Wei-Sheng Lee

Curriculum Vitae
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EDUCATION

Ph. D. - Physics, Stanford University, Stanford, California, USA (June, 2008)
M. S. - Physics, National Taiwan University, Taipei, Taiwan (June, 1998)
B. S. - Physics, Nation Taiwan University, Taipei, Taiwan (June, 1996)

PROFESSIONAL APPOINTMENTS

2012 – Present Staff Scientist
Stanford Institute for Materials and Energy Science (SIMES), SLAC National Accelerator Lab.

2010 – 2012 Associated Staff Scientist
SIMES, SLAC National Accelerator Lab.

2008 – 2009 Post-Doctoral Research Associate
SIMES, SLAC National Accelerator Lab.

RESEARCH EXPERIENCE

2012 – Present, Staff Scientist
Stanford Institute for Materials and Energy Science (SIMES), SLAC National Accelerator Lab.

Investigating dynamics of complex quantum materials, such as high temperature superconductors and transition metal oxides, via performing and innovating novel x-ray scattering measurements.

- Pioneer ultra-high resolution resonant inelastic x-ray scattering (RIXS) measurements to map out elementary excitations in energy-momentum domains.
- Co-led the first x-ray scattering under extreme magnetic field using x-ray free electron laser and a pulsed magnet.
- Exploiting time-resolved (resonant) x-ray diffraction at LCLS to study non-equilibrium dynamics of lattice, spin, charge, and orbital orders.

2010 - 2012, Associated Staff Scientist
SIMES, SLAC National Accelerator Lab.

- Co-led the first time-resolved resonant soft x-ray diffraction experiment at LCLS.
- Utilized static and time-resolved resonant x-ray diffraction measurements to study the properties of spin, charge, and orbital orders.

2008 – 2009, Post Doctoral Research Associate
SLAC National Accelerator Lab.
Advisor: Prof. Z. X. Shen

- Performed ultrahigh-resolution Laser angle-resolved photoemission spectroscopy (ARPES) study on high temperature superconducting cuprates.
- Designed and constructed a 7 eV laser for ultra-high resolution Laser ARPES system.

2001 – 2008, Research Assistant
Department of Physics, Stanford University
Advisor: Prof. Z. X. Shen

- Performed ARPES measurement on high temperature superconductors, including Bi-based, Hg-based, and Tl-Based cuprates.
- Jointly developed the ARPES endstation of BL5-4 in Stanford Synchrotron Radiation Lightsource and a lab-based ARPES system in Stanford campus.

2000 – 2001, Research Assistant
Institute of Physics, Academia Sinica, Taiwan
Advisor: Prof. T. K. Lee

Used Monte Carlo simulation for relaxation dynamics of interacting classical spins, and ferromagnetic nanoparticles.

1996 – 1998, Research Assistant
Department of Physics, National Taiwan University
Advisor: Prof. Y. Y. Chen

Numerical study of the synchronization of distinct chaos systems.

1995 – 1996, Research Assistant
Department of Physics, National Taiwan University
Advisor: Prof. M. Y. Chern

Designed and constructed a magneto-optical Kerr Effect system (MOKE) to study magnetic properties of ferrimagnetic super-lattices.

TEACHING EXPERIECE AND OTHER

2003 **Teaching assistant**, Modern Physics, Stanford University

2003 **Teaching assistant**, Intermediate Physics Lab, Stanford University

1996 – 1998 **Teaching assistant**, Freshmen Physics, National Taiwan University, Taiwan

1996 – 1998 **Assistant**, Physics Course Committee, National Taiwan University, Taiwan

1998 – 2000 **Mandatory Military Service**, 2nd Lieutenant, Combined Service Force, Taiwan

SERVICE TO PROFESSION

- **Proposal Review Panel for Swiss Free Electron Laser** (2018 - present)
- **Chair on International Program Committee for IXS2021 conference** (2020)
- **Diamond-II Flagship project User Work Group for RIXS** (2020).
- **SSRL Scientific Visional Development Team** (2020).
- **IXS task force at LCLS** (2020).
- **BESSY III expert group "Correlated materials and Antiferromagnets"** (2020)
- **Instrument Advisory Panel Members for soft x-ray RIXS instrument at NEH 2.1, LCLS-II**
- **Co-organizer of quantum material working group and workshops to developing scientific case for LCLS-II and LCLS-II-HE.** (2015 - 2017)
- **Organizer of 2015 SSRL/LCLS user meeting workshop – Probing Structure and Dynamics of Quantum Materials via X-ray Scattering at LCLS.**
- **Panelist of REDSOX Conceptual Design Review,** SXR instrument, LINAC Coherent Light Source, SLAC National Accelerator Lab.
- **Member of American Physic Society (APS)**
- **Referee** of a number of peer-review Journals, including Nature, Science, Nature Physics, Nature Materials, Nature Communications, Physical Review Letter, and Physics Review X.

SELECTED INVITED TALKS

As of 2020, **51** invited talks. See attached "Invited Talks" for a full list.

2020 "Explore Collective Charge Dynamics in Cuprate Superconductors using Resonant Inelastic X-ray Scattering", The 33rd International Symposium on Superconductivity (ISS2020), AIST, Tsukuba, Japan.

2020 "Explore Collective Charge Dynamics in Cuprate Superconductors using RIXS", SLAC Photon Science Seminar, Menlo Park, CA

2020 "RIXS study on superconducting cuprates and nickelate", tentative title, RIXSREXS 2020, Port Jefferson, NY, USA.

2019 "Case Studies of Quantum Materials using X-ray Free Electron Laser", hRIXS workshop, European XFEL, Hamburg, Germany

2019 "Probing CDW phenomena and charge excitations in cuprates via RIXS", Satellite Workshop of Spectroscopy for Novel Superconductors (SNS2019), Sendai, Japan.

2019 "Probing CDW phenomena and charge excitations in cuprates via RIXS", International Conference on Inelastic x-ray scattering (IXS2019), Stony Brook, NY, USA

2018 "Some aspects of nanoscale phenomenon in superconducting cuprates", NSLS-II 2018 User Meeting/Workshop, Brookheaven, NY, USA

2018 "RIXS studies of CDW and charge excitations in cuprates", RIXS/REXS 2018 Workshop, Diamond Light Source, Dictcot, U.K.

2018 "Study of Charge Dynamics and CDW in high-Tc Cuprates via Resonant Inelastic X-ray Scattering", The Materials and Mechanisms of Superconductivity and High-Temperature Superconductivity Conference (M2S2018), Beijing, China

SELECTED PUBLICATIONS

As of September 2020: **77** total publications. See attached "Publications" for a full list.

1. M. Hepting, D. Li, C. J. Jia, H. Lu, E. Paris, Y. Tseng, X. Feng, M. Osada, E. Been, Y. Hikita, Y.-D. Chuang, Z. Hussain, K. J. Zhou, A. Nag, M. Garcia-Fernandez, M. Rossi, H. Y. Huang, D. J. Huang, Z. X. Shen, T. Schmitt, H. Y. Hwang, B. Moritz, J. Zaanen, T. P. Devereaux, and **W. S. Lee**, Electronic structure of the parent compound of superconductivity infinite-layer nickelates, Nature Materials advanced published online https://www.nature.com/articles/s41563-019-0585-z (2020). Paper form in print. (as one of the corresponding authors).

2. M. Hepting, L. Chaix, E. W. Huang, R. Fumagalli, Y. Y. Peng, B. Moritz, K. Kummer, N. B. Brookes, W. C. Lee, M. Hashimoto, T. Sarkar, J. F. He, C. R. Rotundu, Y. S. Lee, R. L. Greene, L. Braicovich, G. Ghiringhelli, Z. X. Shen, T. P. Devereaux, **W. S. Lee.**
Three-dimensional collective charge excitations in electron-doped copper oxide superconductors
Nature **563**, 374 (2018). (as one of the corresponding authors)

3. L. Chaix, G. Ghiringhelli, Y. Y. Peng, M. Hashimoto, B. Moritz, K. Kummer, N. Brookes, Y. He, S. Chen, S. Ishida, Y. Yoshida, H. Eisaki, L. Braicovich, Z.-X. Shen, T. P. Devereaux, **W.-S. Lee.**
Dispersive charge density wave excitations in underdoped cuprates $Bi_2Sr_2CaCu_2O_{8+d}$.
Nature Physics, **13**, 952 (2017). (as one of the corresponding authors).

4. S. Gerber, S.-L. Yang, D. Zhu, H. Soifer, J. A. Sobota, S. Rebec, J. J. Lee, T. Jia, B. Moritz, C. Jia, A. Gauthier, Y. Li, D. Leuenberger, Y. Zhang, L. Chaix, W. Li, H. Jang, J.-S. Lee, M. Yi, G. L. Dakovski4, S. Song, J. M. Glownia, S. Nelson, K. W. Kim, Y.-D. Chuang, Z. Hussain, C.-C. Kao, R. G. Moore, T. P. Devereaux, **W.-S. Lee**, P. S. Kirchmann, Z.-X. Shen.
Femtosecond electron-phonon lock-in via photoemission and x-ray free-electron laser
Science **357**, 71 (2017) (as one of the corresponding authors).

5. S. Gerber, H. Jang, H. Nojiri, S. Matsuzawa, Y. Yasumura, D. A. Bonn, R. Liang, H. N. Hardy, Z. Islam, A. Mehta, S. Song, M. Sikorski, D. Stefanescu, Y. Feng, J. Hastings, S. A. Kivelson, T. P. Devereaux, Z.-X. Shen, C.-C. Kao, **W.-S. Lee**, D. Zhu, J.-S. Lee.
Three Dimensional Charge Density Wave Order in $YBa_2Cu_3O_{6.67}$ at High Magnetic Fields,
Science **340**, 949 (2015). (as one of the corresponding authors).

6. S. Gerber, K. W. Kim, Y. Zhang, D. Zhu, N. Plonka, M. Yi, G. L. Dakovski, D. Leuenberger, P. S. Kirchmann, R. G. Moore, M. Chollet, J. M. Glownia, Y. Feng, J.-S. Lee, A. Mehta, A. F. Kemper, T. Wolf, Y.-D. Chuang, Z. Hussain, C.-C. Kao, B. Moritz, Z.-X. Shen, T. P. Devereaux, and **W.-S. Lee**
Direct characterization of photo-induced lattice dynamics in $BaFe_2As_2$.
Nature Communications **6**, 7377 (2015). (as one of the leading authors and supervisors)

7. **W. S. Lee**, J. J. Lee, E. A. Nowadnick, S. Gerber, W. Tabis, S. W. Huang, V. N. Strocov, E. M. Motoyama, G. Yu, B. Moritz, H. Y. Huang, R. P. Wang, Y. B. Huang, W. B. Wu, C. T. Chen, D. J. Huang, M. Greven, T. Schmitt, Z. X. Shen, and T. P. Devereaux.
   Asymmetry of collective excitations in electron and hole doped cuprate superconductors.
   Nature Physics **10**, 883–889 (2014)

8. **W. S. Lee,** S. Johnston, B. Moritz, J. Lee, M. Yi, K. J. Zhou, T. Schmitt, K. Kudo, Y. Koike, J. van den Brink, T. P. Devereaux, and Z. X. Shen
   The Role of Lattice Coupling in Establishing Electronic and Magnetic Properties in Quasi-One-Dimensional Cuprates
   Phys. Rev. Lett. **110**, 265502 (2013).

9. **W. S. Lee**, Y. D. Chuang, R. G. Moore, Y. Zhu, L. Patthey, M. Trigo, D. H. Lu, P. S. Kirchmann, O. Krupin, M. Yi,M. Langner, N. Huse, J. S. Robinson, Y. Chen, S. Y. Zhou, G. Coslovich, B. Huber, D. A. Reis, R. A. Kaindl, R. W. Schoenlein, D. Doering, P. Denes, W. F. Schlotter, J. J. Turner, S. L. Johnson, M. Först, T. Sasagawa, Y. F. Kung, A. P. Sorini, A. F. Kemper, B. Moritz, T. P. Devereaux, D.-H. Lee, Z. X. Shen, and Z. Hussain
   Phase fluctuations and the absence of topological defects in photo-excited charge ordered nickelate
   Nature Communications **3**, 838 (2012).

10. **W. S. Lee,** I. M. Vishik, K. Tanaka, D. H. Lu, T. Sasagawa, N. Nagaosa, T. P. Devereaux, Z. Hussain, and Z. -X. Shen
    Abrupt onset of second energy gap at superconducting transition along the Fermi arc of underdoped Bi2212
    Nature **450,** 81 (2007).

For a full list, please see “FULL PUBLICATION LIST”.