Curriculum Vitae

Yi Tseng

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EDUCATION BACKGROUND

École polytechnique fédérale de Lausanne, Switzerland, 04.2017-04.2021

-Ph.D. in Physics; thesis conducted in Photon Science Division, Paul Scherrer Institut

National Taiwan University, Taiwan, 09.2011-06.2016

-M.Sc. in Department of Physics, overall GPA 4.0/4.0, 09.2014-06.2016

-B.Sc. in Department of Mechanical Engineering, overall GPA 3.6/4.0, 09.2011-06.2014

National Tsing Hua University, Taiwan, 09.2010-06.2011

-Department of Physics, overall GPA 3.2/4.0, transfer to NTU in July 2011

RESEARCH EXPERIENCE

Massachusetts Institute of Technology, Department of Physics, USA, 11.2021-present

(Supervisor: Prof. Riccardo Comin)

Postdoctoral associate. X-ray and optical spectroscopies of quantum materials based on metal oxide interfaces and van der Waals' material heterostructures.

Paul Scherrer Institut, Spectroscopy on Novel Materials Group, Switzerland, 04.2017-04.2021

Ph.D. Thesis: "Resonant Inelastic X-ray Scattering Studies of Low-dimensional and Frustrated 3d Transition Metal Oxides." (Supervisor: Prof. Henrik M. Rønnow and Dr. Thorsten Schmitt)

Resonant inelastic X-ray scattering (RIXS) studies on the quasi-one-dimensional chain-ladder cuprate $Sr_{14}Cu_{24}O_{41}$ and honeycomb nickelate $Na_2Ni_2TeO_6$. Investigate the collective magnetic and charge excitations, charge density wave (CDW) order with impurity effects, interplay between magnetic frustration and multi-particle electron-phonon exciton, etc.

National Taiwan University, Nanomagnetism Lab, Taiwan, 09.2014-06.2016

Master Thesis: "Surface characterization of 3-D Dirac semimetal Cd_3As_2 using Scanning Tunneling Microscopy and First-Principles Calculation." (Supervisor: Prof. Minn-Tsong Lin)

Scanning tunneling microscopy (STM) on the surface superstructure and its correlations to the crystal-symmetry-protected topological order in a Dirac semimetal Cd_3As_2, combine with *ab-initio* calculations using density functional theory (DFT).

PAPER IN PREPARATION (EQUALLY CONTRIBUTED MARKED BY *)

1. E. Paris, W. Zhang, **Y. Tseng**, A. Efimenko, V. Favre, V. N. Strocov, K. Rolfs, T. Shang, M. Medarde, E. Pomjakushina, H. M. Rønnow, M. Radović, and T. Schmitt, Evidence for short-range antiferromagnetic interactions in the elementary excitation spectrum of $SrIrO_3$, manuscript in preparation.
2. D. E. McNally, S. Catalano, J. Pelliciari, M. Gibert, E. Paris, C. Dominguez, **Y. Tseng**, V. N. Strocov, J.-M. Triscone, S. Johnston, and T. Schmitt, Evolution of the electron-phonon interactions across the metal-insulator transition of rare-earth nickelates, manuscript in preparation.
3. **Y. Tseng**, E. Paris, K. P. Schmidt, W. Zhang, T. C. Asmara, R. Bag, V. N. Strocov, J. Schlappa, S. Singh, H. M. Rønnow, and T. Schmitt, Unraveling the spectroscopic signature of $\Delta S=0$ multi-bound states and continua in the hole-doped ladders of $Sr_{14}Cu_{24}O_{41}$, manuscript in preparation.
4. W. Zhang*, C. E. Agrapadis*, **Y. Tseng**, T. C. Asmara, E. Paris, V. N. Strocov, E. Giannini, S. Nishimoto, K. Wohlfeld, and T. Schmitt, Unraveling the nature of the spin excitations disentangled from the charge contributions in the superconducting cuprate $Bi_2Sr_2CaCu_2O_{8+\delta}$, manuscript submitted.
5. **Y. Tseng**, J. Thomas, W. Zhang, E. Paris, P. Puphal, R. Bag, G. Deng, T. C. Asmara, V. N. Strocov, S. Singh, E. Pomjakushina, U. Kumar, A. Nocera, H. M. Rønnow, S. Johnston, and T. Schmitt, Crossover of the high-energy spin fluctuations from collective triplons to localized magnetic excitations in doped $Sr_{14-x}Ca_xCu_{24}O_{41}$ cuprate ladders, manuscript under review.
6. Q. Xiao*, W. Zhang*, T. C. Asmara*, D. Li*, Q. Li, S. Zhang, **Y. Tseng**, X. Dong, Y. Wang, C.-C. Chen, T. Schmitt, and Y. Peng, Dispersionless orbital excitations in (Li,Fe)OHFeSe superconductors, manuscript under review.
7. X. Lu, W. Zhang, **Y. Tseng**, R. Liu, Z. Tao, E. Paris, P. Liu, T. Chen, Y. Song, R. Yu, Q. Si, P. Dai, and T. Schmitt, Spin-excitation anisotropy in the nematic state of detwinned FeSe, manuscript under review.
8. F. Barantani, M. K. Tran, I. Madan, I. Kapon, N. Bachar, T. C. Asmara, E. Paris, **Y. Tseng**, W. Zhang, Y. Hu, X. X. Huang, E. Giannini, G. D. Gu, T. P. Devereaux, C. Berthod, F. Carbone, T. Schmitt, and D. van der Marel, Experimental observation of electron-exciton coupling in high-T_c cuprates, manuscript under review.

PUBLICATION LIST (EQUALLY CONTRIBUTED MARKED BY *)

1. E. Paris*, C. W. Nicholson*, S. Johnston, **Y. Tseng**, M. Rumo, G. Coslovich, S. Zohar, M.-F. Lin, V. N. Strocov, R. Saint-Martin, A. Revcolevschi, A. Kemper, W. Schlotter, G. Dakovski, C. Monney, and T. Schmitt, Probing the interplay between lattice dynamics and short-range magnetic correlations in $CuGeO_3$ with femtosecond RIXS, npj Quantum Mater **6**, 51 (2021).
2. R. Gaina*, C. W. Nicholson*, M. Rumo, S. Sarkar, J. Khmaladze, E. Paris, **Y. Tseng**, W. Zhang, T. C. Asmara, D. E. McNally, C. Piamonteze, E. Weschke, T. Schmitt, C. Monney, and C. Bernhard, Long-ranged Cu-based order with d_{z2} orbital character at a $YBa_2Cu_3O_7$/manganite interface, npj Quantum Mater **6**, 12 (2021).
3. Y. Song, W. Wang, E. Paris, X. Lu, J. Pelliciari, **Y. Tseng**, Y. Huang, D. E. McNally, M. Dantz, C. Cao, R. Yu, R. J. Birgeneau, T. Schmitt, and P. Dai, Spin dynamics in NaFeAs and $NaFe_{0.53}Cu_{0.47}As$ probed by resonant inelastic X-ray scattering, Phys. Rev. B **103**, 075112 (2021).
4. K. von Arx, F. Forte, M. Horio, V. Granata, Q. Wang, L. Das, Y. Sassa, R. Fittipaldi, C. G. Fatuzzo, O. Ivashko, **Y. Tseng**, E. Paris, A. Vecchione, T. Schmitt, M. Cuoco, and J. Chang, Resonant inelastic X-ray scattering study of $Ca_3Ru_2O_7$, Phys. Rev. B **102**, 235104 (2020).
5. E. Paris*, **Y. Tseng***, E. M. Pärschke*, W. Zhang, M. H. Upton, A. Efimenko, K. Rolfs, D. E. McNally, L. Maurel, M. Naamneh, M. Caputo, V. N. Strocov, Z. Wang, D. Casa, C. Schneider, E. Pomjakushina, K. Wohlfeld, M. Radović, and T. Schmitt, Strain engineering of the charge and spin-orbital interactions in Sr_2IrO_4, PNAS **117**, 24764 (2020).
6. Q. Wang, M. Horio, K. von Arx, Y. Shen, D. Mukkattukavil, Y. Sassa, O. Ivashko, C. E. Matt, S. Pyon, T. Takayama, H. Takagi, T. Kurosawa, N. Momono, M. Oda, T. Adachi, **Y. Tseng**, W. Zhang, J. Zhao, K. Kummer, M. Garcia-Fernandez, K.-J. Zhou, N. B. Christensen, H. M. Rønnow, T. Schmitt, and J. Chang, High-temperature charge-stripe correlations in $La_{1.675}Eu_{0.2}Sr_{0.125}CuO_4$, Phys. Rev. Lett. **124**, 187002 (2020).
7. S. Parchenko*, E. Paris*, D. E. McNally, E. Abreu, M. Dantz, E. M. Bothschafter, A. H. Reid, W. F. Schlotter, M.-F. Lin, S. F. Wandel, G. Coslovich, S. Zohar, G. L. Dakovski, J. J. Turner, S. Möller, **Y. Tseng**, M. Radović, C. Saathe, M. Agaaker, J. E. Nordgreen, S. L. Johnson, T. Schmitt, and U. Staub, Orbital dynamics during an ultrafast insulator to metal transition, Phys. Rev. Research **2**, 023110 (2020).
8. 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-Fernadez, 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 superconducting infinite-layer nickelates, Nat. Mater **19**, 381 (2020).

9. H. Elnaggar, R. Wang, S. Lafuerza, E. Paris, A. C. Komarek, H. Guo, **Y. Tseng**, D. E. McNally, F. Frati, M. W. Haverkort, M. Sikora, T. Schmitt, and F. M. F. de Groot, Possible absence of trimeron correlations above the Verwey temperature in Fe_3O_4, Phys. Rev. B **101**, 085017 (2020).
10. H. Elnaggar, R. Wang, S. Lafuerza, E. Paris, **Y. Tseng**, D. E. McNally, A. C. Komarek, M. W. Haverkort, M. Sikora, T. Schmitt, and F. M. F de Groot, Magnetic contrast at spin-flip excitations: An advanced X-ray spectroscopy tool to study magnetic-ordering, ACS Appl. Mater. Interfaces **11**, 36213 (2019).
11. O. Ivashko*, M. Horio*, W. Wan, N. B. Christensen, D. E. McNally, E. Paris, **Y. Tseng**, N. E. Shaik, H. M. Rønnow, H. I. Wei, C. Adamo, M. Gibert, K. M. Shen, J. M. Tomczak, T. Schmitt, and J. Chang, Strain-engineering Mott-insulating La_2CuO_4, Nat. Commun. **10**, 786 (2019).
12. S. Kang, **Y. Tseng**, B. H. Kim, S. Yun, B. Sohn, B. Kim, D. E. McNally, E. Paris, C. H. Kim, C. Y. Kim, T. W. Noh, S. Ishihara, T. Schmitt, and J.-G. Park, Orbital-selective confinement effect of Ru 4d orbitals in $SrRuO_3$ ultrathin film, Phys. Rev. B **99**, 045113 (2019).
13. L. Das, F. Forte, R. Fittipaldi, C. G. Fatuzzo, V. Granata, O. Ivashko, M. Horio, F. Schindler, M. Dantz, **Y. Tseng**, D. E. McNally, H. M. Rønnow, W. Wan, N. B. Christensen, J. Pelliciari, P. Olalde-Velasco, N. Kikugawa, T. Neupert, A. Vecchione, T. Schmitt, M. Cuoco, and J. Chang, Spin-orbital excitations in Ca_2RuO_4 revealed by resonant inelastic X-ray scattering, Phys. Rev. X **8**, 011048 (2018).
14. C. J. Butler, Y.-M. Wu, C.-R. Hsing, **Y. Tseng**, R. Sankar, C.-M. Wei, F.-C. Chou, and M.-T. Lin, Quasiparticle interference in ZrSiS: Strongly band-selective scattering depending on impurity lattice site, Phys. Rev. B **96**, 196125 (2017).
15. C. J. Butler*, **Y. Tseng***, C.-R. Hsing, Y.-M. Wu, R. Sankar, M.-F. Wang, C.-M. Wei, F.-C. Chou, and M.-T. Lin, Observation of surface superstructure induced by systematic vacancies of topological Dirac semimetal Cd_3As_2, Phys. Rev. B **95**, 081410(R) (2017).

ACADEMIC PRESENTATIONS

1. Hybrid Workshop on Resonant Inelastic and Elastic X-ray Scattering 2021; Poster session (virtual attendance), *Crossover of the high-energy spin fluctuations from collective triplons to localized magnetic excitations in doped $Sr_{14-x}Ca_xCu_{24}O_{41}$ cuprate ladders*; 2021 Aug. 25-27, Brookhaven National Laboratory, Upton, USA.
2. Photon Science Division (PSD) Mini-Symposia 2019; Contributed talk in *X-ray scattering* session, *Doping evolution of the spin dynamics in two-leg spin ladders probed by resonant inelastic X-ray scattering*; 2019 Dec. 10; Villigen PSI, Switzerland.
3. 10th New Generation in Strongly Correlated Electron Systems (NGSCES); Contributed talk in *RIXS* session, *Electronic and magnetic tuning of charge order and phonon anomaly in a cuprate spin ladder*; 2019 Sept. 2-6, Pescara, Italy.
4. Joint Annual Meeting of Swiss Physical Society (SPS) and Austrian Physical Society (APS) 2019; Contributed talk in *MaNEP* session, *Electronic and magnetic tuning of charge order and phonon anomaly in a cuprate spin ladder*; 2019 Aug. 26-30, Zürich, Switzerland.
5. Emergent Phenomena in Correlated Quantum Matter Summer School 2019; Poster presentation, *Electronic and magnetic tuning of charge order and phonon anomaly in the cuprate spin ladder $Sr_{14}(Cu_{1-x}Co_x)_{24}O_{41}$*; 2019 Aug. 5-17, Cargèse, Corsica.
6. The 40th International Conference on Vacuum Ultraviolet and X-ray Physics (VUVX); Contributed talk in *Electronic* session, *Electronic and magnetic tuning of charge order and phonon anomaly in a cuprate spin ladder*; 2019 Jul. 1-5, San Francisco, USA.
7. Swiss Physical Society (SPS) Annual Meeting 2020; Contributed talk in *Condensed Matter Physics (KOND)* session, *Manipulating the spin and hole dynamics in the spin ladder of Co doped $Sr_{14}Cu_{24}O_{41}$*; 2018 Aug. 28-31, Lausanne, Switzerland.
8. 2018 Swiss Workshop on Materials with Novel Electronic Properties (MaNEP); Poster presentation at *Quantum and mesoscopic magnetism* session, *Manipulating the spin and hole dynamics in the spin ladder of Co doped $Sr_{14}Cu_{24}O_{41}$*; 2018 Aug. 29-31; Les Diablerets, Switzerland.
9. 2018 Workshop, Group of Spectroscopy on Novel Materials; Contributed talk, *Co impurity modification of the magnetic correlation in the spin ladder $Sr_{14}Cu_{24}O_{41}$*; 2018 Jan. 16-20; Saas-Grund, Switzerland.
10. 2nd PSI Condensed Matter Retreat; Poster presentation at *Quantum Magnetism* session, *Co impurity modification of the magnetic correlation in the spin ladder $Sr_{14}Cu_{24}O_{41}$*; 2017 Nov. 15-16; Windisch, Switzerland.
11. Annual Meeting of the Physical Society of the Republic of China; Poster presentation at *Surface Science* session, *Atomically Resolved Surface Study of Three-Dimensional Dirac Semimetal Cadmium Arsenide*; 2016 Jan. 25-27; Kaohsiung, Taiwan.

12. Joint Seminar of Korea University and National Taiwan University; Poster presentation at *Surface Science* session, *Atomically Resolved Surface Study of Three-Dimensional Dirac Semimetal Cadmium Arsenide*; 2016 Jan. 19-21; Taipei, Taiwan.

TEACHING EXPERIENCE

Assistance in Supervision of Master Semester Project, Department of Material Science, École Polytechnique Fédérale de Lausanne, Switzerland, 09.2020-12.2020

Master semester project of Gabriele Domaine. Title: "Resonant inelastic X-ray scattering study on magnetic van der Waals' materials MPS_3." Hand-on practicals and experimental data analysis.

Teaching Assistance, Center for Emerging Materials and Advanced Devices (CEMAD), National Taiwan University, Taiwan, 02.2015-06.2015

Course: Nanoscience Lab(I). Demonstration and teaching students the fundamentals of scanning probe technique by performing ambient STM on highly-oriented polycrystalline graphite.

HONORS & AWARDS

BenQ Materials Corp. Research Scholarship, 12.2015

- ca. 18000 USD.

SKILLS

Research:

- Soft X-ray scattering techniques in synchrotron radiation-based facilities.
- Ultra-high vacuum (UHV) system with low-temperature science skills (operation of L-He cryostat at 4.5 K)
- Experience of free-electron-laser (FEL) spectroscopic techniques
- First principle simulation using Vienna *ab initio* Simulation Package (VASP)
- Programming using Matlab and Python
- Graphics using AutoCAD

Language:

- Mandarin: Native speaker
- English: IELTS 7.5 (Listening 8.5/Reading 8/Writing 6.5/Speaking 6.5)
- German: Learning hours ca. 100 in total. (6 months)