Stanford

Xijie Wang

Distinguished Scientist, SLAC National Accelerator Laboratory

Bio

BIO

Xijie Wang is a distinguished scientist and the founding director of SLAC MeV-UED user facility at SLAC National Accelerator Laboratory. Xijie Wang has more than 30 years' experience in accelerator physics, free electron laser, THz, and ultrafast science and technology. Xijie pioneered the idea using mega-electron-volt electrons for ultrafast electron diffraction (MeV-UED) and ultrafast electron microscope (MeV-UEM). Under Wang's direction, SLAC has become the world leader in ultrafast electron scattering technologies including single-shot, diffuse scattering, micro-diffraction, operando and in-situ, the first ever femto-second gas and liquid phase UED. These technologies have opened new frontiers in ultrafast science and materials in extreme conditions, produced insight into ultrafast structure dynamics of 2-D materials; control of the topological properties of matter; and atomic & molecular movies of complex materials such as perovskite and fundamental chemical processes in gas and liquid phases. He established the first ultrafast electron scattering user facility in the world – SLAC MeV-UED in 2019. Xijie Wang initiated superconducting RF gun R&D program at SLAC, and he led the effort established SRF gun R&D for LCLSII-HE.

Prior to his time at SLAC, Wang spent over 20 years at Brookhaven National Laboratory (BNL), where he led development and operations of the Accelerator Test Facility (ATF) and the Source Development Laboratory (SDL). Wang played a leading role in research on laser accelerators, high-brightness electron beams, X-ray free electron lasers (FEL), RF deflector for LCLS, THz and MeV-UED at BNL. He developed photocathode RF gun injectors that derived the first saturation of both high-gain harmonic generation (HGHG) FEL at BNL's ATF and Self-amplified spontaneous emission (SASE) FEL at Argonne National Laboratory. Wang and his collaborators carried out a series of pioneering FEL experiments in early 2000s: 2nd to 4th harmonic HGHG, VISA (Visible to Infrared SASE Amplifier) SASE FEL and nonlinear harmonic generation characterization; super radiance FEL, detuning and tapering for FEL efficiency improvement.

Xijie Wang has co-authored over 300 publications, including 8 in Science, 4 in Nature, 7 in Science Advances, 14 in Nature family journals, and over 20 in PRL.

HONORS AND AWARDS

- Particle Accelerator Science and Technology Award, IEEE (2021)
- Director Award, SLAC (2016)

EDUCATION AND CERTIFICATIONS

- BS, Shaanxi Normal University , Physics (1982)
- PhD, UCLA , Physics (1992)

PATENTS

- Edbert Sie, Clara Nyby, Das Pemmaraju Xijie Wang, Aaron Lindenberg. "United States Patent 10861995 Fast topological switch using strained weyl semimetals", Leland Stanford Junior University, Dec 8, 2020

Publications

PUBLICATIONS

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- **Capturing the generation and structural transformations of molecular ions** *NATURE*
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- **Applying Bayesian inference and deterministic anisotropy to retrieve the molecular structure ÷#(<bold>R</bold>)÷² distribution from gas-phase diffraction experiments** *COMMUNICATIONS PHYSICS*
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  2023

- **Femtosecond Electronic and Hydrogen Structural Dynamics in Ammonia Imaged with Ultrafast Electron Diffraction.** *Physical review letters*
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- **Author Correction: Ultrafast non-radiative dynamics of atomically thin MoSe2.** *Nature communications*
  Lin, M., Kochat, V., Krishnamoorthy, A., Oftelie, L. B., Weninger, C., Zheng, Q., Zhang, X., Apte, A., Tiwary, C. S., Shen, X., Li, R., Kalia, R., Ajayan, et al
  2023; 14 (1): 4917

- **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

- **Verwey transition as evolution from electronic nematicity to trimerons via electron-phonon coupling.** *Science advances*
  Wang, W., Li, J., Liang, Z., Wu, L., Lozano, P. M., Komarek, A. C., Shen, X., Reid, A. H., Wang, X., Li, Q., Yin, W., Sun, K., Robinson, et al
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- **Rehybridization dynamics into the pericyclic minimum of an electrocyclic reaction imaged in real-time.** *Nature communications*
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- **Measurement of femtosecond dynamics of ultrafast electron beams through terahertz compression and time-stamping** *APPLIED PHYSICS LETTERS*
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  Chen, Z., Shen, X., Andrejevic, N., Liu, T., Luo, D., Nguyen, T., Drucker, N. C., Kozina, M. E., Song, Q., Hua, C., Chen, G., Wang, X., Kong, et al
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- **Large Exchange Coupling Between Localized Spins and Topological Bands in Magnetic Topological Insulator MnBi2 Te4.** *Advanced materials (Deerfield Beach, Fla.)*
  Padmanabhan, H., Stoica, V. A., Kim, P. K., Poore, M., Yang, T., Shen, X., Reid, A. H., Lin, M., Park, S., Yang, J., Hugo Wang, H., Koocher, N. Z., Puggioni, et al
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- **Interlayer magnetophononic coupling in MnBi2Te4.** *Nature communications*
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- **Fast attenuation of high-frequency acoustic waves in bicontinuous nanoporous gold** *APPLIED PHYSICS LETTERS*
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- **Direct observation of ultrafast hydrogen bond strengthening in liquid water.** *Nature*
  Yang, J., Dettori, R., Nunes, J. P., List, N. H., Biasin, E., Centurion, M., Chen, Z., Cordones, A. A., Deponte, D. P., Heinz, T. F., Kozina, M. E., Ledbetter, K., Lin, et al
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- **Frontier nonequilibrium materials science enabled by ultrafast electron methods** *MRS BULLETIN*
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- **Synthesis of Macroscopic Single Crystals of Ge2Sb2Te5 via Single-Shot Femtosecond Optical Excitation** *CRYSTAL GROWTH & DESIGN*
  Zajac, M., Sood, A., Kim, T. R., Mo, M., Kozina, M., Park, S., Shen, X., Guzelturk, B., Lin, M., Yang, J., Weathersby, S., Wang, X., Lindenberg, et al
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- **Coherent Lattice Wobbling and Out-of-Phase Intensity Oscillations of Friedel Pairs Observed by Ultrafast Electron Diffraction** *ACS NANO*
  Qian, Q., Shen, X., Luo, D., Jia, L., Kozina, M., Li, R., Lin, M., Reid, A. H., Weathersby, S., Park, S., Yang, J., Zhou, Y., Zhang, et al
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- **Spectroscopic and Structural Probing of Excited-State Molecular Dynamics with Time-Resolved Photoelectron Spectroscopy and Ultrafast Electron Diffraction** *PHYSICAL REVIEW X*
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- **Concurrent probing of electron-lattice dephasing induced by photoexcitation in 1T-TaSeTe using ultrafast electron diffraction** *PHYSICAL REVIEW B*
  Li, J., Li, J., Sun, K., Wu, L., Li, R., Yang, J., Shen, X., Wang, X., Luo, H., Cava, R. J., Robinson, I. K., Jin, X., Yin, et al
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- **Optical Control of Non-Equilibrium Phonon Dynamics.** *Nano letters*
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