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RESEARCH INTERESTS

Theoretical condensed matter physics

- 1) Exotic topological states in condensed matter and ultra-cold atom systems;
 - Weyl semi-metals, topological insulators and superconductors;
 - Quantum Hall effects, 3D and 4D Landau levels, solvable models with topological excitations;
 - Synthetic gauge fields with ultra cold atoms, spin-orbit coupled many-body physics with magnetic dipolar fermions.
- 2) Novel many-body states in strongly correlated states
 - Itinerant ferromagnetism, Hund's metal, orbital physics;
 - Quantum Monte Carlo methods and non-perturbative analytic approaches.

EDUCATION AND EMPLOYMENT

Jul 2016 - Department of Physics & Astronomy, The Johns Hopkins University
Present *Assistant Professor*

Sep 2013 - Princeton Center for Theoretical Science, Princeton University
Jun 2016 *Postdoctoral Fellow*

Sep 2009 - Department of Physics, University of California, San Diego
Jun 2013 *Ph.D. in Physics*

- Advisor: Prof. Congjun Wu; Co-advisor: Prof. Kenneth Intriligator
- Thesis: "Topological States in Condensed Matter and Cold Atom Systems"

(Aug 2012 - Kavli Institute of Theoretical Physics, University of California, Santa Barbara
Dec 2012) *Graduate Fellow*

Sep 2006 - Department of Physics, Fudan University, Shanghai, China
Jul 2009 *M. S. in Physics*

- Advisor: Prof. Ruibao Tao; Co-advised by Prof. Yue Yu

Sep 2003 - Department of Physics, Fudan University, Shanghai, China
Jul 2006 *B. S. in Physics*

HONORS AND AWARDS

- 2013 PCTS Postdoctoral Fellow, Princeton University
- 2012 KITP Graduate Fellow, University of California, Santa Barbara
- 2012 Inamori Fellowship, University of California, San Diego
- 2011 Shanghai Outstanding Graduate Students Academic Achievements Award
- 2006/2009 Excellent Undergraduate/Master Thesis Awards, Fudan University, Shanghai

SCIENTIFIC DUTIES

Referee for “Physical Review Letters”, “Physical Review B”, “Scientific Reports”, “Europhysics Letters”, “International Journal of Modern Physics B”, “The European Physical Journal B”.

PROGRAM ORGANIZATION

1. 10/2014, PCTS/ONR program “**Majorana Zero Modes and Beyond**”, Princeton. [Co-organizers: T. Neupert, N. P. Ong, S. Sondhi, C. von Keyserlingk, A. Yazdani];
2. 04/2015, PCTS program “**Topological and Strongly Correlated Phases in Cold Atoms**”, Princeton. [Co-organizers: W. Bakr, D. Huse, T. Neupert, C. von Keyserlingk];
3. 03/2016, PCTS/PCCM/MRSEC/Moore program “**Dirac and Weyl Fermions in Topological Semi-metals**”, Princeton. [Co-organizers: A. Bernevig, Z. Hasan, T. Neupert, N. P. Ong].

CITATION METRICS

- h-index=11 at Google Scholar (Preprints and Refereed papers)
- h-index=9 at Researcher ID based on Web of Science (Refereed papers)

PUBLICATIONS AND PREPRINTS

22. **Topological Septet Pairing with Spin-3/2 Fermions: High Partial-wave Channel Counterparts of the $^3\text{He-B}$ Phase**
Wang Yang, **Yi Li**, Congjun Wu
Phys. Rev. Lett. **117**, 075301 (2016).
21. **Majorana Positivity and the Fermion Sign Problem of Quantum Monte Carlo Simulations**
Z. C. Wei, Congjun Wu, **Yi Li**, Shiwei Zhang, Tao Xiang
Phys. Rev. Lett. **116**, 250601 (2016).
20. **Three-dimensional Quaternionic Condensations, Hopf Invariants, and Skyrmion Lattices with Synthetic Spin-orbit Coupling**
Yi Li, Xiangfa Zhou, Congjun Wu
Phys. Rev. A. **93**, 033628 (2016).
19. **Topological Nodal Cooper Pairing in Doped Weyl Semi-metals**
Yi Li, F. Duncan M. Haldane (arXiv:1510.01730)
18. **Time-reversal Invariant SU(2) Hofstadter Problem in Three Dimensional Lattices**
Yi Li
Phys. Rev. B **91**, 195133 (2015).

17. **Thermodynamic Properties of a 2D Itinerant Ferromagnet - a Sign-problem Free Quantum Monte Carlo Study**
Shenglong Xu, **Yi Li**, Congjun Wu
Phys. Rev. X **5**, 021032 (2015).
16. **Exact Results for Itinerant Ferromagnetism in t_{2g} -orbital Systems on Cubic and Square Lattices**
Yi Li
Phys. Rev. B **91**, 115112 (2015).
15. **Exact Results for Itinerant Ferromagnetism in Multi-orbital Systems on Square and Cubic Lattices**
Yi Li, Elliott H. Lieb, Congjun Wu
Phys. Rev. Lett. **112**, 217201 (2014).
14. **2D Topological Insulators with p_x - and p_y -orbital Bands in the Honeycomb Lattice**
Gufeng Zhang, **Yi Li**, Congjun Wu
Phys. Rev. B **90**, 075114 (2014).
13. **Competing Orders in the 2D Half-filled SU(2N) Hubbard Model Through the Pinning Field Quantum Monte-Carlo Simulations**
Da Wang, **Yi Li**, Zi Cai, Zhichao Zhou, Yu Wang, Congjun Wu
Phys. Rev. Lett. **112**, 156403 (2014).
12. (Review article) **Unconventional Symmetries of Fermi Liquid and Cooper Pairing Properties with Electric and Magnetic Dipolar Fermions**
Yi Li, Congjun Wu
J. Phys. Condens. Matter **26**, 493203 (2014).
11. **Spontaneous Time-reversal Symmetry Breaking in the Boundary Majorana Flat Bands**
Yi Li, Da Wang, Congjun Wu
New J. Phys. **15**, 085002 (2013) [Focus Issue on Majorana Fermions].
10. (Review article) **Unconventional States of Bosons with the Synthetic Spin-orbit Coupling**
Xiangfa Zhou, **Yi Li**, Zi Cai, Congjun Wu
J. Phys. B: At. Mol. Opt. Phys. **46**, 134001 (2013).
9. **Topological Insulators with SU(2) Landau Levels**
Yi Li, Shou-Cheng Zhang, Congjun Wu
Phys. Rev. Lett. **111**, 186803 (2013).
8. **High-Dimensional Topological Insulators with Quaternionic Analytic Landau Levels**
Yi Li, Congjun Wu
Phys. Rev. Lett. **110**, 216802 (2013).
7. **Spin-orbit Coupled Fermi Liquid Theory with Magnetic Dipolar Interaction**
Yi Li, Congjun Wu
Phys. Rev. B **85**, 205126 (2012).
6. **2D and 3D Topological Insulators with Isotropic and Parity-breaking Landau Levels**
Yi Li, Xiangfa Zhou, Congjun Wu
Phys. Rev. B **85**, 125122 (2012).
5. **Isotropic Landau Levels of Dirac Fermions in High Dimensions**
Yi Li, Kenneth Intriligator, Yue Yu, Congjun Wu
Phys. Rev. B **85**, 085132 (2012).

4. **The J-triplet Cooper Pairing with Magnetic Dipolar Interactions**
Yi Li, Congjun Wu
Scientific Report **2**, 392 (2012).
3. **Anyons Emerging from Fermions with Conventional 2-body Interactions**
Yue Yu, Yi Li
J. Phys. A: Math. Theor. **43**, 105306 (2010). [IOP Select]
2. **Extra Current and Integer Quantum Hall Conductance in the Spin-orbit Coupling System**
Yi Li, Tianxing Ma, Ruibao Tao
Europhys. Lett., **83**, 27002 (2008).
1. **Current in a Spin-orbit-coupling System: Generalization of the Noether's Theorem**
Yi Li, Ruibao Tao
Phys. Rev. B **75**, 075319 (2007).

INVITED TALKS

29. **Johns Hopkins University, Department of Physics**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems.” (2016.2)
28. **Boston University, Department of Physics**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems.” (2016.2)
27. **Yale University, Department of Physics**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems.” (2016.2)
26. **University of Houston, Department of Physics**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems.” (2016.2)
25. **Iowa State University, Department of Physics**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems.” (2016.2)
24. **University of Alabama, Department of Physics**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems.” (2016.1)
23. **Rutgers University, Department of Physics**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems.” (2016.1)
22. **Penn State University, Department of Physics**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems.” (2016.1)
21. **Northeastern University, Department of Physics**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems.” (2016.1)
20. **University of Oregon, Department of Physics**, “Colloquium: Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems.” (2016.1)
19. **Hong Kong University of Science and Technology, Department of Physics**, “Monopole Harmonic Cooper Pairing.” (2015.12)
18. **UMass at Amherst, Department of Physics**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems.” (2015.11)
17. **Tsinghua University, Institute for Advanced Study**, “Monopole Harmonic Cooper Pairing.” (2015.8)

16. **Tsinghua University, Institute for Advanced Study**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems on Square and Cubic Lattices.” (2015.8)
15. **INT Program on Frontiers in Quantum Simulation with Cold Atoms, University of Washington**, “Three-dimensional Quantum Hall Effects.” (2015.4)
14. **MIT, Informal Condensed Matter Seminar**, “Non-perturbative Results for Itinerant Ferromagnetism in Multi-orbital Systems on Square and Cubic Lattices.” (2015.3)
13. **Cornell University, Department of Physics**, “Exact Results for Itinerant Ferromagnetism in Multi-orbital Systems on Square and Cubic Lattices.” (2014.11)
12. **University of Michigan, Department of Physics**, “Exact Results for Itinerant Ferromagnetism in Multi-orbital Systems on Square and Cubic Lattices.” (2014.10)
11. **Ohio State University, Department of Physics**, “Exact Results for Itinerant Ferromagnetism in Multi-orbital Systems on Square and Cubic Lattices.” (2014.10)
10. **Aspen Center for Physics, Winter Conference: Unconventional Order in Strongly Correlated Electron Systems**, “Exotic Electronic States in Matter: Exact Results on Ferromagnetism in 2D and 3D.” (2014.1.)
9. **Princeton University**, Symposium on Quantum Hall and Topological Physics, “Three- and Four-dimensional Topological Insulators from SU(2) Landau Levels.” (2013.9.)
8. **California Institute of Technology, Institute for Quantum Information and Matter**, “Quaternion analytic Landau levels in 3D and 4D.” (2013.1.)
7. **University of California, Los Angeles, Department of Physics**, “3D and 4D Topological Insulators from SU(2) Landau Levels.” (2012.11.)
6. **Stanford University, Department of Physics**, “3D and 4D Topological Insulators from SU(2) Landau Levels.” (2012.10.)
5. **Workshop on “Topological states in quantum matter”, Qingdao, China**, “Topological Insulators, Coming Back to Landau Levels.” (2012.7.)
4. **Fudan University, Department of Physics, Shanghai**, “3D and 4D Topological Insulators, Coming Back to Landau Levels.” (2012.7.)
3. **Tsinghua University, Department of Physics, Beijing**, “Isotropic Landau Levels of Relativistic and Non-Relativistic Fermions in 3D Flat Space.” (2011.8.)
2. **Tsinghua University, Institute for Interdisciplinary Information Sciences, Beijing**, “Isotropic Landau Levels of Relativistic and Non-Relativistic Fermions in 3D Flat Space.” (2011.8.)
1. **KITPC, Chinese Academy of Sciences, Beijing**, “Isotropic Landau Levels of Relativistic and Non-Relativistic Fermions in 3D Flat Space.” (2011.8.)

TEACHING EXPERIENCE

Teaching assistant at UC San Diego: quantum mechanics (graduate, 2012-2013), classical mechanics (undergraduate, 2011-2012), electrodynamics (undergraduate, 2010-2011), and general physics (undergraduate, 2009-2011).