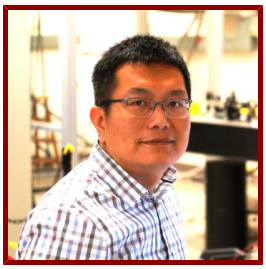
Stanford



Xiaodong Xu

Professor of Applied Physics

Bio

BIO

Xiaodong Xu is a Professor of Applied Physics at Stanford University. He received his Ph.D. in Physics from the University of Michigan in 2008 and conducted postdoctoral research in Physics at Cornell University from 2009 to 2010. From 2010 to 2026, he was a faculty member at the University of Washington, with appointments in the Department of Physics and the Department of Materials Science and Engineering.

Xu's research explores emergent quantum phenomena in atomically thin materials, with a particular focus on moiré quantum matter, topological and correlated electronic states, magnetism, and spin–valley physics. By combining quantum device engineering with optical spectroscopy, magneto-optical techniques, and quantum transport, his group seeks to discover, understand, and control new states of quantum matter, with the goal of enabling new forms of quantum electronics and optoelectronics.

His research has contributed to the discovery and understanding of valleytronics, two-dimensional magnets, moiré excitons, moiré magnetism, quantum spin Hall insulators, and the fractional quantum anomalous Hall effect. His current interests include anyon quantum matter, interacting topological phases, quantum magnetism, and the optical control and readout of correlated quantum systems. He is a recipient of the 2025 National Academy of Sciences Award for Scientific Discovery and the 2025 Dan Maydan Prize in Nanoscience Research.

ACADEMIC APPOINTMENTS

- Professor, Applied Physics

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Xu's research explores emergent quantum phenomena in atomically thin materials, with a particular focus on moiré quantum matter, topological and correlated electronic states, magnetism, and spin–valley physics. By combining quantum device engineering with optical spectroscopy, magneto-optical techniques, and quantum transport, his group seeks to discover, understand, and control new states of quantum matter, with the goal of enabling new forms of quantum electronics and optoelectronics.

Teaching

COURSES

2026-27

- Condensed Matter Seminar: APPPHYS 470 (Win)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Weijie Li, Yue Sun, Zijie Yan

Publications

PUBLICATIONS

- **Signatures of fractional charges via anyon-trions in twisted MoTe2.** *Nature*
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- **Observation of dissipationless fractional Chern insulator** *NATURE PHYSICS*
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- **Optical control of orbital magnetism in magic-angle twisted bilayer graphene** *NATURE PHYSICS*
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- **Nonmonotonic Band Flattening near the Magic Angle of Twisted Bilayer MoTe2** *PHYSICAL REVIEW X*
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- **Local probe of bulk and edge states in a fractional Chern insulator.** *Nature*
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  2024; 635 (8039): 578-583

- **Trion sensing of a zero-field composite Fermi liquid.** *Nature*
  Anderson, E., Cai, J., Reddy, A. P., Park, H., Holtzmann, W., Davis, K., Taniguchi, T., Watanabe, K., Smolenski, T., Imamoğlu, A., Cao, T., Xiao, D., Fu, et al
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Wu, H., Hu, C., Xie, Y., Jang, B., Huang, J., Guo, Y., Wu, S., Hu, C., Yue, Z., Shi, Y., Basak, R., Ren, Z., Yilmaz, et al
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