



## Zhi-Xun Shen

Paul Pigott Professor of Physical Sciences, Professor of Applied Physics, of Physics and Senior Fellow at the Precourt Institute for Energy

 Curriculum Vitae available Online

### CONTACT INFORMATION

#### • Alternate Contact

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### Bio

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#### BIO

Dr. Shen is the Paul Pigott Professor in Physical Sciences, a professor of Physics and Applied Physics Departments, a senior fellow of the Precourt Institute for Energy, and a member of the faculty advisory board for the Knight-Hennessy Scholars Program and a member of the steering committee of the Stanford Science Fellow Program at Stanford University. He is a Member of the National Academy of Sciences and a fellow of American Academy of Arts and Sciences. He is an expert on quantum phenomena in materials, and a recipient of E.O. Lawrence Award of the Department of Energy, the Oliver E. Buckley Prize of the American Physical Society, and the Kamerlingh Onnes International Prize on Superconductivity. He served as the Chief Scientist of SLAC National Accelerator Laboratory, the Director of the Geballe Laboratory for Advanced Materials, and the Director of the Stanford Institute for Materials and Energy Sciences. He mentored about 100 graduate students and postdoctoral fellows, and co-founded companies.

#### ACADEMIC APPOINTMENTS

- Professor, Applied Physics
- Professor, Physics
- Senior Fellow, Precourt Institute for Energy
- Principal Investigator, Stanford Institute for Materials and Energy Sciences

#### ADMINISTRATIVE APPOINTMENTS

- Science and Technology Advisor, SLAC, (2013- present)
- Chief Scientist, SLAC, (2010-2013)
- Director, Stanford Institute for Materials and Energy Sciences, (2006-2011)
- Director, Geballe Laboratory For Advanced Materials, (2005-2008)

#### HONORS AND AWARDS

- Tage Erlander Guest Professorship award, Swedish Research Council and KTH Royal Institute of Technology, Sweden (2020)
- Bershadsky Distinguished Visiting Scholar and Loeb Lecturer, Physics Department, Harvard University (2019)
- William and Flora Hewlett Foundation Fellow, Radcliffe Institute for Advanced Study, Harvard University (2019)

- Fellow, American Academy of Arts and Sciences (2017)
- Foreign Member, Chinese Academy of Sciences (2017)
- Member, National Academy of Sciences (2015)
- Honorary Professorship, Nanjing University (2014)
- Investigator, Emerging Phenomena in Quantum System Initiative, Gordon and Betty Moore Foundation (2014)
- Visiting Professor, Riken and University of Tokyo (2014)
- Einstein Professorship Award, Chinese Academy of Sciences (2013)
- Visiting Professor, University of Paris - Orsay (2013)
- Oliver Buckley Condensed Matter Physics Prize, American Physical Society (2011)
- Ernest Orlando Lawrence Award, US Department of Energy (2010)
- Paul Pigott Professor in Physical Science, Stanford University (2006)
- Fellow, American Physical Society (2002)
- The Takeda Techno-Entrepreneurship Award, The Takeda Foundation, Japan (2002)
- Visiting Professor, University of Zurich (2001)
- H. Kamerlingh Onnes Prize, Conference on Materials and Mechanism of superconductivity (2000)
- Centennial Cerebration Lecture, American Physical Society (1999)
- Outstanding Scientific Accomplishment Award, Office of Basic Energy Sciences, Department of Energy (1994)
- Fellow, Alfred P. Sloan Foundation (1993)
- Young Investigator, National Science Foundation (1993)

## **BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS**

- Member and Team Lead, DOE BESAC subcommittee on International Bench Marking Study (2020 - 2021)
- Member, International Review committee, Physics Department, the University of Tokyo (2020 - 2020)
- Member, NSF SUPER Review Panel (2017 - 2017)
- Member of Faculty Advisory Board, Knight-Hennessy Scholars Program, Stanford University (2016 - present)
- Member and Chair (since 2020), Science Advisory Board, Max Planck Institute for Matter and Dynamics, Germany (2015 - present)
- Member of Advisory Board for Major Scientific Facilities, Chinese Academy of Sciences (2015 - 2017)
- Member, External Review Committee, School of Physical Science and Technology, Shanghai Tech (2015 - 2015)
- Member of Coucil, Materials Science Division, Office of Basic Energy Sciences, Department of Energy (2014 - 2017)
- Chair of Oliver Buckley Prize Committee, American Physical Society (2013 - 2013)
- Member of the Board, PrimeNano Inc. (2011 - present)
- Member, Scientific Advisory Committee,, National Synchrotron Radiation Research Center, Taiwan. (2008 - 2011)
- Member of the Board, Astronergy Corp (2007 - 2015)
- Member of Visiting Committee,, Physics Department, Fudan University, China (2007 - 2007)
- Member of Executive Committee,, Division of Condensed Matter Physics, American Physical Society (2002 - 2004)
- Member of Visiting Committee,, Physics Department, Tsinghua University, China (2001 - 2010)
- Chair, Scientific Advisory Committee, Advanced Light Source, Lawrence Berkeley National Laboratory (1998 - 2000)
- Member of Basic Energy Science Advisory Committee, Department of Energy (1997 - 2002)
- Member of Executive Committee,, Forum on International Physics, American Physical Society (1996 - 1999)
- Scientific Spokesperson, NEDO International Cooperative Research Program on Metal Oxides; MITI, Japan (1994 - 1997)

## PROFESSIONAL EDUCATION

- Ph.D., Stanford University , Applied Physics (1989)
- MS, Rutgers University , Physics (1985)
- BS, Fudan University , Physics (1983)

## PATENTS

- Michael Kelly, K.J. Lai and Zhi-Xun Shen. "United States Patent US Patent # 8,266,718 Modulated Microwave Microscopy and Probes Used There with", Stanford
- Jared William Schwede, Nickolas A. Melosh and Zhi-Xun Shen. "United States Patent 8853531 Photoemission Enhanced Thermionic Emission for Solar Energy Harvesting", Stanford University, Oct 7, 2014
- Wanli Yang, Jason D. Fabbri, Zahid Hussain, Nicholas A. Melosh and Zhi-Xun Shen. "United States Patent US Patent #8,154,185 Diamondoid Monolayers as Electron Emitters", Stanford University and LBNL, Apr 20, 2012
- Michael Kelly, Zhengyu Wang, and Zhi-Xun Shen. "United States Patent US Patent #7,190,175 Orthogonal Microwave Imaging Probe", Stanford University, Mar 13, 2007
- Michael Kelly, Zhengyu Wang, and Zhi-Xun Shen. "United States Patent US Patent #6,825,645 Non-resonant Microwave Imaging Probe", Stanford University, Nov 30, 2004

## LINKS

- My Lab Site: <http://arpes.stanford.edu>

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

Dr. Shen's main research interest lies in the area of condensed matter and materials physics, as well as the applications of materials and devices. He develops photon based innovative instrumentation and advanced experimental techniques, ranging from angle-resolved photoemission to microwave imaging, soft x-ray scattering and time domain spectroscopy and scattering. He has created a body of literature that advanced our understanding of quantum materials, including superconductors, semiconductors, novel magnets, topological insulators, novel carbon and electron emitters. He is best known for his discoveries of the momentum structure of anisotropic d-wave pairing gap and anomalous normal state pseudogap in high temperature superconductors. He has further leveraged the advanced characterization tool to make better materials through thin film and interface engineering.

## Teaching

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### COURSES

#### 2023-24

- Electrons and Photons: APPPHYS 201, PHOTON 201 (Spr)
- Electrons in Low Dimensional and Narrow Band Systems: PHYSICS 276 (Win)

#### 2022-23

- Condensed Matter Seminar: APPPHYS 470 (Aut)
- Electrons and Photons: APPPHYS 201, PHOTON 201 (Spr)

#### 2021-22

- Condensed Matter Seminar: APPPHYS 470 (Aut, Win, Spr)
- Electrons and Photons: APPPHYS 201, PHOTON 201 (Win)
- Frontiers of Physics Research: PHYSICS 59 (Aut)

## STANFORD ADVISEES

### Doctoral Dissertation Reader (AC)

Yifan Li

### Postdoctoral Faculty Sponsor

Qinda Guo, Paulina Majchrzak, Denny Puntel, Bai Yang Wang, Yong Zhong

### Doctoral Dissertation Advisor (AC)

Sebastien Abadi, Erin Fleck, Xue Han, Matthew Hurley, Yingfei Li, Dongyu Liu, Noah Meyer, Siyuan Qiu, Jay Qu, Ruohan Wang, Jin Gene Wong

### Doctoral Dissertation Co-Advisor (AC)

Nicole Ticea

### Doctoral (Program)

Chaitrali Duse

### Postdoctoral Research Mentor

Yu He, Yong Zhong

## Publications

### PUBLICATIONS

- **Doping Dependence of 2-Spinon Excitations in the Doped 1D Cuprate  $\text{Ba}_{1-x}\text{CuO}_{2+x}$ .** *Physical review letters*  
Li, J., Jost, D., Tang, T., Wang, R., Zhong, Y., Chen, Z., Garcia-Fernandez, M., Pellicciari, J., Bisogni, V., Moritz, B., Zhou, K., Wang, Y., Devereaux, et al  
2025; 134 (14): 146501
- **Electronic Structure of the Alternating Monolayer-Trilayer Phase of  $\text{La}_{1-x}\text{Ni}_2\text{O}_{7-x}$ .** *Physical review letters*  
Abadi, S., Xu, K. J., Lomeli, E. G., Puphal, P., Isobe, M., Zhong, Y., Fedorov, A. V., Mo, S. K., Hashimoto, M., Lu, D. H., Moritz, B., Keimer, B., Devereaux, et al  
2025; 134 (12): 126001
- **Electronic Structure of the Alternating Monolayer-Trilayer Phase of  $\text{La}_3\text{Ni}_2\text{O}_7$**  *PHYSICAL REVIEW LETTERS*  
Abadi, S., Xu, K., Lomeli, E. G., Puphal, P., Isobe, M., Zhong, Y., Fedorov, A., Mo, S., Hashimoto, M., Lu, D., Moritz, B., Keimer, B., Devereaux, et al  
2025; 134 (12)
- **Analysis methodology of coherent oscillations in time- and angle-resolved photoemission spectroscopy.** *The Review of scientific instruments*  
Gauthier, N., Soifer, H., Sobota, J. A., Pfau, H., Sie, E. J., Lindenberg, A. M., Shen, Z. X., Kirchmann, P. S.  
2025; 96 (2)
- **Observation of cupratelike nonlinear terahertz responses in superconducting infinite-layer nickelates via two-dimensional coherent spectroscopy** *PHYSICAL REVIEW B*  
Cheng, B., Cheng, D., Lee, K., Mootz, M., Huang, C., Luo, L., Chen, Z., Lee, Y., Wang, B., Perakis, I. E., Shen, Z., Hwang, H. Y., Wang, et al  
2025; 111 (1)
- **Floquet-Bloch manipulation of the Dirac gap in a topological antiferromagnet** *NATURE PHYSICS*  
Bielinski, N., Chari, R., May-Mann, J., Kim, S., Zwettler, J., Deng, Y., Aishwarya, A., Roychowdhury, S., Shekhar, C., Hashimoto, M., Lu, D., Yan, J., Felser, et al  
2025
- **Pseudogap in electron-doped cuprates: Strong correlation leading to band splitting.** *Proceedings of the National Academy of Sciences of the United States of America*  
Horio, M., Sakai, S., Suzuki, H., Nonaka, Y., Hashimoto, M., Lu, D., Shen, Z., Ohgi, T., Konno, T., Adachi, T., Koike, Y., Imada, M., Fujimori, et al  
2025; 122 (1): e2406624122

- **Colossal magnetoresistance from spin-polarized polarons in an Ising system.** *Proceedings of the National Academy of Sciences of the United States of America*  
Li, Y. F., Been, E. M., Balguri, S., Jia, C. J., Mahendru, M. B., Wang, Z. C., Cui, Y., Chen, S. D., Hashimoto, M., Lu, D. H., Moritz, B., Zaanen, J., Tafti, et al  
2024; 121 (50): e2409846121
- **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
- **Planar Thermal Hall Effect from Phonons in Cuprates** *PHYSICAL REVIEW X*  
Chen, L., Le Roux, L., Grissonnanche, G., Boulanger, M., Theriault, S., Liang, R., Bonn, D. A., Hardy, W. N., Pyon, S., Takayama, T., Takagi, H., Xu, K., Shen, et al  
2024; 14 (4)
- **Anomalous normal-state gap in an electron-doped cuprate.** *Science (New York, N.Y.)*  
Xu, K. J., He, J., Chen, S. D., He, Y., Abadi, S. N., Rotundu, C. R., Lee, Y. S., Lu, D. H., Guo, Q., Tjernberg, O., Devereaux, T. P., Lee, D. H., Hashimoto, et al  
2024; 385 (6710): 796-800
- **Band structure of Bi surfaces formed on Bi<sub>2</sub>Se<sub>3</sub> upon exposure to air** *PHYSICAL REVIEW MATERIALS*  
Gauthier, A., Sobota, J. A., Gauthier, N., Rotundu, C. R., Shen, Z., Kirchmann, P. S.  
2024; 8 (5)
- **Controlling structure and interfacial interaction of monolayer TaSe<sub>2</sub> on bilayer graphene.** *Nano convergence*  
Lee, H., Im, H., Choi, B. K., Park, K., Chen, Y., Ruan, W., Zhong, Y., Lee, J. E., Ryu, H., Crommie, M. F., Shen, Z. X., Hwang, C., Mo, et al  
2024; 11 (1): 14
- **Beyond Conventional Charge Density Wave for Strongly Enhanced Two-dimensional Superconductivity in 1H-TaS<sub>2</sub>Superlattices.** *Advanced materials (Deerfield Beach, Fla.)*  
Li, Z., Lyu, P., Chen, Z., Guan, D., Yu, S., Zhao, J., Huang, P., Zhou, X., Qiu, Z., Fang, H., Hashimoto, M., Lu, D., Song, et al  
2024: e2312341
- **Unraveling sources of emission heterogeneity in Silicon Vacancy color centers with cryo-cathodoluminescence microscopy.** *Proceedings of the National Academy of Sciences of the United States of America*  
Angell, D. K., Li, S., Utzat, H., Thurston, M. L., Liu, Y., Dahl, J., Carlson, R., Shen, Z. X., Melosh, N., Sinclair, R., Dionne, J. A.  
2024; 121 (14): e2308247121
- **Characterization of Two Fast-Turnaround Dry Dilution Refrigerators for Scanning Probe Microscopy** *JOURNAL OF LOW TEMPERATURE PHYSICS*  
Barber, M. E., Li, Y., Gibson, J., Yu, J., Jiang, Z., Hu, Y., Ji, Z., Nandi, N., Hoke, J. C., Bishop-Van Horn, L., Arias, G. R., Van Harlingen, D. J., Moler, et al  
2024
- **Charge density waves in two-dimensional transition metal dichalcogenides.** *Reports on progress in physics. Physical Society (Great Britain)*  
Hwang, J., Ruan, W., Chen, Y., Tang, S., Crommie, M. F., Shen, Z., Mo, S.  
2024
- **Evidence for d-wave superconductivity of infinite-layer nickelates from low-energy electrodynamics.** *Nature materials*  
Cheng, B., Cheng, D., Lee, K., Luo, L., Chen, Z., Lee, Y., Wang, B. Y., Mootz, M., Perakis, I. E., Shen, Z. X., Hwang, H. Y., Wang, J.  
2024
- **Probing the edge states of Chern insulators using microwave impedance microscopy** *PHYSICAL REVIEW B*  
Wang, T., Wu, C., Mogi, M., Kawamura, M., Tokura, Y., Shen, Z., You, Y., Allen, M. T.  
2023; 108 (23)
- **Efficient Photonic Integration of Diamond Color Centers and Thin-Film Lithium Niobate** *ACS PHOTONICS*  
Riedel, D., Lee, H., Herrmann, J. F., Grzesik, J., Ansari, V., Borit, J., Stokowski, H. S., Aghaeimeibodi, S., Lu, H., McQuade, P. J., Melosh, N. A., Shen, Z., Safavi-Naeini, et al  
2023; 10 (12): 4236-4243

- **Bogoliubov quasiparticle on the gossamer Fermi surface in electron-doped cuprates** *NATURE PHYSICS*  
Xu, K., Guo, Q., Hashimoto, M., Li, Z., Chen, S., He, J., He, Y., Li, C., Berntsen, M. H., Rotundu, C. R., Lee, Y. S., Devereaux, T. P., Rydh, et al  
2023; 19 (12): 1834-+
- **Coherent light control of a metastable hidden state.** *Science advances*  
Maklar, J., Sarkar, J., Dong, S., Gerasimenko, Y. A., Pincelli, T., Beaulieu, S., Kirchmann, P. S., Sobota, J. A., Yang, S., Leuenberger, D., Moore, R. G., Shen, Z. X., Wolf, et al  
2023; 9 (47): eadi4661
- **Spin skyrmion gaps as signatures of strong-coupling insulators in magic-angle twisted bilayer graphene.** *Nature communications*  
Yu, J., Foutty, B. A., Kwan, Y. H., Barber, M. E., Watanabe, K., Taniguchi, T., Shen, Z. X., Parameswaran, S. A., Feldman, B. E.  
2023; 14 (1): 6679
- **Angle-resolved pair photoemission theory for correlated electrons** *PHYSICAL REVIEW B*  
Devereaux, T. P., Claassen, M., Huang, X., Zaletel, M., Moore, J. E., Morr, D., Mahmood, F., Abbamonte, P., Shen, Z.  
2023; 108 (6)
- **Development of deflector mode for spin-resolved time-of-flight photoemission spectroscopy.** *The Review of scientific instruments*  
Han, X., Qu, J., Sakamoto, S., Liu, D., Guan, D., Liu, J., Li, H., Rotundu, C. R., Andresen, N., Jozwiak, C., Hussain, Z., Shen, Z. X., Sobota, et al  
2023; 94 (10)
- **Bogoliubov quasiparticle on the gossamer Fermi surface in electron-doped cuprates** *NATURE PHYSICS*  
Xu, K., Guo, Q., Hashimoto, M., Li, Z., Chen, S., He, J., He, Y., Li, C., Berntsen, M. H., Rotundu, C. R., Lee, Y. S., Devereaux, T. P., Rydh, et al  
2023
- **Ingredients of strong interactions in cuprates** *PHYSICA C-SUPERCONDUCTIVITY AND ITS APPLICATIONS*  
Shen, Z., Devereaux, T.  
2023; 613
- **From Stoner to local moment magnetism in atomically thin Cr<sub>2</sub>Te<sub>3</sub>.** *Nature communications*  
Zhong, Y., Peng, C., Huang, H., Guan, D., Hwang, J., Hsu, K. H., Hu, Y., Jia, C., Moritz, B., Lu, D., Lee, J. S., Jia, J. F., Devereaux, et al  
2023; 14 (1): 5340
- **Traces of electron-phonon coupling in one-dimensional cuprates.** *Nature communications*  
Tang, T., Moritz, B., Peng, C., Shen, Z. X., Devereaux, T. P.  
2023; 14 (1): 3129
- **Terahertz-Driven Local Dipolar Correlation in a Quantum Paraelectric.** *Physical review letters*  
Cheng, B., Kramer, P. L., Shen, Z. X., Hoffmann, M. C.  
2023; 130 (12): 126902
- **Signatures of the exciton gas phase and its condensation in monolayer 1T-ZrTe<sub>2</sub>.** *Nature communications*  
Song, Y., Jia, C., Xiong, H., Wang, B., Jiang, Z., Huang, K., Hwang, J., Li, Z., Hwang, C., Liu, Z., Shen, D., Sobota, J. A., Kirchmann, et al  
2023; 14 (1): 1116
- **Influence of local symmetry on lattice dynamics coupled to topological surface states** *PHYSICAL REVIEW B*  
Sobota, J. A., Teitelbaum, S. W., Huang, Y., Querales-Flores, J. D., Power, R., Allen, M., Rotundu, C. R., Bailey, T. P., Uher, C., Henighan, T., Jiang, M., Zhu, D., Chollet, et al  
2023; 107 (1)
- **Identification of a characteristic doping for charge order phenomena in Bi-2212 cuprates via RIXS** *PHYSICAL REVIEW B*  
Lu, H., Hashimoto, M., Chen, S., Ishida, S., Song, D., Eisaki, H., Nag, A., Garcia-Fernandez, M., Arpaia, R., Ghiringhelli, G., Braicovich, L., Zaanen, J., Moritz, et al  
2022; 106 (15)
- **Evidence for a spinon Kondo effect in cobalt atoms on single-layer 1T-TaSe<sub>2</sub>** *NATURE PHYSICS*  
Chen, Y., He, W., Ruan, W., Hwang, J., Tang, S., Lee, R. L., Wu, M., Zhu, T., Zhang, C., Ryu, H., Wang, F., Louie, S. G., Shen, et al  
2022
- **Differentiated roles of Lifshitz transition on thermodynamics and superconductivity in La<sub>2</sub>-xSrxCuO<sub>4</sub>.** *Proceedings of the National Academy of Sciences of the United States of America*

Zhong, Y., Chen, Z., Chen, S., Xu, K., Hashimoto, M., He, Y., Uchida, S., Lu, D., Mo, S., Shen, Z.  
2022; 119 (32): e2204630119

- **A Novel 19\*19 Superstructure in Epitaxially Grown 1T-TaTe2.** *Advanced materials (Deerfield Beach, Fla.)*  
Hwang, J., Jin, Y., Zhang, C., Zhu, T., Kim, K., Zhong, Y., Lee, J., Shen, Z., Chen, Y., Ruan, W., Ryu, H., Hwang, C., Lee, et al  
2022: e2204579
- **A broken translational symmetry state in an infinite-layer nickelate** *NATURE PHYSICS*  
Rossi, M., Osada, M., Choi, J., Agrestini, S., Jost, D., Lee, Y., Lu, H., Wang, B., Lee, K., Nag, A., Chuang, Y., Kuo, C., Lee, et al  
2022
- **Electronic nature of the pseudogap in electron-doped Sr2IrO4** *NPJ QUANTUM MATERIALS*  
Peng, S., Lane, C., Hu, Y., Guo, M., Chen, X., Sun, Z., Hashimoto, M., Lu, D., Shen, Z., Wu, T., Chen, X., Markiewicz, R. S., Wang, et al  
2022; 7 (1)
- **Electronic structure of superconducting nickelates probed by resonant photoemission spectroscopy** *MATTER*  
Chen, Z., Osada, M., Li, D., Been, E. M., Chen, S., Hashimoto, M., Lu, D., Mo, S., Lee, K., Wang, B., Rodolakis, F., McChesney, J. L., Jia, et al  
2022; 5 (6)
- **Momentum-resolved resonant inelastic soft X-ray scattering (qRIXS) endstation at the ALS** *JOURNAL OF ELECTRON SPECTROSCOPY AND RELATED PHENOMENA*  
Chuang, Y., Feng, X., Cruz, A., Hanzel, K., Brown, A., Spucce, A., Frano, A., Lee, W., Kim, J., Chen, Y., Smith, B., Pepper, J. S., Shao, et al  
2022; 257
- **Correlated Hofstadter spectrum and flavour phase diagram in magic-angle twisted bilayer graphene** *NATURE PHYSICS*  
Yu, J., Foutty, B. A., Han, Z., Barber, M. E., Schattner, Y., Watanabe, K., Taniguchi, T., Phillips, P., Shen, Z., Kivelson, S. A., Feldman, B. E.  
2022
- **Laser-induced patterning for a diffraction grating using the phase change material of Ge2Sb2Te5 (GST) as a spatial light modulator in X-ray optics: a proof of concept** *OPTICAL MATERIALS EXPRESS*  
Park, J., Zalden, P., Ng, E., Johnston, S., Fong, S. W., Chang, C., Tassone, C. J., Van Campen, D., Mok, W., Mabuchi, H., Wong, H., Shen, Z., Lindenberg, et al  
2022; 12 (4): 1408-1416
- **Thermal Hall conductivity of electron-doped cuprates** *PHYSICAL REVIEW B*  
Boulanger, M., Grissonnanche, G., Lefrancois, E.,ourgout, A., Xu, K., Shen, Z., Greene, R. L., Taillefer, L.  
2022; 105 (11)
- **Large-gap insulating dimer ground state in monolayer IrTe2.** *Nature communications*  
Hwang, J., Kim, K., Zhang, C., Zhu, T., Herbig, C., Kim, S., Kim, B., Zhong, Y., Salah, M., El-Desoky, M. M., Hwang, C., Shen, Z., Crommie, et al  
2022; 13 (1): 906
- **Unconventional Hysteretic Transition in a Charge Density Wave.** *Physical review letters*  
Lv, B. Q., Zong, A., Wu, D., Rozhkov, A. V., Fine, B. V., Chen, S. D., Hashimoto, M., Lu, D. H., Li, M., Huang, Y. B., Ruff, J. P., Walko, D. A., Chen, et al  
2022; 128 (3): 036401
- **Unconventional spectral signature of Tc in a pure d-wave superconductor.** *Nature*  
Chen, S., Hashimoto, M., He, Y., Song, D., He, J., Li, Y., Ishida, S., Eisaki, H., Zaanen, J., Devereaux, T. P., Lee, D., Lu, D., Shen, et al  
1800; 601 (7894): 562-567
- **Expanding the momentum field of view in angle-resolved photoemission systems with hemispherical analyzers.** *The Review of scientific instruments*  
Gauthier, N., Sobota, J. A., Pfau, H., Gauthier, A., Soifer, H., Bachmann, M. D., Fisher, I. R., Shen, Z. X., Kirchmann, P. S.  
2021; 92 (12): 123907
- **Expanding the momentum field of view in angle-resolved photoemission systems with hemispherical analyzers** *REVIEW OF SCIENTIFIC INSTRUMENTS*  
Gauthier, N., Sobota, J. A., Pfau, H., Gauthier, A., Soifer, H., Bachmann, M. D., Fisher, I. R., Shen, Z., Kirchmann, P. S.  
2021; 92 (12)

- **Microwave impedance microscopy and its application to quantum materials** *NATURE REVIEWS PHYSICS*  
Barber, M. E., Ma, E., Shen, Z.  
2021
- **Phonon-Mediated Long-Range Attractive Interaction in One-Dimensional Cuprates** *PHYSICAL REVIEW LETTERS*  
Wang, Y., Chen, Z., Shi, T., Moritz, B., Shen, Z., Devereaux, T. P.  
2021; 127 (19): 197003
- **Distinct Oxygen Redox Activities in Li<sub>2</sub>MO<sub>3</sub> (M = Mn, Ru, Ir)** *ACS ENERGY LETTERS*  
Zhuo, Z., Dai, K., Wu, J., Zhang, L., Tamura, N., Chuang, Y., Feng, J., Guo, J., Shen, Z., Liu, G., Pan, F., Yang, W.  
2021; 6 (10): 3417-3424
- **Superconducting Fluctuations in Overdoped Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>8+delta</sub>** *PHYSICAL REVIEW X*  
He, Y., Chen, S., Li, Z., Zhao, D., Song, D., Yoshida, Y., Eisaki, H., Wu, T., Chen, X., Lu, D., Meingast, C., Devereaux, T. P., Birgeneau, et al  
2021; 11 (3)
- **Evidence for quantum spin liquid behaviour in single-layer 1T-TaSe<sub>2</sub> from scanning tunnelling microscopy** *NATURE PHYSICS*  
Ruan, W., Chen, Y., Tang, S., Hwang, J., Tsai, H., Lee, R. L., Wu, M., Ryu, H., Kahn, S., Liou, F., Jia, C., Aikawa, A., Hwang, et al  
2021
- **Quantum Photonic Interface for Tin-Vacancy Centers in Diamond** *PHYSICAL REVIEW X*  
Rugar, A. E., Aghaieimibodi, S., Riedel, D., Dory, C., Lu, H., McQuade, P. J., Shen, Z., Melosh, N. A., Vuckovic, J.  
2021; 11 (3)
- **Evolution of the electronic structure in Ta<sub>2</sub>NiSe<sub>5</sub> across the structural transition revealed by resonant inelastic x-ray scattering** *PHYSICAL REVIEW B*  
Lu, H., Rossi, M., Kim, J., Yavas, H., Said, A., Nag, A., Garcia-Fernandez, M., Agrestini, S., Zhou, K., Jia, C., Moritz, B., Devereaux, T. P., Shen, et al  
2021; 103 (23)
- **Angle-resolved photoemission studies of quantum materials** *REVIEWS OF MODERN PHYSICS*  
Sobota, J. A., He, Y., Shen, Z.  
2021; 93 (2)
- **Imaging Dual-Moire Lattices in Twisted Bilayer Graphene Aligned on Hexagonal Boron Nitride Using Microwave Impedance Microscopy.** *Nano letters*  
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