.V. Rangan, D. Cai and D. McLaughlin, *Quantifying neuronal network dynamics through coarse-grained event trees,* Proc. Nat. Acad. Sci. (USA), 105, 10990 (2008).
- A.V. Rangan, D. Cai and G. Kovacic, *Kinetic theory for neuronal networks with fast and slow excitatory conductances driven by the same spike train*, Phys. Rev. E **77** 041915 (2008)
- A.V. Rangan and D. Cai, *Fast numerical methods for simulating large-scale integrate-and-fire neuronal networks*, J. Comput. Neurosci. 22, 81-100 (2007).
- A.V. Rangan, *Automatic coordinate transformation for two-point boundary value problems*, Commun. Math Sci. 5 (2007).
- A.V. Rangan, D. Cai and L. Tao, *Numerical methods for solving moment equations in kinetic theory of neuronal network dynamics*, J. Comput. Phys. 221, 781-798 (2007).
- A.V. Rangan and D. Cai, *Maximum-entropy closures for kinetic theories of neuronal network dynamics*, Phys. Rev. Lett. 96, 178101 (2006).
- D. Cai, L. Tao, A.V. Rangan and D. McLaughlin, *Kinetic theory for neuronal network dynamics*, Comm. Math. Sci. 4, 97 (2006).
- A.V. Rangan, D. Cai and D. McLaughlin, *Modeling the spatiotemporal cortical activity associated with the line-motion illusion in primary visual cortex*, Proc. Natl. Acad. Sci. (USA), 102, 18793 (2005).
- D. Cai, A.V. Rangan and D. McLaughlin, *Architectural and synaptic mechanisms underlying coherent spontaneous activity in V1*, Proc. Natl. Acad. Sci. (USA), 102**,** 5868 (2005).
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