

W. Vincent Liu

Curriculum Vitae

[as of July 2023]

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EDUCATION

- Ph.D. in Physics, University of Texas at Austin, May 1999
Advisor: **Steven Weinberg** (*Nobel laureate*)
Thesis: “Applications of effective field theory to condensed matter”
Awarded: “Best Dissertation in Physics” in the class of 1998–99.
- M.S. in Physics, Beijing Normal University, China, 1994
- B.S. in Physics, Jilin University, China, 1991
Awarded: “Outstanding University Graduate”

EMPLOYMENT

- 2022 – Director, IQ Initiative (Interdisciplinary Quantum Science for Fundamental Physics Initiative), University of Pittsburgh
- 2004 – Professor (2014), Associate Professor (2009), Assistant Professor (2004), University of Pittsburgh
- 2001- 2004 Postdoctoral Fellow, Department of Physics, Massachusetts Inst of Tech (MIT)
Supervisor: Frank Wilczek (*Nobel laureate*)
Affiliated with: Patrick A. Lee and Xiao-Gang Wen
- 1999-2001 Postdoctoral Research Associate, Condensed Matter Theory Group, Dept of Physics, Univ of Illinois at Urbana-Champaign (UIUC)
Supervisors: Eduardo Fradkin and Mike Stone

HONORS, AWARDS, & MEMBERSHIPS

- Fellow, American Physical Society, 2017
- “Outstanding Young Researcher Award”, International Organization of Chinese Physicists and Astronomers <https://ocpaweb.org/home/page/awards-info>, 2007
- Ralph E. Powe Junior Faculty Enhancement Award, Oak Ridge Associated Universities, 2006
- “Best Dissertation in Physics” Award in the class of 1998-99, Department of Physics, University of Texas at Austin

- Presidential Line of OCPA (International Organization of Chinese Physicists and Astronomers), Secretary 2021-2023, Vice President 2023-2025, President 2025-2027
- Wilczek Quantum Center, Shanghai Jiao Tong University, China: • Scientific Advisor, 2019– ; • Director (Founding), 2014-2019; • Executive Board, Member, 2014– .

- Member, National Advisory Board, Kavli Institute for Theoretical Physics China (KITPC), Chinese Academy of Sciences, Beijing, 2011–2016

PROFESSIONAL ACTIVITIES

- Editorial Board Member, *Chinese Physics Letters*, Chinese Physical Society, 2020 –
- Referee for *Nature*, *Nature Physics*, *Nature Communications*, *Physical Reviews* and *Physical Review Letters*, *Annals of Physics*, *Chinese Physics Letters*, *Quantum Science & Tech*, and *PNAS*
- Proposal Reviewer for (U.S.) NSF, ARO (Army Research Office), AFOSR, and PECASE (Presidential Early Career Awards for Scientists and Engineers).
- Name list of Overseas Reviewing Experts of Chinese Academy of Sciences, 2015.

RESEARCH PROGRAM INVITATIONS [selected list]

12/03–12/22/2023	KITP Program “Out-of-equilibrium Dynamics and Quantum Information of Many-body Systems with Long-range Interactions”, Kavli Institute for Theoretical Physics, University of California, Santa Barbara
05/19–06/07/2019	KITP Program “Open Quantum System Dynamics”, Kavli Institute for Theoretical Physics, University of California, Santa Barbara
09/26–10/14/2016	KITP Program “Synthetic Quantum Matter,” Kavli Institute for Theoretical Physics, University of California, Santa Barbara
11/02–11/20/2015	KITP Program “Many-Body Physics with Light,” Kavli Institute for Theoretical Physics, University of California, Santa Barbara
9/14–10/02/2015	KITP Program “New Phases and Emergent Phenomena in Correlated Materials with Strong Spin-Orbit Coupling”, Kavli Institute for Theoretical Physics, University of California, Santa Barbara
10/8–11/2/2012	KITP Program “Quantum Dynamics in Far from Equilibrium Thermally Isolated Systems”, Kavli Institute for Theoretical Physics, University of California, Santa Barbara
6/24–7/20/2007	Paris “Quantum Gases” Program, Centre Emile Borel, Institut Henri Poincaré, Paris, France.
4/30–5/25/2007	KITP Program “Strongly Correlated Phases in Condensed Matter and Degenerate Atomic Systems”, Kavli Institute for Theoretical Physics, University of California, Santa Barbara.
2/08–2/16/2006	KITP Mini-Program “Supersolid State of Matter”, Kavli Institute for Theoretical Physics, University of California, Santa Barbara.
4/27–5/7/2015	INT Program “Frontiers in Quantum Simulation with Cold Atoms”, University of Washington, Seattle.
5/10–6/12/2004	KITP Program “Quantum Gases”, Kavli Institute for Theoretical Physics, University of California, Santa Barbara.
6/30–7/20/2002	Trento BEC Summer Program, European Centre for Theoretical Studies in Nuclear Physics and Related Areas (ECT*), Trento, Italy. (with daily financial support)

various times

Aspen Center for Physics, Invited Participant for various programs (and one work group): 8/24-9/6/2014; 8/11-25/2013; 8/10-8/23/2008; 5/29-6/11/2006; 5/29-6/18/2005; 6/29-13/2003; 6/14-27/1999.

ORGANIZED CONFERENCES

- Co-Organizer, “Joint IQ Initiative & PITT PACC Workshop: Axions, Fundamental and Synthetic”, Pittsburgh, Apr 6, 2023 - Apr 8, 2023
- Scientific Advisor, KITP Program “Revealing Emergent Many-Body Phenomena with Spatiotemporal Control”, Univ of California, Santa Barbara, Jun 1 - Aug 7, 2020 (postponed to 2021 due to COVID19).
<https://www.kitp.ucsb.edu/activities/emergecontrol20>
- Advisor, KITS Program “Emergent Phenomena in Ultracold Atoms: Merging Topology, Interaction, and Dynamics”, Beijing, China, June 3-23, 2019. Organized jointly by KITS UCAS, Peking Univ, Fudan Univ, and Inst of Physics of CAS
<http://ultracold.csp.escience.cn/dct/page/1>
- Co-organizer, Workshop on Universal Themes of Bose-Einstein Condensation - UBEC 2019, Twentieth Century Club, Pittsburgh, Pennsylvania, April 1-5, 2019. Program committee: David Snoke (Chair), Nick Proukakis, Gretchen Campbell, Moses Chan, Thierry Giamarchi, Vincent Liu, Mohit Randeria, Christian Rüegg, David Weiss.
<https://www.mrs.org/ubec-2019>
- Organizer (with F. Wilczek et al), WQC Inaugural Conference “Quantum Theory in 21st Century”, Shanghai, October 27 - 28, 2018
- Co-Advisor, *KITPC Program* “Spin-orbit-coupled quantum gases”, Aug 1-19, 2016, <http://www.kitpc.ac.cn/?p=ProgDetail&id=PS20160801&i=main> and *KITPC Conference* “Synthetic Topological Quantum Matter”, Aug 1-5, 2016, <http://www.kitpc.ac.cn/?p=ProgDetail&id=CS20160801&i=main> Kavli Institute for Theoretical Physics China, Beijing, China. Coordinators: G. Juzeliunas, W. M. Liu, X.-J. Liu, B. A. Malomed, H. Pu, S. Yi, C. Zhang. Advisors: W. V. Liu, I. Spielman
- Co-organizer and Proposal Submitter, KITPC Program “Precision Many-body Physics of Strongly correlated Quantum Matter”, May 5 - June 13, 2014, Kavli Institute for Theoretical Physics China, Beijing, China. Organizers: Xi Dai, Thierry Giamarchi, Tin-Lun (Jason) Ho, W. Vincent Liu, Boris Svistunov, Matthias Troyer, Biao Wu, Tao Xiang, Martin Zwierlein
<http://www.kitpc.ac.cn/?p=ProgDetail&id=PP20140505&i=main>
- Co-organizer, KITPC Symposium “Precision Tests of Many-Body Physics with Ultracold Quantum Gases”, June 9-13, 2014, Kavli Institute for Theoretical Physics China, Beijing, China.
<http://www.kitpc.ac.cn/?p=ProgDetail&id=CP20140609&i=main>

- Co-organizer, Pitt Quantum Initiative (PQI) Symposium on “Quantum Matter”, 18-19 April 2013, University of Pittsburgh. <http://pqi.pitt.edu/events>
- Co-organizer, Symposium on “Novel Topological Quantum Matter”, February 25-26, 2013, University of Texas at Dallas campus, sponsored by U.S. Army Research Office (ARO)
<http://www.utdallas.edu/nsm/quantum/index.html>
- Lead coordinator, KITP Conference, “Frontiers of Ultracold Atoms and Molecules,” Kavli Institute for Theoretical Physics, UCSB, Santa Barbara, Oct 11–15, 2010, Coordinators: Ofir Alon, Immanuel Bloch, W. Vincent Liu , William Phillips
<http://www.kitp.ucsb.edu/activities/dbdetails?acro=BOPTILATT.C10>
- Lead coordinator (primary contact), KITP Program, “Beyond Standard Optical Lattices,” Kavli Institute for Theoretical Physics, UCSB, Santa Barbara, Sep 13, 2010–Dec 10, 2010
Coordinators: Ehud Altman, Maciej Lewenstein, W. Vincent Liu
Scientific Advisors: Immanuel Bloch, Sankar Das Sarma, Mikhail Lukin, William D. Phillips
<http://www.kitp.ucsb.edu/activities/dbdetails?acro=BOPTILATT10>
- Co-Organizer (with P. Zoller, Fei Zhou, et al), KITPC Program, “Condensed Matter Physics of Cold Atoms,” Kavli Institute for Theoretical Physics China (KITPC), Chinese Academy of Sciences, Beijing, China, Sep 21–Nov 6, 2009. International coordinators: W. Vincent Liu, Chang-Pu Sun, Fei Zhou, Peter Zoller. Local coordinators : Wu-ming Liu, Biao Wu, Su Yi, Yue Yu
<http://www.kitpc.ac.cn/program.jsp?id=PC20090921>

INVITED CONFERENCE PRESENTATIONS & COLLOQUIUMS (skip seminars)

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| <i>25-29 May 2023</i> | Plenary talk: “QuIST VII: The 7th International Conference on Quantum Information, Spacetime, and Topological Order”, Datong, Shanxi province, China. |
| <i>1 Jul 2022</i> | Invited talk: “Higher orbital optical lattices”, 9th International Symposium on Cold Atom Physics (ISCAP-IX), Quanzhou, China, June 29 to July 02, 2022. |
| <i>3 Dec 2021</i> | (Parallel In-person and tele-presentation) Colloquium, Division of Quantum Physics and Quantum Information, University of Science and Technology, China. Presentation jointly broadcasted in USTC Shanghai Campus (in person) and Hefei campus (tele-projection). Talk title: “Chiral Orbital Superfluidity in Dynamic Optical Lattices” |
| <i>24-27 Nov 2021</i> | Invited speaker, The 9th International Symposium on Cold Atom Physics (ISCAP-IX), Xi’an, China (in-person conference postponed to 2022 due to COVID) |

- 5 Nov 2021 Physics Colloquium, Department of Physics, The Chinese University of Hong Kong. Talk title: “Chiral Orbital Superfluidity in Dynamical Optical Lattices”
- 29 Oct–1 Nov 2021 Invited speaker, The 21st National Conference on Condensed Matter Theory and Statistical Physics, Jinan City, China (postponed to 2022 due to COVID)
- 8-11 Oct 2021 Invited speaker, Workshop on Frontier Developments in Cold Atom Quantum Simulation, held in Jilin City, organized by Institute of Physics, CAS, Beijing. Talk title: “Optical lattice topological phases: from weakly interacting to strongly correlated regime”
- 21 Jul 2021 Plenary speaker, (Zoom) Workshop on Quantum Materials, Jointly held by Southern University of Science and Tech (China) and Advanced Institute for Materials Research of Tohoku University (Japan). Talk title: “Orbital symmetry, chiral superfluid and anomalous Floquet topological insulator in spatiotemporal controlled optical lattices”
- 8-10 Mar 2021 Invited speaker, ICTP Trieste “Conference on Time Crystals” (Online, Trieste, Italy)
- 5-7 May 2020 Invited speaker, NORDITA Conference on Frontiers in Higher-Order Topological Matter (Stockholm, Sweden, – postponed due to COVID19)
- 15-20 Sep 2019 Invited speaker (& also served as Opening Session Chair), International Conference on Emerging Quantum Technology (Hefei, China)
- 18-19 Jul 2019 Selected speaker, AFOSR 2019 Quantum Information Sciences and Atomic/Molecular Physics Program Review Workshop (Arlington, VA)
- 17-21 Dec 2018 Invited talk, Winter Symposium “Precision Measurement Physics with Atoms and Molecules”, Chinese Academy of Sciences, Wuhan, China
- 11 October 2018 Review conference talk, MURI “Anyons in 2D materials and cold Atomic gases” Program annual review, California Inst of Tech, Pasadena, CA
- 25-19 Jun 2018 Invited talk, Workshop on Quantum Connections in Sweden 3: Quantum Topology and Time, Nordita, Stockholm, Sweden
- 15 Nov 2017 Southern University of Science and Tech, Shenzhen, China. Physics Department Invited Talk: “Superfluid and topological phases unique to interacting cold atoms”.
- 3-7 Jul 2017 Invited talk, Workshop on “Quantum Connections in Sweden”, Stockholm University, Albanova University Center, Sweden
- 27-29 Oct 2017 Invited talk, “Frontiers of Artificial Quantum Systems” Workshop, Fudan University, Shanghai, China

- 3-7 Jul 2017 Invited talk, Workshop on “Quantum Connections in Sweden”, Stockholm University, Albanova University Center, Sweden
- 18-21 Jun 2016 Invited talk, International Symposium on Cold Atom Physics - ISCAP VII, Hangzhou, China.
- 31 Aug-4 Sep 2015 Invited talk, International workshop on “Synthetic Quantum Magnetism”, Max Planck Institute for the Physics of Complex Systems (MPIPKS), Dresden, Germany
- 14 Nov 2014 Colloquium, Department of Physics, College of William & Mary, Williamsburg, VA
- 6 Nov 2014 Colloquium, Department of Physics, SUNY Buffalo
- 14-17 Jun 2014 Invited talk, 6th International Symposium on Cold Atom Physics - ISCAP VI, Taiyuan, China.
- 24-25 Sep 2013 Army Science Planning & Strategy Meeting: Quantum Information and Sensing, Bolger Conference Center in Potomac, Maryland (Washington DC sub), invited talk: “Topological orbital physics of cold atoms in novel lattice geometries — a possible future direction for the Army”
- 8-10 Jul 2013 “Cold Atoms” Summer School of Department of Physics, Tsinghua University, Beijing. Pedagogical lecture: “Selected Topics in Modern Many-Body Theory”
- 28-30 Jun 2013 7th Cross-Strait and International Conference on Quantum Manipulation, Institute of Physics, Chinese Academy of Sciences (CAS), Beijing. Invited speaker: “Topological phases of fermions in the p-orbital band of optical lattices”
- 19-21 Jun 2013 International Workshop on “Quantum Many-Body Systems in Low Dimensions”, Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences, Wuhan, China. Invited long talk: “Orbital phase transitions in low dimensional beyond-standard optical lattices”
- 25-26 Feb 2013 Symposium on ‘Novel Topological Quantum Matter’, University of Texas at Dallas campus: Discussion Leader for Session “Future Directions”
- 4 Feb 2013 Nordita Workshop “Pushing the Boundaries with Cold Atoms”, NORDITA, KTH and Stockholm University, Stockholm, Sweden, Feb 1-10, 2013. Invited Speaker/Participant: “Topological phases of fermions in the p-orbital band of optical lattices”
- 6 Dec 2012 Tsinghua University, Department of Physics Colloquium: “Orbital dance beyond standard optical lattices”, Beijing, China
- 24 Oct 2012 U Texas at Dallas Physics Colloquium: “Orbital dance beyond standard optical lattices,” Dallas, TX
- 17 Oct 2012 KITP Santa Barbara “Quantum Dynamics” Program Talk: “Topological orbital phases beyond standard optical lattices,” UC Santa Barbara

- 26 Apr 2012 Kent State University, Department of Physics Colloquium: “Ultracold atoms tuned to many-body regimes previously impossible”, Kent, OH
- 23-27 June 2012 The 5th International Symposium on Cold Atom Physics (ISCAP-V), Three Gorges, China. Invited talk: “Topological orbital gases in optical lattices”
- 14 Oct 2011 University of New Brunswick, Department of Physics, Colloquium: “Ultracold atoms tuned to new many-body regimes”, Fredericton, Canada
- 18-22 July 2011 Advanced Workshop on “Non-standard superfluids and insulators”, ICTP, Trieste, Italy, invited talk: “p-band superfluid and insulator phases in optical lattices”
- 13 July 2011 Universitaet Hamburg, Institute of Laser Physics, Colloquium of the Center for Optical Quantum Technologies: “Ultracold atoms in the unprecedented regimes of condensed matter”
- 3-8 Jan 2011 International Conference “Frontiers of Condensed Matter Physics”, Stockholm, Sweden, January 3-8, 2011, invited talk: “Ultracold spin-imbalanced Fermi gases in low dimensions”
- 22 July 2010 NORDITA Workshop “Quantum solids, liquids, and gases,” Stockholm, Sweden, 19 July —27 Aug, 2010. Invited talk: “p-orbital ultracold particles and Bose-Einstein crystal.”
- 6 July 2010 CAS 4th International Symposium on Cold Atom Physics, July 5-8, 2010, Zhoushan Islands, Zhejiang, China. Sponsored by Center for Cold Atom Physics (Shanghai), Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences. More than 260 participants. Invited talk: “Novel p-orbital quantum phases in cold atom optical lattices”
- 11-13 Nov 2009 Workshop on “Ab-initio Modeling of Cold Gases,” CECAM/ETH, Zurich, Switzerland, November 11-13, 2009. Invited talk: “Cold atoms and molecules in elongated Wannier orbitals.”
- 8 Sep 2009 Conference: Bose-Einstein Condensation 2009, Frontiers in Quantum Gases, Sant Feliu de Guixols (Costa Brava), Spain, 05-11 September 2009. Invited short talk: “Analytic thermodynamics and thermometry of 1D imbalanced Fermi gases at strong interaction.”
- 20 Mar 2009 APS March Meeting, Pittsburgh, PA, March 16-20, 2009. Invited talk in the invited session on “Novel orbital quantum phases in cold atom optical lattices”: “Non-zero momentum Bose-Einstein condensation of orbital atoms.”
- 8 Jan 2009 PQE 2009: 39th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, Utah, January 4-8, 2009. Invited talk in the “Optical Lattice” Session: “Crystalline superfluidity of cold atoms in lattice p-bands.”
- 19 Aug 2008 Aspen Center for Physics. Summer Workshop, “Frontiers in Strongly Correlated Systems,” Invited talk: “Orbital physics of optical lattices.”

<i>10 July 2007</i>	Henri Poincare Institute, Paris, France, Quantum Gases Program Talk: “Some unconventional phases of cold atomic matter with or without an optical lattice”.
<i>7 June 2007</i>	APS DAMOP/DAMP (38th Annual Meeting of APS Division of AMO), 5-9 June 2007, Calgary, Canada. Invited speaker in the “Optical Lattices” session: “Orbital phases of cold atoms in the lattice p-orbital band”
<i>8 May 2007</i>	KITP, U. California Santa Barbara. “Strongly Correlated Phases in Condensed Matter and Degenerate Atomic Systems” Program Invited Talk: “Exploring New Phases of Cold Atomic Matter with or without an Optical Lattice”.
<i>28 & 29 Jun 2006</i>	APCTP (Asia Pacific Center for Theoretical Physics, Pohang, Korea), Focus Program on Search for Exotic State of Dense Matter. Two lectures on “Exotic superfluids for ultracold atomic gases”. (with all international travel expenses paid by the program)
<i>19-23 Sep 2005</i>	Univ of Washington Institute for Nuclear Theory in Seattle, Workshop on Pairing in Fermionic Systems—Beyond BCS, Session Talk: “Breached pair superfluidity”
<i>16 June 2005</i>	Aspen Center for Physics, Program on Ultracold Atomic Gases (May 29–June 18, 2005), Blackboard Discussion Session Talk: “Anomalous quantum flow of atoms near p-wave resonance”.
<i>18-21 Apr 2005</i>	OCTS at Ohio State University, Strongly Interacting Quantum Gases Conference: “Anomalous quantum mass flow of atoms near p-wave resonance”
<i>21-25 Mar 2005</i>	APS March meeting, Los Angeles, invited talk: “Quantum phases and an anomaly of interacting fermionic atoms”
<i>24 Feb 2004</i>	University of Texas at Austin. Department of Physics Special Colloquium: “Exotic superfluidity of cold atomic gases”.
<i>10 July 2002</i>	BEC 2002 Summer Program at Trento, Italy. Program invited talk: “New states of matter in cold atoms”.

RESEARCH GRANTS

- Total awarded to Liu at University of Pittsburgh (2004-2023): \$6.099M
- Funded by:
 - ARO (U.S. Army) [single PI]
 - AFOSR (Air Force) [lead PI]
 - DARPA (Defense) [“Optical Lattice Emulator” Program, with Rice U (lead), UIUC, Ohio State, Princeton, Cornell, Penn State]
 - MURI (Multidisciplinary University Research Initiative) [Topic “Anyons in 2D materials and cold atomic gases”, with UC Santa Barbara (lead), CalTech, Columbia, Rice, and UC Berkeley]

PUBLICATIONS

A. Representative Publications

1. Biao Huang, Ying-Hai Wu, W. V. Liu, “Clean Floquet Time Crystals: Models and Realizations in Cold Atoms,” *Phys. Rev. Lett.* **120**, 110603 (2018)
2. X. Li, W. V. Liu, “Physics of higher orbital bands in optical lattices: a review”, *Rep. Prog. Phys.* **79**, 116401 (2016)
3. M. Lewenstein and W. V. Liu, “Orbital Dance,” a “News & Views” article, *Nature Physics* **7**, 101 (FEB 2011).
4. W. V. Liu, C. Wu, “Atomic matter of non-zero momentum Bose-Einstein condensation and orbital current order,” *Phys. Rev. A* **74**, 013607 (2006).
5. K. Sun, W. V. Liu*, A. Hemmerich, S. Das Sarma, “Topological semimetal in a fermionic optical lattice,” *Nature Physics* **8**, 67–70 (2012) [* **corresponding author**].
6. M. M. Forbes, E. Gubankova, W. V. Liu, and F. Wilczek, “Stability criteria for breached pair superfluidity,” *Phys. Rev. Lett.* **94**, 017001 (2005). arXiv: hep-ph/0405059. [Reported in **Phys. Rev. Focus** (January 5, 2005)].
7. W. V. Liu and F. Wilczek, “Interior gap superfluidity,” *Phys. Rev. Lett.* **90**, 047002 (2003). arXiv: cond-mat/0208052.
8. W. V. Liu, “Theoretical study of the damping of collective excitations in a Bose-Einstein condensate,” *Phys. Rev. Lett.* **79**, 4056 (1997).

B. Other Publications

9. Georg Engelhardt, Amit Bhoonah, W. V. Liu, “Detecting axion dark matter with Rydberg atoms via induced electric dipole transitions”, arXiv:2304.05863
10. Georg Engelhardt, Sayan Choudhury, W. V. Liu, “Unified Light-Matter Floquet Theory and its Application to Quantum Communication”, arXiv:2207.08558
11. Biao Huang, Tsz-Him Leung, Dan Stamper-Kurn, W. Vincent Liu, “Discrete Time Crystals Enforced by Floquet-Bloch Scars”, *Phys. Rev. Lett.* **129**, 133001 (2022).

12. Huan Wang, Shuai Li, Maksims Arzamasovs, W. V. Liu, Bo Liu, “Manipulating Goldstone modes via the superradiant light in a bosonic lattice gas inside a cavity,” *Phys. Rev. A* **105**, 063301 (2022)
13. Sayan Choudhury, W. V. Liu, “Self-ordered Time Crystals: Periodic Temporal Order Under Quasiperiodic Driving,” arXiv:2109.05318
14. W. V. Liu, “Breach pair superfluidity: a brief review,” arXiv:2109.02208 (2021). A chapter in book “Frank Wilczek: 50 Years of Theoretical Physics”, Edited by: Antti Niemi, Kok Khoo Phua, Alfred Shapere (World Scientific, 2022). Article link: https://doi.org/10.1142/9789811251948_0013
15. Haiping Hu, Erhai Zhao, W. V. Liu, “Point-gap Weyl semimetal: dynamical current and boundary-skin modes” arXiv:2107.02135 (2021)
16. X.-Q. Wang, G.-Q. Luo, J.-Y. Liu, W. V. Liu*, A. Hemmerich*, and Z.-F. Xu*, “Evidence for an atomic chiral superfluid with topological excitations”, *Nature* 596, 227–231 (2021). [* co-corresponding authors]
17. Xiaopeng Li, W. V. Liu, “Weyl Semimetal Made Ideal with a Crystal of Raman Light and Atoms”, arXiv:2104.11374. Invited “News & View” article, *Science Bulletin* 66(13):1253-1255 (2021)
18. Bhaskar Mukherjee, Zi Cai, W. V. Liu, “Constraint-induced breaking and restoration of ergodicity in spin-1 PXP models”, arXiv:2104.00699 (2021), *Phys. Rev. Research* **3**, 033201 (2021)
19. Zehan Li, Sayan Choudhury, W. V. Liu, “Long Range Ordered Phase in a Quantum Heisenberg Chain with Interactions beyond Nearest Neighbor”, arXiv:2103.04271 (2021), *Phys. Rev. A***104**, 013303 (2021)
20. M. Arzamasovs, Shuai Li, W. V. Liu, Bo Liu, “Topological semimetal and superfluid of s-wave interacting fermionic atoms in an orbital optical lattice”, arXiv:2101.03774 (2021)
21. Hua Chen, W. V. Liu, “Intertwined Space-Time Symmetry, Orbital Magnetism and Dynamical Berry Curvature in a Circularly Shaken Optical Lattice”, arXiv:2012.01822 (2020), *Phys. Rev. A***104**, 013308 (2021)
22. Zehan Li, Sayan Choudhury, W. V. Liu, “Fast scrambling without appealing to holographic duality”, *Phys. Rev. Research* **2**, 043399 (2020)
23. Zehan Li, Jian-Song Pan, W. V. Liu, “Superfluid phases and excitations in a cold gas of d-wave interacting bosonic atoms and molecules”, arXiv:2001.04331 (2020), *Chin. Phys. B* **30**, 066703 (2021)
24. Jian-Song Pan, W. V. Liu, Xiong-Jun Liu, “Emergence of the unconventional type-II Nambu-Goldstone modes in Bose superfluids”, *Phys. Rev. Lett.* **125**, 260402 (2020)

25. Haiping Hu, Biao Huang, Erhai Zhao, W. V. Liu, “Dynamical Singularities of Floquet Higher-Order Topological Insulators”, *Phys. Rev. Lett.* **124**, 057001 (2020)
26. Zi Cai, Yizhen Huang, W. V. Liu, “Imaginary time crystal of quantum gases”, *Chin. Phys. Lett.* (Express letter)**37**, 050503 (2020)
27. Biao Huang, W. V. Liu, “Floquet Higher-Order Topological Insulators with Anomalous Dynamical Polarization”, *Phys. Rev. Lett.* **124**, 216601 (2020) arXiv:1811.00555 (2018)
28. Zehan Li, Jian-Song Pan, W. V. Liu, “Spontaneous formation of polar superfluid droplets in a p-wave interacting Bose gas”, *Phys. Rev. A***100**, 053620 (2019)
29. Biao Huang, W. V. Liu, “Moire Localization in Two Dimensional Quasi-Periodic Systems”, *Phys. Rev. B***100**, 144202 (2019)
30. Ahmet Keles, Erhai Zhao, W. V. Liu, “Scrambling dynamics and many-body chaos in a random dipolar spin model”, *Phys. Rev. A***99**, 053620 (2019)
31. Haiyuan Zou, Erhai Zhao, Xi-Wen Guan, W. V. Liu, “Exactly solvable symmetry protected topological phases of quantum spins on a zig-zag lattice”, *Phys. Rev. Lett.* **122**, 180401 (2019)
32. Tianyou Gao, et al, W. V. Liu, Kaijun Jiang “Observation of phonon parametric down-conversion in a spherical Bose-Einstein condensate”, arXiv:1805.04727 (2018)
33. Zhi-Fang Xu, Andreas Hemmerich, W. V. Liu, “Odd-parity topological superfluidity for fermions in a bond-centered square optical lattice,” *Phys. Rev. A***96**, 053607 (2017)
34. Ahmet Keles, Erhai Zhao, W. V. Liu, “Theory of interacting fermions in shaken square optical lattice,” *Phys. Rev. A***95**, 063619 (2017)
35. Haiyuan Zou, Erhai Zhao, W. V. Liu, “Frustrated magnetism of dipolar molecules on square optical lattice: evidence for a quantum paramagnetic ground state,” *Phys. Rev. Lett.* **119**, 050401 (2017)
36. Z.-F. Xu, L. You, A. Hemmerich, W. V. Liu, “ π -flux Dirac bosons and topological edge excitations in a bosonic chiral p-wave superfluid,” *Phys. Rev. Lett.* **117**, 085301 (2016)
37. H. Zou, B. Liu, E. Zhao, W. V. Liu, “A continuum compass model on the honeycomb lattice: phase diagram from tensor networks,” *New J. Phys.* **18**, 053040 (2016)
38. B. Liu, X. Li, R. G. Hulet, W. V. Liu, “Detecting π -phase superfluids with p-wave symmetry in a quasi-one-dimensional optical lattice,” *Phys. Rev. A* **94**, 031602 (2016)
39. X.-J. Liu, Z.-X. Liu, K. T. Law, W. V. Liu, T. K. Ng, “Chiral Topological Orders in an Optical Raman Lattice”, *New J. Phys.* **18**, 035004 (2016)
40. Bo Liu, Xiaopeng Li, W. V. Liu, “Topological phases via engineered orbital hybridization in noncentrosymmetric optical lattices”, *Phys. Rev. A***93**, 033643 (2016)

41. Z. Zhou, E. Zhao, and W. V. Liu, “Spin-Orbital Exchange of Strongly Interacting Fermions in the p Band of a Two-Dimensional Optical Lattice”, *Phys. Rev. Lett.* 114, 100406 (2015)
42. Z.-F. Xu, X. Li, P. Zoller, W. V. Liu, “Spontaneous Quantum Hall Effect in an Atomic Spinor Bose-Fermi Mixture”, *Phys. Rev. Lett.* 114, 125303 (2015)
43. B. Liu, X. Li, L. Yin, W. V. Liu, “Weyl Superfluidity in a Three-Dimensional Dipolar Fermi Gas”, *Phys. Rev. Lett.* 114, 045302 (2015)
44. B. Liu, X. Li, B. Wu, W. V. Liu*, “Chiral superfluidity with p-wave symmetry from an interacting s-wave atomic Fermi gas”, *Nature Communications* 5:5064 (2014) [* **corresponding author**]
45. X. Li, W. V. Liu, Leon Balents, “Spirals and skyrmions in two dimensional oxide heterostructures”, *Phys. Rev. Lett.* 112, 067202 (2014). News: Selected as **Research Highlight** by Editor of **Nature Nanotechnology** 9, 245 (2014) [doi:10.1038/nnano.2014.83]
46. X. Li, A. Paramekanti, A. Hemmerich, W. V. Liu*, “Formation and detection of a chiral orbital Bose liquid in an optical lattice”, *Nature Communications* 5:3205 (2014) [* **corresponding author**]
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