

# Curriculum Vitae of Congjun Wu

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## RESEARCH AREA

My research is on the study of **new states of matter** and their **organizing principles** in condensed matter and cold atom systems. It includes superconductivity, magnetism, orbital physics, topological states, strongly correlated cold atom systems, and quantum Monte-Carlo simulations.

## EDUCATION

- Ph. D. in Physics, Stanford University, Jun. 2002 - Sept. 2005.  
Advisor: Prof. Shou-Cheng Zhang (deceased).
- University of Illinois at Urbana-Champaign, May 2000 - May 2002.  
Advisor: Prof. Eduardo H. Fradkin.
- M.S. in Physics, Peking University, Beijing, China, Sept. 1997 - Jun. 2000.  
Advisor: Prof. Zhao-Bin Su.
- B.S. in Physics, Tsinghua University, Beijing, China, Sept. 1992 - Jul. 1997.

## EMPLOYMENT

Mar. 2021 -	Chair Professor, Department of Physics, School of Science, Westlake University, Hangzhou, China
Jul. 2017- Mar. 2021	Professor, Department of Physics, University of California, San Diego (UCSD)
Jul. 2011- Jun. 2017	Associate Professor, Department of Physics, UCSD.
Jul. 2007- Jun. 2011	Assistant Professor, Department of Physics, UCSD.
Aug. 2005- Jun. 2007	Postdoctoral Research Associate, Kavli Institute for Theoretical Physics, University of California, Santa Barbara.

## HONORS and AWARDS

- New Cornerstone Investigator (the inaugural award), 2023-2027.
- American Physical Society (APS) Fellowship, nominated by Division of Condensed Matter Physics, APS (2018).  
**Citation:** "For research in helical edge liquids of topological insulators, itinerant magnetism, novel states of matter including cold fermions with high symmetries, orbital physics in optical lattices, spin-orbit coupled Bose-Einstein condensates, and for work on the quantum Monte-Carlo sign problem".
- Air Force Office of Scientific Research (AFOSR), Young Investigator Award, 2011-2014.
- Alfred P. Sloan Research Fellowship, 2008.
- "Outstanding Young Researcher Award" of Overseas Chinese Physics Association, 2008.
- The most influential paper award from Chinese Physics Society 2013 for "Wu, Mondragon-Shem, and Zhou, *Chin. Phys. Lett.* 28, 086104 (2011)" (This paper is one of two earliest works theoretically studying spin-orbit coupled BEC").

## CITATION RECORDS

- Web of Science: Total citations **8101**, **H-index:** 47
- Researcher ID: <http://www.researcherid.com/rid/L-1750-2015>
- Google Scholar: <https://scholar.google.com/citations?user=RVhTP8oAAAAJ&hl=en>  
Total citations **11988**.

## PH. D. STUDENTS CULTIVATED

1. Dr. Yi Li, Ph.D. 2013.  
She is currently an Assistant Professor at **Johns Hopkins University** since 07/2016. She was awarded the Sloan Research Fellowship in 2018, and the NSF Career Award in 2019. She did postdoctoral research at **Princeton Center of Theoretical Sciences** from 07/2013 to 06/2016.
2. Dr. Shenglong Xu, Ph. D. 2016.  
He is currently an Assistant Professor from Department of Physics, **Texas A&M University** since 2023. He was a postdoctoral researcher at **University of Maryland** from 09/2016 - 12/2019.
3. Dr. Wang Yang, Ph. D. 2017.  
Currently he is an Associate professor at School of Physics, Nankai University 2023. He was a postdoctoral researcher at **University of British Columbia**, working with Prof. Ian Affleck.
4. Dr. Hsiang-Hsuan Hung, Ph. D. 2011.  
He did postdoctoral research at **UIUC** and **UT, Austin**, and is currently in industry.

### POSTDOCTORAL RESEARCHERS SUPERVISED

1. Dr. Wei-cheng Lee (08/2008-08/2010), Ph. D 2008 from UT Austin.  
He is currently an Associate Professor at **Binghamton University, SUNY**.
2. Dr. Zi Cai (09/2010-08/2012), Ph.D 2010 from Institute of Physics, Chinese Academy of Sciences. He is currently an Associate Professor **Shanghai Jiaotong University** since 2022, and an Assistant Professor from 2016-2022.
3. Dr. Da Wang (09/2012-08/2014), Ph. D. 2012 from Nanjing University. He has been an Associate Professor at **Nanjing University**, China since 2015.
4. Dr. Jianda Wu (09/2014-08/2017), Ph. D 2014 from Rice University. He has been an Associate Professor at **T. D. Lee Institute, Shanghai Jiaotong University**, China since 2018.
5. Dr. Lunhui Hu (09/2018 -04/2020), Ph. D. 2018 from Zhejiang University. He has been an Assistant Professor of **Zhejiang University** since 2024.
6. Dr. Chen Lu (09/2022-09/2024), Ph. D. 2020 from Beijing Institute of Technology. He has been an Associate Professor at **Hangzhou Normal University** since 2024.
7. Dr. Zhiming Pan (09/2021-09/2024), Ph. D. 2021 from Peking University. He has been an Associate Professor at **Xiamen University** since 2024.

### CAREER SIGNIFICANT PUBLICATIONS

1. Chen Lu, Zhiming Pan, Fan Yang, Congjun Wu “*Interlayer-coupling-driven high-temperature superconductivity in  $La_3Ni_2O_7$  under pressure*”, Phys. Rev. Lett. **132**, 146002 (2024).  
The link: <https://doi.org/10.1103/PhysRevLett.132.146002>
2. Shenglong Xu, Congjun Wu, “*Space-time crystal and space-time group*”, Phys. Rev. Lett. **120**, 096401 (2018).  
The link: <https://doi.org/10.1103/PhysRevLett.120.096401>
3. Zhong-chao Wei, Congjun Wu, Yi Li, Shi-Wei Zhang, Tao Xiang, “*Majorana Positivity and the Fermion sign problem of Quantum Monte Carlo Simulations*”, Phys. Rev. Lett. **116**, 250601 (2016).  
The link: <https://doi.org/10.1103/PhysRevLett.116.250601>
4. Shenglong Xu, Yi Li, Congjun Wu, “*Sign-Problem-Free Quantum Monte Carlo Study on Thermodynamic Properties and Magnetic Phase Transitions in Orbital-Active Itinerant Ferromagnets*”, Phys. Rev. X **5**, 021032, (2015).  
The link: <https://doi.org/10.1103/PhysRevX.5.021032>
5. Yi Li, E. H. Lieb, Congjun Wu, “*Exact Results on Itinerant Ferromagnetism in Multi-orbital Systems on Square and Cubic Lattices*”, Phys. Rev. Lett. **112**, 217201 (2014).

- The **link**: <https://doi.org/10.1103/PhysRevLett.112.217201>
6. Yi Li, Congjun Wu, “High-Dimensional Topological Insulators with Quaternionic Analytic Landau Levels”, *Phys. Rev. Lett.* **110**, 216802 (2013).  
The **link**: <https://doi.org/10.1103/PhysRevLett.110.216802>
  7. Congjun Wu, Doron Bergman, Leon Balents, and S. Das Sarma, “Flat bands and Wigner crystallization in the honeycomb optical lattice”, *Phys. Rev. Lett.* **99**, 70401 (2007).  
Times Cited: 439. The **link**: <https://doi.org/10.1103/PhysRevLett.99.070401>
  8. Congjun Wu, B. Andrei Bernevig, and Shou-Cheng Zhang, “*The helical liquid and the edge of quantum spin Hall systems*”, *Phys. Rev. Lett.* **96**, 106401(2006).  
Times Cited 650. The **link**: <https://doi.org/10.1103/PhysRevLett.96.106401>
  9. Congjun Wu, Jiangping Hu, and Shou-Cheng Zhang, “*Exact SO(5) symmetry in spin 3/2 fermionic systems*”, *Phys. Rev. Lett.* **91**, 186402 (2003).  
Times Cited 275. The **link**: <https://doi.org/10.1103/PhysRevLett.91.186402>
  10. **Congjun Wu** and Shou-Cheng Zhang, “*Dynamic generation of spin-orbit coupling*”, *Phys. Rev. Lett.* **93**, 36403 (2004).  
The **link**: <https://doi.org/10.1103/PhysRevLett.93.036403>
  11. Congjun Wu, Ian Mondragon Shem, and Xiang-Fa Zhou, “*Unconventional Bose-Einstein condensations from spin-orbit coupling*”, *Chin. Phys. Lett.* **28**, 097102 (2011) (arXiv:0809.3532)  
Times Cited 294. The **link**: <http://stacks.iop.org/0256-307X/28/i=9/a=097102>

## SCIENTIFIC DUTIES

- Serve in the Editorial Board for “*Science China Physics, Mechanics & Astronomy*” since 2023.
- Serve in the Editorial Board for “*Physics(Wuli)*”, *Chinese Physical Society* since 2023.
- Serve in the Editorial Board for “*Chinese Physics Letters*” from 2015 -2020.
- Proposal Reviewer for National Science Foundation of China, U. S. National Science Foundation, Division of Materials Research and Division of Physics; U. S. Army Research Office; U.S. Air Force Office of Scientific Research; Research Grants Council of Hong Kong; the Foundation for Fundamental Research on Matter, the physics research council in the Netherlands.
- Referee for *Nature*; *Nature Physics*, *Physical Review Letters*, *Physical Review A*, and *Physical Review B*; *Nuclear Physics B*; *Physics Letters A*; *Europhysics Letters*.

## PHYSICS COLLOQUIA (21)

1. School of Physics, **Zhejiang University**, “Unconventional magnetism”, Dec 11, 2024.
2. Department of Physics, **Fudan University**, “*Symmetry and Correlation Aspects of Quantum Dynamics*”, Nov. 28, 2023.
3. The 412th Zhongguancun Forum, **Institute of Physics**, “*Multi-particle clustering physics*”, May 29, 2023.
4. Department of Physics, **Xiamen University**, “*Novel Orbital Physics – Unconventional BEC, Ferromagnetism in optical lattices*”, April 27, 2023.
5. Department of Physics, **Southern University of Science and Technology**, “*Novel Orbital Physics – Unconventional BEC, Ferromagnetism in optical lattices*”, March 09, 2023.
6. Department of Physics, **Fudan University**, “*Unification of orbital active honeycomb material*”, Oct. 24, 2021.
7. University Colloquium, **Hunan University**, online talk, “*Electron sociology - an Introduction to Condensed Matter Physics*”, Nov. 12, 2020.
8. Online talk organized by **Editorial Board of Frontiers of Physics**, “*Unification of orbital active honeycomb material*”, Aug. 5, 2020.
9. T. D. Lee Institute, **Shanghai Jiaotong University**, “*Interaction and Correlation Aspects of Ferromagnetism*”, July 7, 2020.

10. Department of Physics, **University of California, San Diego**, “*Symmetry and Correlation Aspect of Quantum Dynamics*”, April 18, 2019.
11. Department of Physics, **Simon Fraser University**, “*Novel orbital physics – Unconventional BEC and Curie-Weiss Metal states in optical lattices*”, Nov. 17, 2017.
12. Department of Physics, **University of British Columbia**, “*Novel orbital physics – Unconventional BEC and Curie-Weiss Metal states in optical lattices*”, Nov. 16, 2017.
13. Department of Physics, **University of California, San Diego**, “*Novel orbital physics – Unconventional BEC and Curie-Weiss Metal states in optical lattices*”, Nov. 9, 2017.
14. Center for Nonlinear Studies, **Los Alamos National Lab**, Condensed Matter Science Colloquium, “*Novel orbital phases in optical lattices – unconventional BEC and itinerant ferromagnetism*”, Dec. 14, 2016.
15. Department of Physics, **Huazhong University of Science & Technology**, Physics Colloquia, “*New progress on itinerant ferromagnetism and the Curie-Weiss Metal State*”, Jun 23, 2016.
16. Department of Physics, **University of Texas at Dallas**, Physics Colloquia, “*Unconventional orbital phases with cold atoms*”, Sept, 2015.
17. Department of Physics, **Tulan University**, Physics Colloquia, “*Exact results on itinerant ferromagnetism*”, Oct 22, 2014.
18. Department of Physics, **University of Houston**, Physics Colloquia, “*Unconventional metamagnetism and orbital ordering in transition metal oxides*”, March 27, 2012.
19. Institut fur Laserphysik, **University of Hamburg**, Germany, Unconventional Bose-Einstein condensation beyond the no-node paradigm”, Jan. 31, 2012.
20. Department of Physics, **Washington State University**, Physics Colloquia, “*Orbital Phases of cold atoms: unconventional BEC, ferromagnetism, and unconventional Cooper pairing*”, Nov. 17, 2009.
21. Department of Physics, **Washington University in St. Louis**, Physics Colloquia, “*Unconventional magnetism and dynamic generation of spin-orbit coupling*”, Jan. 17, 2007.

#### INVITED CONFERENCE TALKS (58)

22. **Westlake QMC workshop**, “Sign problem of QMC”, Nov 22, 2024.
23. **10th heavy fermion conference**, “Hund’s coupling assisted high T<sub>c</sub> superconductivity in La<sub>3</sub>Ni<sub>2</sub>O<sub>7</sub>”, Wenzhou, 11/02/2024.
24. **Shanxi University**, “Space-time Group and Dynamic Crystal”, 10/26/2024.
25. Fall meeting of Chinese Physical Society, Haikou, “Aspect of Symmetry—In memory of Shou-cheng”, 09/12/2024.
26. “**101 Project, statistical mechanics**”, “*Frustrated superfluidity and sextteting order*”, Xiamen Aug 12th, 2024.
27. **The 8th Quantum Information, space-time, and topological states**, “*Quaternion, harmonic oscillator and high dimensional topological states*”, Dalian Aug 3rd, 2024.
28. **The Great Bay Quantum Science Forum**, “*Multi-fermion clustering instability*”, Shenzhen, July 25, 2024.
29. **2024 Zhejiang Workshop on Correlated Matter**, “*Unconventional magnetism and altermagnetism*”, Zhejiang University, May 10, 2024.
30. **Forum of Innovation**, “*Unconventional magnetism and altermagnetism*”, Suzhou University, May 10, 2024.
31. **The fifth Peng Huanwu theoretical physics forum**, “*Quaternion, harmonic oscillator and high dimensional topological states*”, ITP, Beijing, Jan 25, 2024.
32. **International Conference on Ultra-cold atomic gases: 30 years of activities and looking forward**, “*Novel Orbital Physics in Optical Lattices: Unconventional BEC and Curie-Weiss Metal*”, University of Hong Kong, Dec 6, 2023.

33. **Workshop for Topological Quantum Materials and Information**, “*Novel triplet and septet Cooper pairings*”, Shanghai Tech University, Nov 29, 2023.
34. **Workshop for Topological Materials**, “*Symmetry constraints on Josephson diode*”, Fudan University, Nov 28, 2023.
35. **International Conference on Nickelate Superconductivity**, “*Inter-layer driven high  $T_c$  superconductivity in  $La_3Ni_2O_7$* ”, Sun Yat-sen University, Nov 19, 2023.
36. “**Asia-Pacific Workshop on Strongly Correlated Systems 2023**”, “*Fermion clustering instability*”, Sept 24, 2023.
37. **Nan’ao Conference on Photo-electric physics**, “*Unconventional Bose-Einstein Condensation*”, Nan’ao, Sept 9, 2023.
38. **Fall meeting of Chinese Physical Society**, “*Multi-particle clustering physics*”, Yinchuan, Aug 20, 2023.
39. **The 2023 International Workshop on Frontiers of Theoretical and Computational Physics and Chemistry**, “*Fermion Positivity and Quantum Monte-Carlo Studies to Strong Correlation Physics*”, Lanzhou University, Aug 16, 2023.
40. **The 11th Workshop on Quantum Many-Body Computation**, “*Novel States of Matter with Ultra-Cold Multi-component Bosons and Fermions*”, Fuzhou Workshop, 04/13/2023.
41. **Workshop for Topological Quantum Materials and Information**, “*Frustrated superconductivity and superfluidity*”, Shanghai Tech University, Dec 14, 2022.
42. **Kavli Institute Workshop on Magnetism, Superconductivity, Topology**, “*Frustrated superconductivity and superfluidity*”, Songshan Lake, Dongguan, 11/05/2022.
43. Youth Forum of Quantum Magnetism, “*Frustrated orbital exchange and orbital ice*”, online participation, 10/10/2022.
44. **Low temperature physics conference of China**, “*Quaternary (charge 4e) instability*”, participation online, 07/07/2022.
45. **Workshop on  $SU(N)$  physics in condensed matter and cold atoms**, “*Exploring  $Sp(N)$  and  $SU(N)$  symmetries*”, participation online, Osaka University, 05/09/2022
46. **Workshop for Topological Quantum Materials and Information**, “*Time-Reversal Symmetry Breaking Pairing in Iron-Chalcogenide Superconductors*”, ShanghaiTech University, Nov. 25, 2021.
47. **International Workshop: New Frontiers in Extremely Strongly Interacting Quantum Matter: Transport dynamics, quantum hydrodynamics and Topological matter**, “*Space-time Group and Dynamic Crystal*”, T. D. Lee Institute, Shanghai Jiaotong University, July 19, 2021.
48. **Physical Review workshop on Quantum Materials for Modern Magnetism & Spintronics**, “*Unification of orbital active honeycomb material*”, USTC, Hefei, July 14, 2021.
49. **Low Temperature Physics Conference of China**, “*Mott Physics of  $SU(N)$  Hubbard models*” Jinhua, June 04, 2021.
50. **Zhejiang Conference for strong correlation physics**, “*Non-perturbative studies on strong-correlation physics*”, Nov. 28, 2020.
51. **Emergent phenomena in ultracold atoms: topology, interaction, and dynamics** at Kavli Institute for Theoretical Science, Beijing, “*Symmetry and Correlation Aspect of Quantum Dynamics*”, June 13 2019, invited talk.
52. **Memorial workshop for Shoucheng Zhang** at Tsinghua University, “*Quaternionic analyticity and high dimensional topological matter*”, June 10 2019, invited talk.
53. **Memorial workshop for Shoucheng Zhang** at Stanford University, “*Application of the symmetry principle in condensed matter physics*”, May 4, 2019, invited talk.
54. **Workshop for Topological Quantum Information** at Shanghai Tech University, “*Orbital-active honeycomb material*”, Shanghai, Nov 19-20, invited talk.
55. **12th International Conference on Materials and Mechanisms of Superconductivity and**

- High Temperature Superconductors**, “Spin-3/2 topological superconductivity beyond triplet pairing”, Beijing, Aug 19-24, 2018, invited talk.
56. **AFOSR Program Review**, “*Quantum dynamics: Spact-time Crystal and Bethe String states*”, Arlington, Jun 18-22.
  57. **2018 International Conference on Emergent Phenomena in Quantum Materials**, “*Progress on Itinerant Electrons: Cruie-Weiss metal and Spin-orbit ordering*”, New York University in Shanghai, May 30 - Jun 1.
  58. “**Quantum material workshop**”, Fudan University, “*Quantum dynamics: Spact-time Crystal and Bethe String states*”, Shanghai, April 20 -22, 2018.
  59. “**Sign 2017, International workshop in the sign problem in QCD and beyond**”, “Fermion positivity and sign problem”, University of Washington, Seattle, March 2017.
  60. **The 2nd Condensed Matter Conference**, Chinese Physics Society, the symposium on many-body physics, “Quantum dynamics of the XXZ spin chain in a longitudinal magnetic field”, Nanjing, July 2016.
  61. **The first Condensed Matter Conference**, Chinese Physics Society, ”Topological and strongly correlation physics in the  $p_x, p_y$  orbital bands in the honeycomb lattice – from solid states to optical lattices”, Beijing, July 17, 2015.
  62. **Topological and Strongly Correlated Phases in Cold Atoms**, ”Topological and strongly correlation physics in the  $p_x, p_y$  orbital bands in the honeycomb lattice – from solid states to optical lattices”, Princeton Center for Theoretical Sciences, April 30, 2015.
  63. **The Topology and Mathematical Physics conference**, ”Quaternion analyticity and 3D SU(2) Landau levels”, Center of Mathematical Sciences and Applications, Harvard University, Sept 17, 2014.
  64. **The Quantum Gas Conference**, “Novel Sp(2N)/SU(2N) quantum magnetism and Mott physics – large spin is different”, Center of Advanced Study, Tsinghua University, Aug 26, 2014.
  65. **The Chengdu Condensed Matter Conference** ”Topological and strongly correlated physics in the  $p_x/p_y$ -orbital bands of the honeycomb lattice-from solid states to optical lattices”, Chengdu, China, July 14, 2014.
  66. **The 6th International Symposium on Cold Atom Physics**, “Quaternionic states of matter from synthetic gauge fields”, Taiyuan, China, Jun 16, 2014.
  67. **The 7th Cross-Strait and International Conference on Quantum Manipulation**, title TBA, Institute of Physics, Chinese Academy of Sciences, Beijing, June 28- 30, 2013.
  68. **International workshop on Orbital Physics in Cold Atom Systems**, “Novel states of matter of ultra-cold atoms in high bands in optical lattices”, Institute of Physics, Chinese Academy of Sciences, Beijing, Jan.5-6, 2013.
  69. **2012 Energy, Materials and Nanotechnology (EMN) Meeting**, the parallel session of topological insulators, “*Isotropic Landau Levels of Relativistic and Non-Relativistic Fermions in 3D Flat Space*”, April 16-20, Orlando, Florida, 2012.
  70. **The 26th International Conference on Low Temperature Physics**, the parallel session of quantum gases, “*Hidden symmetries and exotic quantum magnetism of large-spin alkali and alkaline-earth fermions*”, Aug 12, Beijing, 2011.
  71. **Physics Driven by Spin-orbital Coupling in Transition Metal Compounds**, “*New developments of p-orbital physics – unconventional BEC and fermionic insulators*”, Institute of Physics, Chinese Academy of Sciences, Jun 20-22, Beijing, China, 2011.
  72. **Future and Prospect of Topological Insulator**, “*Topological orbital states with cold atoms*”, Institute of Physics, Chinese Academy of Sciences, July 5 to July 10, Beijing and Weihai, China, 2010.
  73. **Exotic Insulating Phases of Matter**, The Johns Hopkins University, “*Topological orbital states with cold atoms*”, Jan. 14-16, 2010.

74. **Canadian Institute for Advanced Research, Cold Atoms Meeting**, Halifax, Canada “*Novel orbital physics with fermions in optical lattices*”, August 12-16, 2009.
75. **American Physical Society March Meeting 2009**, Pittsburgh, PA, “*Novel orbital physics with fermions in optical lattices*”, Mar. 20, 2009.
76. **New Directions in Low-Dimensional Electron Systems (Conference)**, Kavli Institute for Theoretical Physics, University of California, Santa Barbara, Feb 23, 2009.
77. **The 39th Winter Colloquium on the PHYSICS OF QUANTUM ELECTRONICS**, “*Novel orbital physics with fermions in optical lattices*”. Jan. 8, 2009.
78. **Academic conference for the 80-year anniversary of Institute of Physics, Chinese Academy of Sciences**, Beijing, ”*Novel Orbital Physics with Cold Atoms in Optical Lattices*”, Jun. 20, 2008.
79. Department of Physics, University of Maryland, **Condensed Matter Theory Center Symposium**, “*Pomeranchuk instability and dynamic generation of spin-orbit coupling*”, Nov. 8, 2006.

#### INVITED CONDENSED MATTER SEMINAR TALKS (95)

80. **Fudan University**, theory seminar, “Quantum magnetism with  $Sp(2N)$ ,  $SU(2N)$  and  $G_2$  symmetries“, Dec 2, 2024.
81. International Center for Quantum Materials, Peking University, “Pairing, Quartetting and Sextetting Orderings“, 10/23/2024
82. International Center for Quantum Materials, Inner Mongolia University, “Pairing, Quartetting and Sextetting Orderings“, 09/06/2024
83. Department of Physics, **Tsinghua University** , “*Multi-fermion clustering instability* ”, March 28, 2024.
84. Department of Physics, **University of Hong Kong**, “*Symmetry and Correlation Aspects of Quantum Dynamics*”, Dec 6, 2023.
85. Institute for Advanced Studies, **Tsinghua University**, “*Symmetry and Correlation Aspects of Quantum Dynamics*”, Nov 1, 2023.
86. International Center for Quantum Materials, **Peking University**, “Symmetry unification of orbital active honeycomb materials”, Oct 24, 2023.
87. Department of Physics, **Huazhong Univ. of Science and Technology**, ”Multi-particle clustering physics”, May 07, 2023.
88. Department of Physics, **Tianjin University**, Space-time group and dynamic crystal, participation online, Dec 02, 2022.
89. Department of Physics, **Renmin Univ**, “Locality and itineracy from Hubbard models”, participation online, May 17, 2022.
90. Department of Physics, **Peking University**, “Time-reversal symmetry breaking pairing in iron-chalcogenide superconductors”, Nov 24, 2021.
91. ICQD Monthly Seminar Series, **USTC**, “Unconventional Magnetism and Spontaneous Spin-orbit Ordering”, Nov. 19, 2021.
92. Department of Physics, **Rice University**, “Time-reversal symmetry breaking pairing in iron-chalcogenide superconductors”, Feb 3, 2021.
93. Beijing International Center for Mathematical Research, **Peking University**, “Quaternions, Harmonic Oscillator, and High dimensional Topological States”, Oct. 16, 2020.
94. Department of Physics, **Shanghai-Tech University**, “*Interaction and Correlation Aspects of Ferromagnetism*”, July 7, 2020.
95. Department of Physics, **University of California, San Diego**, “*Unification of orbital-active honeycomb materials*”, Nov. 27, 2019.
96. Department of Physics, **University of Chicago**, “*Symmetry and Correlation Aspect of Quantum Dynamics*”, May 28, 2019.

97. Department of Physics, **University of California, Berkeley**, “*Orbital-active Honeycomb Materials*”, April 30, 2019.
98. Westlake University, Hangzhou, China, “*Quantum Dynamics – Space-time group and Bethe String states*”, Nov. 23, 2018.
99. Department of Physics, **University of Buffalo, SUNY**, “*Quantum Dynamics – Space-time group and Bethe String states*”, Sept 18, 2018.
100. **Institute of Physics**, Chinese Academy of Sciences, “*Topological superconductivity with spin- $\frac{3}{2}$  half-Heusler semi-metal beyond triplet pairing*”, Sept. 7, 2018.
101. **Wuhan Institute of Physics and Mathematics**, Chinese Academy of Sciences, “*Quantum Dynamics – Space-time group and Bethe String states*”, Sept. 7, 2018.
102. **Chern Institute of Mathematics**, Nankai University, “*Quantum Dynamics – Space-time group and Bethe String states*”, Aug 12, 2018.
103. **Department of Physics**, Tsinghua University, “*Large gap 2D topological insulator*”, Aug 15, 2018.
104. **Center for Advanced Studies**, Tsinghua University, “*Quantum Dynamics -Space-time crystal and Bethe String states*”, Aug 9, 2018.
105. Center for Quantum Materials, **Peking University**, “*Quantum Dynamics - Space-time Crystal and Bethe String States*”, Aug 2, 2018.
106. Department of Physics, **Shanghai University of Technology**, “*Quantum Dynamics - Space-time Crystal and Bethe String States*”, July 17, 2018.
107. Department of Physics, **Huazhong University of Science & Technology**, “*Quantum Dynamics -Space-time crystal and Bethe String states*”, July 3, 2018.
108. Department of Physics, **Zhejiang University**, “*New development of itinerant electrons: Curie-Weiss metal and spin-orbit ordering*”, June 7, 2018.
109. Department of Physics, Shanghai Jiaotong University, “*Topological superconductivity with spin- $\frac{3}{2}$  half-Heusler semi-metal beyond triplet pairing*”, June 4, 2018.
110. Center for Quantum Materials, **Peking University**, “*Topological superconductivity with spin- $\frac{3}{2}$  half-Heusler semi-metal beyond triplet pairing*”, Dec 21, 2017.
111. Department of Physics, **East China Normal University**, “*Novel orbital physics – unconventional BEC and Curie-Weiss Metal states in optical lattices*”, Dec 15, 2017.
112. Department of Physics, **Fudan University**, “*Enhance topological gap in 2D materials to the scale of atomic spin-orbit coupling*”, Dec 14, 2017.
113. Department of Physics, **Fudan University**, “*Unconventional magnetism and spontaneous spin-orbit ordering*”, July 2017.
114. Department of Physics, **Beijing Normal University**, “*Unconventional magnetism and spontaneous spin-orbit ordering*”, July, 2017.
115. “**Majorana flatband, magnetic domains, and Septet superconductivity**”, Majorana workshop, Shanghai Jiaotong University, Jun 2017.
116. Department of Physics, **Johns Hopkins University**, “*Unconventional magnetism and spontaneous spin-orbit ordering*”, March 29, 2017.
117. Condensed Matter Theory Center, **University of Maryland**, “*Orbital phases in optical lattices and solids: unconventional BEC and large gap topological states*”, March 28, 2017.
118. Department of Physics, **University of California, San Diego**, “*Unconventional magnetism and spontaneous spin-orbit ordering*”, Jan, 2017.
119. Department of Physics, **Purdue University**, “*Unconventional orbital phases with cold atoms*”, March 03, 2016.
120. Department of Physics, **University of British Columbia**, “*Novel Sp(2N)/SU(2N) quantum magnetism and Mott physics - large spins are different*”, Nov 16, 2015.
121. Department of Physics, **University of Washington**, “*Topological and strong correlation physics*”



- in the  $p_x/p_y$ -orbital bands of the honeycomb lattice from solid states to optical lattices” April 1, 2015.
122. **INT workshop, University of Washington**, ”Novel Sp(2N)/SU(2N) quantum magnetism and Mott physics - large spins are different”, March 25, 2015.
  123. **Institute of theoretical atomic, molecular and optical physics, Harvard**, ”Topological and strongly correlation physics in the  $p_x, p_y$  orbital bands in the honeycomb lattice – from solid states to optical lattices” Nov 21, 2014.
  124. Department of physics, **MIT**, ”Topological and strongly correlation physics in the  $p_x, p_y$  orbital bands in the honeycomb lattice – from solid states to optical lattices”, Nov 19, 2014.
  125. Department of Physics, **Penn. State University**, “Topological and strongly correlation physics in the  $p_x/p_y$  orbital bands in the honeycomb lattice – from solid states to optical lattices”, Nov. 4, 2014, scheduled.
  126. Department of Physics, **Boston College**, “Novel Sp(2N)/SU(2N) quantum magnetism and Mott physics – large spin is different”, Oct. 15, 2014.
  127. Department of Physics, **Harvard University**, “Quaternionic analytic Landau level in 3D”, Oct 17, 2013.
  128. Workshop for celebration Prof. Shou-cheng Zhang’s 50 birthday, “Quaternionic BEC and Landau levels”, March 23-25, 2013.
  129. KITP workshop “Frustrated Magnetism and quantum spin liquids” “Power-law Correlated 2D SU(6) Quantum Paramagnets”, Sept. 18, 2012.
  130. Workshop on “Topological insulators and superconductors”, “Unconventional magnetism in transition metal oxides”, July, 2012.
  131. Department of Physics, **UCSD**, “Quantum Monte-Carlo simulation of novel 2D quantum magnetism with power-law correlations”, Nov 21, 2012.
  132. Department of Physics, **The Florida State University**, “Isotropic Landau Levels of Relativistic and Non-Relativistic Fermions in 3D Flat Space”, September 14, 2012.
  133. Department of Physics, **University of British Columbia**, Canada, “*Isotropic Landau Levels of Relativistic and Non-Relativistic Fermions in 3D Flat Space*”, March 20, 2012.
  134. Department of Physics, **University of California, Irvine**, “*Unconventional metamagnetism and orbital ordering in transition metal oxides*”, Feb 8, 2012.
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