YANLIANG SHI

Princeton Neuroscience Institute, Washington Road, Princeton, NJ 08544, USA
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EDUCATION

Stony Brook University, New York, USA *Aug 2012- Aug 2018*
Ph.D. Theoretical Physics
Advisor: Prof. Robert Shrock

Nankai University, Tianjin, China *Sep 2008- Jun 2012*
Bachelor of Science Major: Physics
GPA: 91.8/100 Graduated 1^{st} in Class

PROFESSIONAL POSITIONS

Princeton Neuroscience Institute
Princeton University, New Jersey, USA *Jan 2023- Present*
Associate Research Scholar
Advisor: Prof. Tatiana Engel

International Brain Laboratory *Aug 2020- Present*
Researcher
Advisor: Prof. Tatiana Engel

Cold Spring Harbor Laboratory, New York, USA *May 2018- Dec 2022*
Postdoctoral fellow
Advisor: Prof. Tatiana Engel

C. N. Yang Institute for Theoretical Physics
Stony Brook University, NY, USA *Aug 2014- May 2018*
Ph.D. Thesis Student and Graduate Research Assistant

Department of Physics and Astronomy
Stony Brook University, NY, USA *Aug 2012- Aug 2014*
Graduate Teaching Assistant

RESEARCH INTERESTS

- Theoretical and Computational Neuroscience
- Theoretical Particle Physics and Quantum Field Theory

HONORS AND AWARDS

Trainee Highlight Award (Honorable Mention), 8th Annual BRAIN Initiative Meeting, in virtual *2022*
Swartz Foundation Fellow in Neuroscience, Swartz Foundation *2019*
Travel Award to attend 28th Annual Computational Neuroscience Meeting, Barcelona, Spain *2019*
Travel Award to attend Ninth International Workshop "Statistical Analysis of Neuronal Data" (SAND9), Pittsburgh, PA *2019*
Physics/Astronomy Dept. and YITP Travel Awards to participate in Simons Non-perturbative Bootstrap School at ICTP-SAIFR, Sao Paulo, Brazil and Higgs Centre School of Theoretical Physics at the University of Edinburgh *2017*
YITP Travel Award to attend and present at the workshop on "Effective Field Theories as Discovery Tool", Johannes Gutenberg University, Mainz, Germany *2016*

YITP Travel Award to attend and present at the workshop "Origin of Mass 2016", CP3-Origins, University of Southern Denmark, Denmark *2016*
Di Tian Prize for Outstanding Scholarship and Departmental Citizenship, Stony Brook University *2016*
The National Scholarship, China (awarded annually to top 0.2% students nation wide) *2011*
First-Grade Scholarship of Nankai University, China *2009*

PUBLICATIONS

1. **Y.-L. Shi**, R. Zeraati, A.Levina, T. A. Engel, "A census of intrinsic timescales across the mouse whole brain", bioRxiv (2025).
2. **Y.-L. Shi**, G. Chan, X. Chen, T. Moore, K. Boahen and T. Engel, "Spatiotemporal dynamics of cortical states in prefrontal cortex", to appear in bioRxiv (2025).
3. **International Brain Laboratory**, et al, "A Brain-wide map of neural activity during complex behaviour", bioRxiv 2023.07.04.547681 (2023). (Nature, in review)
4. Charles Findling, Felix Hubert, **International Brain Laboratory**, et al, "Brain-wide representations of prior information in mouse decision-making",bioRxiv 2023.07.04.547684 (2023). (Nature, in review)
5. **International Brain Laboratory**, et al, "A modular architecture for organizing, processing and sharing neurophysiology data", Nature Methods 20, 403–407 (2023).
6. R. Zeraati, **Y.-L. Shi**, N. A. Steinmetz, M. A. Gieselmann, A. Thiele, T. Moore, A. Levina, T. A. Engel, "Intrinsic timescales in the visual cortex change with selective attention and reflect spatial connectivity", Nature Communications 14, 1858 (2023).
7. **Y.-L. Shi**, R. Zeraati, A.Levina, T. A. Engel, "Spatial and temporal correlations in neural networks with structured connectivity", Phys. Rev. Research **5**, 013005 (2023), in the collection "Physics of Neuroscience".
8. **Y.-L. Shi**, N. Steinmetz, T. Moore, K. Boahen and T. Engel, "Cortical state dynamics and selective attention define the spatial pattern of correlated variability in neocortex", Nature Communications 13, 44 (2022).
9. H. W. Ke, G. Y. Fang and **Y.-L. Shi**, "Study on the mixing of Ξ_c and Ξ_c' by the transition $\Xi_b \to \Xi_c^{(\prime)}$," Phys. Rev. D **109**, no.7, 073006 (2024) [arXiv:2401.11106 [hep-ph]].
10. F. Lu, H. W. Ke, X. H. Liu and **Y. L. Shi**, "Study on the weak decay between two heavy baryons $\mathcal{B}_i(\frac{1}{2}^+) \to \mathcal{B}_f(\frac{3}{2}^+)$ in the light-front quark model," Eur. Phys. J. C **83**, 412 (2023) [arXiv:2303.02946].
11. H. W. Ke and **Y.-L. Shi**, "The study of possible molecular states of $D_s^{(*)}D_s^{(*)}$ and $B_s^{(*)}B_s^{(*)}$," Phys. Rev. D **105**, no.11, 114019 (2022) [arXiv:2202.13380].
12. H. W. Ke, X. Han, X. H. Liu and **Y.-L. Shi**, "Tetraquark state $X(6900)$ and the interaction between diquark and antidiquark," Eur. Phys. J. C **81**, no.5, 427 (2021) [arXiv:2103.13140].
13. H.-Y. Cheng and **Y.-L. Shi**, "Lifetimes of Doubly Charmed Baryons,", Phys. Rev. D **98**, 113005 (2018) [arXiv:1809.08102].
14. **Y.-L. Shi**, "Revisiting radiative decays of 1^{+-} heavy quarkonia in the covariant light-front approach," Eur. Phys. J. C **77**, no. 4, 253 (2017) [arXiv:1611.09838].
15. **Y.-L. Shi** and R. Shrock, "Dynamical Symmetry Breaking in Chiral Gauge Theories with Direct-Product Gauge Groups", Phys. Rev. D **94**, 065001 (2016) [arXiv:1606.08468].
16. **Y.-L. Shi** and R. Shrock, "$A_k\bar{F}$ Chiral Gauge Theories", Phys. Rev. D **92**, 105032 (2015) [arXiv:1510.07663].

17. **Y.-L. Shi** and R. Shrock, "Renormalization-Group Evolution and Nonperturbative Behavior of Chiral Gauge Theories with Fermions in Higher-Dimensional Representations", Phys. Rev. D **92**, 125009 (2015) [arXiv:1509.08501].

18. **Y.-L. Shi** and R. Shrock, "Renormalization-Group Evolution of Chiral Gauge Theories", Phys. Rev. D **91**, 045004 (2015) [arXiv:1411.2042].

19. H.-W. Ke, X.-Q. Li and **Y.-L. Shi**, "The Radiative Decays of 0^{++} and 1^{+-} Heavy Mesons", Phys. Rev. D **87**, 054022 (2013) [arXiv:1301.4014].

20. H.-W. Ke, X.-Q. Li, **Y.-L. Shi**, G.-L. Wang and X.-H. Yuan, "Is $Z_b(10610)$ a Molecular State?", JHEP **1204**, 056 (2012) [arXiv:1202.2178].

PAPERS IN PREPARATION

1. **Y.-L. Shi**, C. Krasniak, A. Zador and T. Engel, "Computational framework for mesoscopic functional dynamics based on biological connectome of mouse cortex", in preparation.

TALKS AND POSTER PRESENTATIONS

- "Universal scaling of intrinsic timescales across the whole mouse brain", poster, Cosyne 2025, Montreal, Canada, 2025
- "The connectome defines large-scale functional dynamics of neural activity across the mouse cortex", talk, Cosyne 2024, Cascais, Portugal, 2024
- "A multiscale theoretical framework for neural dynamics and computation", talk, European Neuroscience Institute Göttingen, Göttingen, Germany, 2023
- "A multiscale theoretical framework for neural dynamics and computation", talk, Washington University in St. Louis, Missouri, 2023
- "Spatiotemporal dynamics of cortical states in prefrontal cortex", poster, Neurobiology of Cognition GRC, Maine, 2022
- "Coding of vision, action initiation, action selection, and expectation in single neurons across the brain in The International Brain Lab dataset", poster, Society for Neuroscience 50th Annual Meeting, in virtual, 2021
- "A mesoscale connectome defines low-dimensional dynamics of neural activity across the mouse cortex", poster, Cosyne 2021, in virtual, 2021
- "Spatiotemporal neural correlations and network dynamics", poster, Cosyne 2020, Denver, CO, 2020
- "Spatiotemporal neural correlations and network dynamics", poster, workshop on "The Operating Regime of Neural Circuits as a Determinant for Computations", Janelia Research Campus, 2019
- "Linking noise correlations to spatiotemporal population dynamics and network structure", poster, Society for Neuroscience 49th Annual Meeting, Chicago, IL, 2019
- "Linking noise correlations to spatiotemporal population neural dynamics and network structure", poster, 28th Annual Computational Neuroscience Meeting,, Barcelona, Spain, 2019
- "Linking noise correlations to spatiotemporal population neural dynamics and network structure", talk, Advanced Methods in Theoretical Neuroscience, Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany, 2019
- "Linking noise correlations to spatiotemporal population neural dynamics and network structure", poster, Ninth International Workshop "Statistical Analysis of Neuronal Data", University of Pittsburgh, Pittsburgh, PA 2019

- "Recent Results on Nonperturbative Behavior of Chiral Gauge Theories", talk, Higgs Centre School of Theoretical Physics, University of Edinburgh, UK, 2017
- "Renormalization-Group Evolution and Nonperturbative Behavior of Chiral Gauge Theories", Mainz Institute for Theoretical Physics (MITP) Workshop on Effective Field Theories, Johannes Gutenberg University, Mainz, Germany, 2016
- "Renormalization-Group Evolution of Asymptotically Free Chiral Gauge Theories", Center for Cosmology and Particle Physics Phenomenology (CP3)-Origins, University of Southern Denmark, Odense, Denmark, 2016
- "Renormalization-Group Evolution of Asymptotically Free Chiral Gauge Theories", C. N. Yang ITP, Stony Brook University, 2015
- "Renormalization-Group Evolution of Asymptotically Free Chiral Gauge Theories", C. N. Yang ITP, Stony Brook University, 2015
- "UV to IR Evolution of Asymptotically Free Chiral Gauge Theories", C. N. Yang ITP, Stony Brook University, 2014

CONFERENCES AND WORKSHOPS

- Cosyne 2025, Montreal, Canada, Mar 27-30, 2025
- Cosyne 2024, Cascais, Portugal, Mar 4-5, 2024
- Neuroscience 2023, Society of Neuroscience, Washington, D.C., November 11-15, 2023
- Lake Conference, Neural coding and dynamics, Seattle, September 17-21, 2023
- Gordon Research Conference, Neurobiology of Cognition, Maine, Jul 24-29, 2022
- 8th Annual BRAIN Initiative Meeting, in virtual, Jun 21-22, 2022
- Neuroscience 2021, Society of Neuroscience, in virtual, Nov. 8-11, 2021
- Cosyne 2021, in virtual, Feb 24-26, 2021
- Cosyne 2020, Denver and Breckenridge, Colorado, Feb. 27 - Mar. 3, 2020
- Workshop on "The Operating Regime of Neural Circuits as a Determinant for Computations", Janelia Research Campus, Nov. 3-6, 2019
- Neuroscience 2019, Society of Neuroscience, Chicago, Oct. 19-23, 2019
- 28th Annual Computational Neuroscience Meeting (CNS2019), Barcelona, Spain, Jul. 13–17, 2019
- Advanced Methods in Theoretical Neuroscience 2019, Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany, Jul. 10-12, 2019
- Ninth International Workshop Statistical Analysis of Neuronal Data (SAND9), University of Pittsburgh, Pittsburgh, May 21-23, 2019
- Simons Summer Workshop on Strings and Quantum Field Theory without Supersymmetry, Simons Center for Geometry and Physics, Stony Brook, July 17-August 11, 2017
- Higgs Centre School of Theoretical Physics 2017, University of Edinburgh, UK, May 29-June 2, 2017
- Simons Non-perturbative Bootstrap School, ICTP-SAIFR (International Centre for Theoretical Physics, South American Institute for Fundamental Research), Sao Paulo, Brazil, May 22-29, 2017

- New Developments in Conformal Field Theory Above Two Dimensions, The Princeton Center for Theoretical Science (PCTS), Princeton University, March 6-8, 2017
- Effective Field Theories as Discovery Tools, Mainz Institute for Theoretical Physics (MITP), Johannes Gutenberg University of Mainz, Aug, 2016 (gave talk)
- Origin of Mass 2016, Center for Cosmology and Particle Physics Phenomenology (CP3)-Origins, University of Southern Denmark, Odense, Denmark, May, 2016 (gave talk)
- Unification Day Workshop, Stony Brook University, Oct. 2015
- International Workshop for the Next Nucleon Decay and Neutrino Detector (NNN15), Stony Brook University, Oct. 2015
- 7th International Workshop on the Dark Side of the Universe, Kavli Institute for Theoretical Physics, Chinese Academy of Sciences, Beijing, China, Sep. 2011 (undergraduate participant)
- Workshop on Neutrino Physics in the Daya Bay Era, Chinese Academy of Sciences, Beijing, China Nov. 2010 (undergraduate participant)

REVIEW EXPERIENCE

- Science Advances (1), ISSN: 2375-2548. Network Neuroscience (1), ISSN: 2472-1751. Cerebral Cortex (1), ISSN: 1047-3211. Cell (1), ISSN: 1097-4172. Physical Review X Life (1), ISSN: 2160-3308. iScience (2), ISSN 2589-0042. Communications Biology (1), ISSN 2399-3642.

REFERENCES

Prof. Tatiana Engel (Postdoctoral advisor), Princeton University, USA
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Prof. Anthony Zador , Cold Spring Harbor Laboratory, USA
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Prof. Nicholas Steinmetz , University of Washington, USA
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Prof. Anna Levina , University of Tübingen, Germany
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Prof. Robert Shrock (Ph.D. thesis advisor), Yang Institute for Theoretical Physics and Dept. of Physics and Astronomy, Stony Brook University, USA
robert.shrock@stonybrook.edu

TEACHING EXPERIENCE

Course Grader, PHY 503: Mathematical Physics	*Fall 2017*
Teaching Assistant, PHY 124: Physics for Life Sciences Laboratory II	*Spring 2014*
Course Grader, PHY 505: Classical Electrodynamics	*Fall 2013*
Course Grader, PHY 431: Nuclear and Particle Physics	*Spring 2013*
Teaching Assistant, PHY 123: Physics for Life Sciences Laboratory I	*Fall 2012*