

Xiaodong Xu

Professor, Applied Physics

Bio

ACADEMIC APPOINTMENTS

- Professor, Applied Physics

Publications

PUBLICATIONS

- **Signatures of fractional charges via anyon-trions in twisted MoTe₂.** *Nature*
Li, W., Wang Beach, C., Hu, C., Taniguchi, T., Watanabe, K., Chu, J. H., Imamoğlu, A., Cao, T., Xiao, D., Xu, X.
2026; 651 (8104): 48-53
- **Atomically Resolved Acoustic Dynamics Coupled with Magnetic Order in a Van der Waals Antiferromagnet.** *Advanced materials (Deerfield Beach, Fla.)*
Zhou, F., Hwangbo, K., Ha, S. S., Zhang, X. W., Chun, S. H., Park, J., Eom, I., Jiang, Q., Yang, Z., Zajac, M., Kim, S., Choi, S., Chu, et al
2026: e22280
- **Observation of dissipationless fractional Chern insulator** *NATURE PHYSICS*
Park, H., Li, W., Hu, C., Beach, C., Goncalves, M., Mendez-Valderrama, J., Herzog-Arbeitman, J., Taniguchi, T., Watanabe, K., Cobden, D., Fu, L., Bernevig, B., Regnault, et al
2026
- **Optical control of integer and fractional Chern insulators** *NATURE*
Holtzmann, W., Li, W., Anderson, E., Cai, J., Park, H., Hu, C., Taniguchi, T., Watanabe, K., Chu, J., Xiao, D., Cao, T., Xu, X.
2026; 649 (8099): 1147-1152
- **Optical control of orbital magnetism in magic-angle twisted bilayer graphene** *NATURE PHYSICS*
Persky, E., Parisot, L., He, M., Cai, J., Taniguchi, T., Watanabe, K., May-Mann, J., Xu, X., Kapitulnik, A.
2026
- **Nonmonotonic Band Flattening near the Magic Angle of Twisted Bilayer MoTe₂** *PHYSICAL REVIEW X*
Deng, Y., Holtzmann, W., Zhu, Z., Zaklana, T., Majchrzak, P., Taniguchi, T., Watanabe, K., Hashimoto, M., Lu, D., Jozwiak, C., Bostwick, A., Rotenberg, E., Fu, et al
2025; 15 (4)
- **Roadmap for Photonics with 2D Materials.** *ACS photonics*
de Abajo, F. J., Basov, D. N., Koppens, F. H., Orsini, L., Ceccanti, M., Castilla, S., Cavicchi, L., Polini, M., Gonçalves, P. A., Costa, A. T., Peres, N. M., Mortensen, N. A., Bharadwaj, et al
2025; 12 (8): 3961-4095
- **Ferromagnetism and topology of the higher flat band in a fractional Chern insulator** *NATURE PHYSICS*
Park, H., Cai, J., Anderson, E., Zhang, X., Liu, X., Holtzmann, W., Li, W., Wang, C., Hu, C., Zhao, Y., Taniguchi, T., Watanabe, K., Yang, et al
2025; 21 (4)
- **Local probe of bulk and edge states in a fractional Chern insulator.** *Nature*
Ji, Z., Park, H., Barber, M. E., Hu, C., Watanabe, K., Taniguchi, T., Chu, J. H., Xu, X., Shen, Z. X.
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
2024; 635 (8039): 590-595
- **Reversible non-volatile electronic switching in a near-room-temperature van der Waals ferromagnet.** *Nature communications*
Wu, H., Chen, L., Malinowski, P., Jang, B. G., Deng, Q., Scott, K., Huang, J., Ruff, J. P., He, Y., Chen, X., Hu, C., Yue, Z., Oh, et al
2024; 15 (1): 2739
- **Spectral evidence for local-moment ferromagnetism in the van der Waals metals Fe₃GaTe₂ and Fe₃GeTe₂** *PHYSICAL REVIEW B*
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
2024; 109 (10)
- **Observation of fractionally quantized anomalous Hall effect.** *Nature*
Park, H., Cai, J., Anderson, E., Zhang, Y., Zhu, J., Liu, X., Wang, C., Holtzmann, W., Hu, C., Liu, Z., Taniguchi, T., Watanabe, K., Chu, et al
2023; 622 (7981): 74-79
- **Signatures of fractional quantum anomalous Hall states in twisted MoTe₂.** *Nature*
Cai, J., Anderson, E., Wang, C., Zhang, X., Liu, X., Holtzmann, W., Zhang, Y., Fan, F., Taniguchi, T., Watanabe, K., Ran, Y., Cao, T., Fu, et al
2023; 622 (7981): 63-68
- **Spin-mediated shear oscillators in a van der Waals antiferromagnet.** *Nature*
Zong, A., Zhang, Q., Zhou, F., Su, Y., Hwangbo, K., Shen, X., Jiang, Q., Liu, H., Gage, T. E., Walko, D. A., Kozina, M. E., Luo, D., Reid, et al
2023
- **Programming correlated magnetic states with gate-controlled moiré geometry.** *Science (New York, N.Y.)*
Anderson, E., Fan, F. R., Cai, J., Holtzmann, W., Taniguchi, T., Watanabe, K., Xiao, D., Yao, W., Xu, X.
2023; 381 (6655): 325-330
- **Dipole ladders with large Hubbard interaction in a moiré exciton lattice** *NATURE PHYSICS*
Park, H., Zhu, J., Wang, X., Wang, Y., Holtzmann, W., Taniguchi, T., Watanabe, K., Yan, J., Fu, L., Cao, T., Xiao, D., Gamelin, D. R., Yu, et al
2023; 19 (9): 1286+
- **Tunable interaction between excitons and hybridized magnons in a layered semiconductor.** *Nature nanotechnology*
Diederich, G. M., Cenker, J., Ren, Y., Fonseca, J., Chica, D. G., Bae, Y. J., Zhu, X., Roy, X., Cao, T., Xiao, D., Xu, X.
2023; 18 (1): 23-28
- **Light-induced ferromagnetism in moiré superlattices.** *Nature*
Wang, X., Xiao, C., Park, H., Zhu, J., Wang, C., Taniguchi, T., Watanabe, K., Yan, J., Xiao, D., Gamelin, D. R., Yao, W., Xu, X.
2022; 604 (7906): 468-473
- **Reversible strain-induced magnetic phase transition in a van der Waals magnet.** *Nature nanotechnology*
Cenker, J., Sivakumar, S., Xie, K., Miller, A., Thijssen, P., Liu, Z., Dismukes, A., Fonseca, J., Anderson, E., Zhu, X., Roy, X., Xiao, D., Chu, et al
2022; 17 (3): 256-261
- **Interlayer electronic coupling on demand in a 2D magnetic semiconductor.** *Nature materials*
Wilson, N. P., Lee, K., Cenker, J., Xie, K., Dismukes, A. H., Telford, E. J., Fonseca, J., Sivakumar, S., Dean, C., Cao, T., Roy, X., Xu, X., Zhu, et al
2021; 20 (12): 1657-1662
- **Direct visualization of magnetic domains and moiré magnetism in twisted 2D magnets.** *Science (New York, N.Y.)*
Song, T., Sun, Q. C., Anderson, E., Wang, C., Qian, J., Taniguchi, T., Watanabe, K., McGuire, M. A., Stöhr, R., Xiao, D., Cao, T., Wrachtrup, J., Xu, et al
2021; 374 (6571): 1140-1144
- **Switching 2D magnetic states via pressure tuning of layer stacking.** *Nature materials*
Song, T., Fei, Z., Yankowitz, M., Lin, Z., Jiang, Q., Hwangbo, K., Zhang, Q., Sun, B., Taniguchi, T., Watanabe, K., McGuire, M. A., Graf, D., Cao, et al
2019
- **Giant nonreciprocal second-harmonic generation from antiferromagnetic bilayer CrI₃.** *Nature*

Sun, Z., Yi, Y., Song, T., Clark, G., Huang, B., Shan, Y., Wu, S., Huang, D., Gao, C., Chen, Z., McGuire, M., Cao, T., Xiao, et al
2019

- **Anisotropic structural dynamics of monolayer crystals revealed by femtosecond surface X-ray scattering** *NATURE PHOTONICS*
Tung, I., Krishnamoorthy, A., Sadasivam, S., Zhou, H., Zhang, Q., Seyler, K. L., Clark, G., Mannebach, E. M., Nyby, C., Ernst, F., Zhu, D., Glowonia, J. M., Kozina, et al
2019; 13 (6): 425-+
- **Signatures of moiré-trapped valley excitons in MoSe₂/WSe₂ heterobilayers.** *Nature*
Seyler, K. L., Rivera, P., Yu, H., Wilson, N. P., Ray, E. L., Mandrus, D. G., Yan, J., Yao, W., Xu, X.
2019; 567 (7746): 66-70
- **Imaging quantum spin Hall edges in monolayer WTe₂.** *Science advances*
Shi, Y., Kahn, J., Niu, B., Fei, Z., Sun, B., Cai, X., Francisco, B. A., Wu, D., Shen, Z., Xu, X., Cobden, D. H., Cui, Y.
2019; 5 (2): eaat8799
- **Imaging quantum spin Hall edges in monolayer WTe₂** *SCIENCE ADVANCES*
Shi, Y., Kahn, J., Niu, B., Fei, Z., Sun, B., Cai, X., Francisco, B. A., Wu, D., Shen, Z., Xu, X., Cobden, D. H., Cui, Y.
2019; 5 (2)
- **Dynamic Optical Tuning of Interlayer Interactions in the Transition Metal Dichalcogenides** *NANO LETTERS*
Mannebach, E. M., Nyby, C., Ernst, F., Zhou, Y., Tolsma, J., Li, Y., Sher, M., Tung, I., Zhou, H., Zhang, Q., Seyler, K. L., Clark, G., Lin, et al
2017; 17 (12): 7761-7766
- **Edge conduction in monolayer WTe₂** *NATURE PHYSICS*
Fei, Z., Palomaki, T., Wu, S., Zhao, W., Cai, X., Sun, B., Nguyen, P., Finney, J., Xu, X., Cobden, D. H.
2017; 13 (7): 677-+
- **Layer-dependent ferromagnetism in a van der Waals crystal down to the monolayer limit.** *Nature*
Huang, B., Clark, G., Navarro-Moratalla, E., Klein, D. R., Cheng, R., Seyler, K. L., Zhong, D., Schmidgall, E., McGuire, M. A., Cobden, D. H., Yao, W., Xiao, D., Jarillo-Herrero, et al
2017; 546 (7657): 270-273
- **Dynamic Optical Tuning of Interlayer Interactions in the Transition Metal Dichalcogenides.** *Nano letters*
Mannebach, E. M., Nyby, C. n., Ernst, F. n., Zhou, Y. n., Tolsma, J. n., Li, Y. n., Sher, M. J., Tung, I. C., Zhou, H. n., Zhang, Q. n., Seyler, K. L., Clark, G. n., Lin, et al
2017; 17 (12): 7761-66
- **Evolution of the Valley Position in Bulk Transition-Metal Chalcogenides and Their Monolayer Limit.** *Nano letters*
Yuan, H., Liu, Z., Xu, G., Zhou, B., Wu, S., Dumcenco, D., Yan, K., Zhang, Y., Mo, S., Dudin, P., Kandyba, V., Yablonskikh, M., Barinov, et al
2016; 16 (8): 4738-4745
- **Monolayer semiconductor nanocavity lasers with ultralow thresholds.** *Nature*
Wu, S., Buckley, S., Schaibley, J. R., Feng, L., Yan, J., Mandrus, D. G., Hatami, F., Yao, W., Vuckovic, J., Majumdar, A., Xu, X.
2015; 520 (7545): 69-72
- **Monolayer semiconductor nanocavity lasers with ultralow thresholds** *NATURE*
Wu, S., Buckley, S., Schaibley, J. R., Feng, L., Yan, J., Mandrus, D. G., Hatami, F., Yao, W., Vuckovic, J., Majumdar, A., Xu, X.
2015; 520 (7545): 69-U142
- **Observation of long-lived interlayer excitons in monolayer MoSe₂-WSe₂ heterostructures.** *Nature communications*
Rivera, P., Schaibley, J. R., Jones, A. M., Ross, J. S., Wu, S., Aivazian, G., Klement, P., Seyler, K., Clark, G., Ghimire, N. J., Yan, J., Mandrus, D. G., Yao, et al
2015; 6: 6242
- **Control of two-dimensional excitonic light emission via photonic crystal** *2D MATERIALS*
Wu, S., Buckley, S., Jones, A. M., Ross, J. S., Ghimire, N. J., Yan, J., Mandrus, D. G., Yao, W., Hatami, F., Vuckovic, J., Majumdar, A., Xu, X.
2014; 1 (1)
- **2D-material Based Nano-photonics**
Majumdar, A., Wu, S., Buckley, S., Jones, A. M., Ross, J. S., Ghimire, N. J., Yan, J., Mandrus, D. C., Yao, W., Hatami, F., Vuckovic, J., Xu, X., IEEE

IEEE.2014

- **Zeeman-type spin splitting controlled by an electric field** *NATURE PHYSICS*
Yuan, H., Bahramy, M., Morimoto, K., Wu, S., Nomura, K., Yang, B., Shimotani, H., Suzuki, R., Toh, M., Kloc, C., Xu, X., Arita, R., Nagaosa, et al
2013; 9 (9): 563-569
- **Optical generation of excitonic valley coherence in monolayer WSe₂**. *Nature nanotechnology*
Jones, A. M., Yu, H., Ghimire, N. J., Wu, S., Aivazian, G., Ross, J. S., Zhao, B., Yan, J., Mandrus, D. G., Xiao, D., Yao, W., Xu, X.
2013; 8 (9): 634-8
- **Electrical control of neutral and charged excitons in a monolayer semiconductor.** *Nature communications*
Ross, J. S., Wu, S., Yu, H., Ghimire, N. J., Jones, A. M., Aivazian, G., Yan, J., Mandrus, D. G., Xiao, D., Yao, W., Xu, X.
2013; 4: 1474
- **Coupled spin and valley physics in monolayers of MoS₂ and other group-VI dichalcogenides.** *Physical review letters*
Xiao, D., Liu, G. B., Feng, W., Xu, X., Yao, W.
2012; 108 (19): 196802
- **Picosecond optical spectroscopy of a single negatively charged self-assembled InAs quantum dot** *APPLIED PHYSICS LETTERS*
Kim, E. D., Truex, K., Wu, Y., Amo, A., Xu, X., Steel, D. G., Bracker, A. S., Gammon, D., Sham, L. J.
2010; 97 (11)