Lixiang Xu

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Research interests

Computational neuroscience, human behavior & human brain imaging, fMRI, natural language processing, EEG, machine learning, computational geometry

Work

California Institute of Technology Pasadena, CA
Postdoc Scholar Research Associate in Computational Imaging July 2022 - Now
PI: Prof. Dean Mobbs

Education

University of Texas at Austin Austin, Texas
Ph.D. in Physics Sep 2014 – June 2022
Advisor: Prof. Alexander G. Huth. *GPA: 3.75.*

University of Science and Technology of China Hefei, Anhui, China
B.S. in Physics Sep 2010 – May 2014
Advisor: Prof. Zhensheng Yuan. *GPA: 3.85.*

Honors and scholarships

National outstanding undergraduates (USTC) 2014
National scholarship (USTC) 2013
Second Prize in college students mathematical competition (CMS) 2012

Research experience

Fear Lab
PI: Dean Mobbs (Caltech) Jul 2022 - Now

- Research on human behaviors under threat and brain neural responses for decision-making

Huth Lab
Advisor: Alexander G. Huth (UT-Austin) Jan 2018 – Jun 2022

- Research on understanding the saliency of distractors using fMRI and EEG. We designed distracting experiments with narrative stories and natural sounds, collected thousands of human behavior data on gorilla and prolific platform, and conducted statistical and linear regression analysis to study distracting effects, which will be used to design fMRI and EEG experiments. (In progress)
- Research on applying shared response model on building better encoding models. We reported the sparse experimental paradigm to collect brain data with limitations and train better language encoding models.
- Research on calculating interior distance in complex 3D body, human cortex for example, with heat kernel method.
- Research on improving biharmonic approximation method by sampling landmarks with saddle points.

Light Matter Interactions at the Nano Scale
Adviser: Professor Xiaoqin (Elaine) Li (UT-Austin) Sep 2014 – Jun 2017
Research on light matter quantum interactions on atomic thin materials, such as WSe_2 and $MoSe_2$.

Nanoelectronic Materials Research Group
Adviser: Professor Chih-Kang (Ken) Shih (UT-Austin) Jun 2013 – Sep 2013
We measured excitation states of semiconductor materials with photoluminescence spectroscopy.

Hefei National Laboratory for Physical Science at the Microscale
Adviser: Professor Zhensheng Yuan (USTC) Jan 2012 – April 2014
We set up optical lattices to trap and manipulating ultra-cold atoms and simulate Bose-Einstein Condensate. I researched the applications of atomic clock in ultra-cold experiments and simulated light diffraction in ultra-small slit.

Publications

Jan 2018 – present, in Computational Neuroscience
Sparse experimental design for brain data (in preparation)
Lixiang Xu, Amanda I. LeBel, Alexander G. Huth.

Sep 2014 – Oct 2017, in Physics
Neutral and charged inter-valley biexcitons in monolayer MoSe2
K. Hao, J. F. Specht, P. Nagler, Lixiang Xu, K. Tran, A. Singh, C. K. Dass, C. Schuller, T. Korn, M. Richter, A. Knorr, X. Li and G. Moody
Nature Communications, 2017.

Trion valley coherence in monolayer semiconductors

K. Hao, Lixiang Xu, F. Wu, P. Nagler, K. Tran, X. Ma, C. Schuller, T. Korn, A. H. MacDonald, G. Moody and X. Li.
2D Materials, 2017.

Coherent and incoherent coupling dynamics between neutral and charged excitons in monolayer MoSe2
K. Hao, Lixiang Xu, P. Nagler, A. Singh, K. Tran, C. K. Dass, C. Schuller, T. Korn, X. Li and G. Moody
Nano Letters, 2016.

Direct measurement of exciton valley coherence in monolayer WSe2
K. Hao, G. Moody, F. Wu, C. K. Dass, Lixiang Xu, C. H. Chen, M. Y. Li, A. H. MacDonald and X. Li
Nature Physics, 2016.

Coherent quantum dynamics of excitons in monolayer transition metal dichalcogenides
G. Moody, K. Hao, C. K. Dass, A. Singh, Lixiang Xu, K. Tran, C. H. Chen, M. Y. Li, L. J. Li, G. Clark, G. Berghauser, E. Malic, A. Knorr, X. Xu and X. Li
International Society for Optics and Photonics, 2016.

Skills

Programming
Proficient in: python, pytorch, tensorflow, matlab
Familiar with: java script, html

Languages
English (fluent), Chinese (advanced)

Conference presentations

Society of Neuroscience Oct 2019
Sparse experimental design for encoding models.

American Physical Society Mar 2017
Neutral and charged inter-valley biexcitons in monolayer transition metal dichalcogenides.

Other interests

Play and design computer games, FCPX.