YISHUAI XU

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EDUCATION

New York Univeristy *Sep 2014 - Present*
Ph.D. candidate in Physics
Focus on experimental condensed matter physics and numerial simulations

Shanghai Jiao Tong University *Sep 2010 - June 2014*
B.S. in Physics

RESEARCH INTERESTS

Topological Quantum Materials, Emergent Quantum Phenomena, Correlated heavy fermions

RESEARCH SKILLS

X-ray/UV spectroscopy (ARPES, XAS, RIXS, REXS), First-principles simulation (DFT), Tight-binding-based simulation, Vacuum technology.

RESEARCH EXPERIENCE

Research Assistant
Department of Physics, New York University *Jan 2015 - present*
Advisor: Prof. L. Andrew Wray; coadvised by R. Biswas (Purdue) for numerical simulation projects.

- ➢ Simulated and discovered emergent phenomena caused by defects in Topological Insulator (TI) and graphene systems. (see publications [7-8], and related work in [4])
- ➢ Discovered weakly protected topological connectivity of step edge states at the surface of a three-dimensional TI. (publications [6])
- ➢ Conducted experiments using photoemission (ARPES) and resonant X-ray scattering (RIXS/REXS) at national labs (ALS, NSLS-II). (publications [1-4,7])
- ➢ Helped setting up in-housing ARPES instrument at NYU.

Undergrad Research Assistant
Institute of Condensed Matter Physics, Shanghai Jiao Tong University *Feb 2013 - June 2014*
Advisor: Prof. Weidong Luo

- ➢ Performed first-principles study on magnetic phases of β-FeSe under Hydrostatic Pressure.
- ➢ Studied chain-like structure interfacial layer between Superconductor $NbSe_2$ and Topological Insulator Bi_2Si_3.

TEACHING EXPERIENCE

Teaching Assistant
New York University *Jan 2015 - May 2016*

Taught lab section for "How things work" (Spring 2015) and "General Physics I & II" (Fall & Spring 2016).

PRESENTATIONS AND TALKS

Feb, 2020: **Seminar at Department of Condensed Matter Physics, Brookhaven National Lab**, " Emergent Phenomena from Disorder on a 3D TI Surface".

Jan, 2020: **Special CMP seminar at University of Pennsylvania**, " Emergent Phenomena from Disorder on a 3D TI Surface".

Dec, 2019: **CMP Seminar at Princeton University**, " Emergent Phenomena from Disorder on a 3D TI Surface".

Jun, 2018: **SJTU Condensed Matter Seminar**, "Disordered Enabled Band Structure Engineering of a Topological Insulator Surface".

March, 2018: **APS March Meeting**, "Weakly Protected 1D Topological Step Edge States at the Surface of a 3D Topological Insulator".

March, 2017: **APS March Meeting**, "Band Structure Engineering by Disorder at a Topological Insulator Surface".

PUBLICATIONS (principal authorships in bold)

1. "Robust coherence phenomena and surface states in magnetically alloyed SmB_6". *Lin Miao, Chulhee Min, Yishuai Xu, Erica Kotta, Rourav Basak, M.S. Song, B.Y. Kang, B. K. Cho, K. Kißner, Friedrich Reinert, Yi-De Chuang, Jonathan D. Denlinger, and L. Andrew Wray*, under review in Physical Review Letters (2020)

2. "Low energy band structure and symmetries of UTe_2 from angle resolved photoemission spectroscopy". *Lin Miao, Shouzheng Liu, Yishuai Xu, Erica C. Kotta, Chang-Jong Kang, Sheng Ran, Johnpierre Paglione, Gabriel Kotliar, Nicholas P. Butch, Jonathan D. Denlinger, and L. Andrew Wray*, Physical Review Letters **124**, 076401 (2020).

3. "Spectromicroscopic measurement of surface and bulk band structure interplay in a disordered topological insulator". *Erica Kotta, Lin Miao, Yishuai Xu, S. Alexander Breitweiser, Chris Jozwiak, Aaron Bostwick, Eli Rotenberg, Wenhan Zhang, Weida Wu, Takehito Suzuki, Joseph Checkelsky, and L. Andrew Wray*, Nature Physics **16**, 285-289 (2020).

4. "High temperature singlet-based magnetism from Hund's rule correlations". *Lin Miao, Rourav Basak, Sheng Ran, Yishuai Xu, Erica Kotta, Haowei He, Jonathan D. Denlinger, Yi-De Chuang, Y. Zhao, Z. Xu, J. W. Lynn, J. R. Jeffries, S. R. Saha, Ioannis Giannakis, Pegor Aynajian, Chang-Jong Kang, Yilin Wang, Gabriel Kotliar, Nicholas P. Butch, L. Andrew Wray*, Nature Communications **10**, 644 (2019).

5. "Classically accelerating solenoidal wave packets in two dimensions". *Argha Mondal, Yishuai Xu, L. Andrew Wray, and David G. Grier*, Physical Review A **98**, 060101 (R) (2018). Rapid Communications.

6. **"Connection topology of step edge state bands at the surface of a three dimensional topological insulator"**. *Yishuai Xu, Guodong Jiang, Janet Chiu, Lin Miao, Erica Kotta, Yutan Zhang, Rudro R. Biswas, L. Andrew Wray*, New Journal of Physics **20**, 073014 (2018).

7. **"Observation of a Topological Insulator Dirac Cone Reshaped by Non-magnetic Impurity Resonance"**. *Lin Miao*, Yishuai Xu*, Wenhan Zhang*, Daniel Older, S. Alexander Breitweiser, Erica Kotta, Haowei He, Takehito Suzuki, Jonathan D. Denlinger, Rudro R. Biswas, Joseph Checkelsky, Weida Wu, L. Andrew Wray*, NPJ Quantum Materials **3**, 29 (2018). (*Contributed equally).

8. **"Disorder Enabled Band Structure Engineering of a Topological Insulator Surface"**. *Yishuai Xu, Janet Chiu, Lin Miao, Haowei He, Zhanybek Alpichshev, A. Kapitulnik, Rudro R. Biswas, L. Andrew Wray*, Nature Communications **8**, 14081 (2017).

SELECTED AWARDS

- MacCracken Fellowship
- National Scholarship for Undergraduate (Top 2%)
- Academic Excellence Scholarship of Shanghai Jiao Tong University