Curriculum Vitae
Ying-Jer Kao

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Education

- 2001 M.S., Ph.D., Department of Physics, University of Chicago
- 1993 B.S., Department of Physics, National Taiwan University

Positions

- 06/2015 - present **Center Scientist**
  National Center for Theoretical Sciences.
- 08/2013 - present **Professor**
  Department of Physics, National Taiwan University.
- 08/2009 - 07/2013 **Associate Professor**
  Department of Physics, National Taiwan University.
- 02/2005 - 08/2009 **Assistant Professor**
  Department of Physics, National Taiwan University.
- 09/2003 - 01/2005 **Postdoctoral Fellow**
  Department of Physics, University of Toronto, Canada.
- 10/2001 - 08/2003 **Postdoctoral Fellow**
  Department of Physics and Astronomy, University of Waterloo, Canada.

Honors

- 2008 Young Investigator Merit Award, National Science Council (國家科學委員會傑出學者養成計畫)
- 2009 Young Theorist Award, National Center of Theoretical Sciences (國家理論科學研究中心年輕理論學者獎)
- 2010 Research Award for Junior Research Investigators, Academia Sinica (中央研究院年輕學者研究著作獎)
- 2011 Ta-You Wu Memorial Award, National Science Council (吳大猷先生紀念獎)
- 2018 QuantEmX Scientist Exchange Award (sponsored by ICAM)

Services

- Organizer: "APCTP - Asia Pacific Workshop on Quantum Magnetism (APWQM)", Seoul, South Korea, August 28-30 (2017).
- Organizer: "2017 TEQMS Summer School: From Tensor Network to Deep Learning", Hsin-Chu, Taiwan, August 7-9 (2017).
- Organizer: "Fourth Workshop on Tensor Network States: Algorithms and Applications", Hsin-Chu, Taiwan, December 12-15 (2016).
- Organizer: " International Conference on Highly Frustrated Magnetism 2016 (HMF2016)", Taipei, Taiwan, September 7-11 (2016).
- Organizer: "Tensor Network States: Algorithms and Applications", Beijing, China, December 1-5, 2014.
- Organizer: "Taipei Tensor Network Workshop 2013", Taipei, Taiwan, December 2-5, 2013.

- Organizer: "Workshop on Statistical Physics of Quantum Matters", Taipei, Taiwan, July 28-31, 2013.
- Organizer: "Taipei Density Matrix Renormalization Group Winter School", Taipei, Taiwan, December 7-9, 2012.
- Organizer: "Mini-workshop on recent developments in DMRG/TNS", Taipei, Taiwan, December 10, 2012.
- Organizer: "Summer School for Numerical Methods in Condensed Matter Physics", Hsin-Chu, Taiwan, September, 2011.
- Organizer: "Summer School for Computational Statistical Physics", Taipei, Taiwan, July, 2010.
- Program Committee of Computational Physics Conference 2009.
- Executive Committee of NCTS "Novel Quantum Phenomena in Condensed Matter" focus group: member (2007-2008), coordinator (2008-2009).
- Executive Committee of NCTS "Numerical Methods in Strongly Correlated Physics": coordinator (2009-2010), member (2011-).
- Organizer: "Numerical Methods in Strongly Correlated Electron Systems", Taipei, Taiwan, August, 2006
- Organizer: "Mini-workshop on strong correlations in condensed matter", Hsin-Chu, Taiwan, December, 2007.
- Co-organizer: "Quantum information science and manybody physics", Tainan, Taiwan, December 2009.
- Referee for journals: Phys. Rev. Lett., Phys. Rev. B, Physica C, and Chinese J. Phys.
- Grant reviewer for National Science Council proposals.

Publications

- **Refereed Journal Articles**

1. A. A. Gangat, I. P. McCulloch, **Ying-Jer Kao**, Symmetry between repulsive and attractive interactions in driven-dissipative Bose-Hubbard systems. Scientific Reports 8, 3698 (2018).
2. N Xu, K.-H. Wu, S. J. Rubin, **Y.-J. Kao**, A. W. Sandvik, Dynamic scaling in the two-dimensional Ising spin glass with normal-distributed couplings. Physical Review E 96 , 052102 (2017)
3. Yu-Chin Tzeng, Hiroaki Onishi, Tsuyoshi Okubo, and **Ying-Jer Kao**, Quantum phase transitions driven by rhombic-type single-ion anisotropy in the S=1 Haldane chain. Phy. Rev. B, 060404(R) (2017).
4. Yu-Ping Lin, **Ying-Jer Kao**, Pochung Chen, and Yu-Cheng Lin, Griffiths singularities in the random quantum Ising antiferromagnet: A tree tensor network renormalization group study. Physical Review B, 96, 064427 (2017). [Editors' suggestion]
5. Adil A. Gangat, Te I, and **Ying-Jer Kao**, Steady States of Infinite-Size Dissipative Quantum Chains via Imaginary Time Evolution. Phys. Rev. Lett. , 119, 010501 (2017).
6. A Farrell, P.-K. Wu, **Y.-J. Kao**, T. Pereg-Barnea, Incommensurate spin density wave as a signature of spin-orbit coupling and precursor of topological superconductivity, Phys. Rev. B 94, 214424 (2016).
7. W.-H. Kao, P. C. W. Holdsworth, **Y.-J. Kao**, Field-induced ordering in dipolar spin ice Phys. Rev. B 93, 180410 (2016).
8. S.-H. Lee, Y.-C. Lai, C.-H. Du, A. F. Siegenfeld, **Y.-J. Kao**, P. D. Hatton, D. Prabhakaran, Y. Su, and D.-J. Huang, Inverse order-disorder transition of charge stripes, Phys. Rev. B 92, 205114 (2015).

9. Olga Sikora, Hsueh-Wen Chang, Chung-Pin Chou, Frank Pollmann, and **Ying-Jer Kao**, Variational Monte Carlo simulations using tensor-product projected states, Phys. Rev. B 91, 165113 (2015).
10. Ya-Lin Lo, Yun-Da Hsieh, Chang-Yu Hou, Pochung Chen and **Ying-Jer Kao**, Quantum impurity in a Luttinger liquid: Universal conductance with entanglement renormalization, Phys. Rev. B 90, 235124 (2014)
11. Yu-Kun Huang, Pochung Chen, **Ying-Jer Kao** and Tao Xiang, Long-time dynamics of quantum chains: Transfer-matrix renormalization group and entanglement of the maximal eigenvector, Phys. Rev. B 89, 201102(R) (2014)
12. Sheng-Ching Lin, and **Ying-Jer Kao**, Half-magnetization plateau of a dipolar spin ice in a [100] field, Phys. Rev. B 88, 220402(R) (2013)
13. Yun-Da Hsieh, **Ying-Jer Kao**, and Anders W. Sandvik, Finite-size scaling method for the Berezinskii-Kosterlitz-Thouless Transition, J. Stat. Mech. P09001 (2013)
14. L. J. Chang, M. R. Lees, G. Balakrishnan, **Y.-J. Kao**, A. D. Hillier, Low-temperature muon spin rotation studies of the monopole charges and currents in Y doped $Ho_2Ti_2O_7$, Scientific Reports 3, 1881 (2013)
15. Yu-Kun Huang, Pochung Chen, **Ying-Jer Kao**, Accurate computation of low-temperature thermodynamics of quantum spin chains, Phys. Rev. B, **86**, 235102 (2012). (SCI, IF: 3.691, Times Cited: 3)
16. Derek Larson and **Ying-Jer Kao**, Tuning the disorder in superglasses, Phys. Rev. Lett. **109**, 157202 (2012). (SCI, IF: 7.943, Times Cited: 1)
17. Lieh-Jeng Chang, Shigeki Onoda, Yixi Su, **Ying-Jer Kao**, Ku-Ding Tsuei, Yukio Yasui, Kazuhisa Kakurai, Martin Richard Lees, Higgs transition from magnetic Coulomb liquid to ferromagnet in $Yb_2Ti_2O_7$, Nature Communications 3:992 (2012). (SCI, IF: 10.015, Times Cited: 30)
18. Jifeng Yu and **Ying-Jer Kao**, Spin-1/2 J_1-J_2 Heisenberg antiferromagnet on a square lattice: A plaquette renormalized tensor network study, Phys. Rev. B **85** 094407 (2012). (SCI, IF: 3.691, Times Cited: 7)
19. Ya-Lin Lo, Shih-Jye Sun and **Ying-Jer Kao**, Length- and temperature-dependent crossover of charge transport across molecular junctions, Phys. Rev. B **84**, 075106 (2011). (SCI, IF: 3.691, Times Cited: 2)
20. L. J. Chang, Y. Su, **Y. -J. Kao**, Y.Z. Chou, K. Kakurai, R. Mittal, H. Schneider , Th. Brueckel, G. Balakrishnan, and M. R. Lees, The temperature evolution of the magnetic correlations in pure and diluted spin ice $Ho_{2-x}Y_xTi_2O_7$, Physica B, **406** 2393 (2011). (SCI, IF: 1.063, Times Cited: 0)
21. Ling Wang, **Ying-Jer Kao**, Anders W. Sandvik, Plaquette Renormalization Scheme for Tensor Network States, Phys. Rev. E. **83**, 056703 (2011). (SCI, IF: 2.255, Times Cited: 5)
22. L. J. Chang, W. Schweika, **Y. -J. Kao**, Y. Z. Chou, J. Persson, Th. Brueckel, H. C. Yang, Y. Y. Chen, and J. S. Gardner, Magnetic correlations in $Ho_xTb_{2-x}Ti_2O_7$, Phys. Rev. B **83** 144413 (2011). (SCI, IF: 3.691, Times Cited: 1)
23. C. W. Liu and **Y. -J. Kao**, Impurity induced interactions in diluted La_2CuO_4, Physica C, **470** S113 (2010).(SCI, IF:1.810, Times Cited:1)
24. J. F. Yu, S. C. Hsiao, **Y.-J. Kao**, GPU accelerated tensor contractions in the plaquette renormalization scheme, Comput. Fluids **45**, 55 (2010) (SCI, IF:1.270 , Times Cited: 3)
25. L. J. Chang, Y. Su, **Y. -J. Kao**, Y. Z. Chou, R. Mittal, H. Schneider, Th. Brueckel, G. Balakrishan, M. R. Lees, Magnetic correlations in spin ice $Ho_{2-x}Y_xTi_2O_7$ as revealed by neutron polarization analysis, Phys. Rev. B,**82** 172403 (2010). (SCI, IF: 3.691, Times Cited: 11)
26. Yang-Zhi Chou and **Ying-Jer Kao**, Quantum order by disorder in a semiclassical spin ice, Phys. Rev. B, **82**, 132403 (2010).(SCI, IF: 3.691, Times Cited: 0)
27. H. C. Hsu, J.-Y. Lin, W. L. Lee, M.-W. Chu, T. Imai, **Y. J. Kao**, C. D. Hu, H. L. Liu, and F. C. Chou, Nonmagnetic impurity perturbation to the quasi-two-dimensional quantum helimagnet $LiCu_2O_2$, Phys. Rev. B **82**, 094450 (2010). (SCI, IF: 3.691, Times Cited: 5)

28. Chen Liu, Ling Wang, Anders W. Sandvik, Yu-Cheng Su, and **Ying-Jer Kao**, Symmetry breaking and criticality in tensor-product states, Phys. Rev. B **82**, 060410 (2010). (SCI, IF: 3.691, Times Cited:15)

29. Jiunn-Wei Chen, **Ying-Jer Kao**, and Wen-Yu Wen, Peak-dip-hump lineshape from holographic superconductivity Phys. Rev. D **82**, 026007 (2010). (SCI, IF: 4.558, Times Cited: 17)

30. Jiunn-Wei Chen, **Ying-Jer Kao**, Debaprasad Maity, Wen-Yu Wen, and Chen-Pin Yeh, Towards a holographic model of D-wave superconductors, Phys. Rev. D **81**, 106008 (2010). (SCI, IF:4.558, Times Cited: 39)

31. Cheng-Wei Liu, Shiu Liu, **Ying-Jer Kao**, A. L. Chernyshev, Anders W. Sandvik, Impurity-induced frustration in correlated oxides, Phys. Rev. Lett. **102**, 167201 (2009). (SCI, IF:7.370, Times Cited:9)

32. S.M.A. Tabei, M.J.P. Gingras, **Y.-J. Kao**, T. Yavors'kii, Perturbative Quantum Monte Carlo Study of $LiHoF_4$ in a Transverse Magnetic Field, Phys. Rev. B **78**, 184408 (2008). (SCI, IF: 3.691, Times Cited: 9)

33. **Ying-Jer Kao**, Roger G. Melko, A short-loop algorithm for quantum Monte Carlo simulations, Phys. Rev. E, **77**, 036708(2008). (SCI, IF:2.255, Times Cited:0)

34. Yu-Chun Chen, Roger G. Melko, Stefan Wessel, **Ying-Jer Kao**, Supersolidity from defect-condensation in the extended boson Hubbard model, Phys. Rev. B **77**, 014524 (2008). (SCI, IF: 3.691, Times Cited: 27)

35. **Ying-Jer Kao**, Hae-Young Kee, Theory of non-Fermi liquid near a diagonal electronic nematic state on a square lattice, Phys. Rev. B **76**, 045106 (2007). (SCI, IF: 3.691, Times Cited: 6)

36. S. M. A. Tabei, M. J. P. Gingras, **Y.-J. Kao**, P. Stasiak, J.-Y. Fortin, Induced Random Fields in the $LiHo_xY_{1-x}F_4$ Quantum Ising Magnet in a Transverse Magnetic Field, Phys. Rev. Lett. 97, 237203 (2006). (SCI, IF: 7.370, Times Cited: 33)

37. **Ying-Jer Kao**, Hae-Young Kee, Anisotropic spin and charge excitations in superconductors: signature of electronic nematic order, Phys. Rev. B, **72**, 024502 (2005). (SCI, IF: 3.691, Times Cited: 22)

38. Jean-Sebastien Bernier, **Ying-Jer Kao**, Yong Baek Kim, U(1) spin liquids and valence bond solids in a large-N three-dimensional Heisenberg model, Phys. Rev. B, **71**, 184406 (2005). (SCI, IF: 3.691, Times Cited: 7)

39. Andrew Iyengar, Jelena Stajic, **Ying-Jer Kao**, K. Levin, ab-plane AC conductivity in the cuprates: Pseudogap effects below below Tc, Phys. Rev. Lett., **90**,187003 (2003).(SCI, IF:7.370,Times Cited: 9)

40. **Ying-Jer Kao**, Matthew Enjalran, Adrian Del Mastreo, Hamid R. Molavian, Michel J.P. Gingras, Understanding paramagnetic spin correlations in the spin-liquid pyrochlore $Tb_2Ti_2O_7$, Phys. Rev. B, **68**, 172407 (2003).(SCI, IF: 3.691, Times Cited: 44)

41. **Ying-Jer Kao**, Andrew P. Iyengar, Jelena Stajic, K. Levin, Pair-breaking effects in the pseudogap regime: Application to high temperature superconductors, Phys. Rev. B, **66**, 214519 (2002).(SCI, IF: 3.691, Times Cited: 5)

42. **Ying-Jer Kao**, Andrew P. Iyengar, Qijin Chen, K. Levin, Magnetic field effects in the pseudogap phase: A competing energy gap scenario for precursor superconductivity, Phys. Rev. B, **64**, R140505 (2001).(SCI, IF: 3.691, Times Cited: 22)

43. **Ying-Jer Kao**, G. S. Grest, K. Levin, J. Brooke, T.F. Rosenbaum, G. Aeppli, History-dependent phenomena in the transverse Ising ferroglass: The free energy landscape, Phys. Rev. B, **64**, R060402 (2001).(SCI, IF: 3.691, Times Cited: 10)

44. **Ying-Jer Kao**, Qimiao Si, K. Levin, Frequency evolution of neutron peaks below T_c: commensurate and incommensurate structure in LaSrCuO and YBaCuO, Phys. Rev. B **61**, R11898 (2000).(SCI, IF: 3.691, Times Cited: 82)

45. I. Kosztin, Q.J. Chen, **Y.-J. Kao**, and K. Levin, Pair excitations, collective modes and gauge invariance in the BCS – Bose-Einstein crossover scenario, Phys. Rev. B **61**, 11662 (2000). (SCI, IF: 3.691, Times Cited: 50)

- **Conference Proceedings**

1. **Ying-Jer Kao**, Yun-Da Hsieh, Pochung Chen, Uni10: an open-source library for tensor network algorithms, J. Phys.: Conf. Ser. 640, 012040 (2015).
2. M. Enjalran, M.J.P. Gingras, **Y.-J. Kao**, A. Del Maestro, H.R. Molavian, The spin liquid state of the Tb2Ti2O7 pyrochlore antiferromagnet: A puzzling state of affairs, J. Phys.: Condens. Matter 16,S673 (2004), Proceedings of HFM 2003.(SCI, IF:2.546, Times Cited: 17)
3. **Y.-J. Kao**, A.P. Iyengar Q.J. Chen, K. Levin, A precursor superconductivity approach to magnetic field effects in the pseudogap phase, Physica B **312**, 42-43 (2002), Proceedings of SCES 2001.(SCI, IF:0.872, Times Cited: 0)
4. A.P. Iyengar,**Y.-J. Kao**, Q.J. Chen, K. Levin, Magnetic field effects on T_c and the pseudogap onset temperature in cuprate superconductors, J. Phys. Chem. Solids, **63**,2349 (2002),Proceedings of SNS 01.(SCI, IF:1.164,Times Cited: 3)
5. K. Levin, Qijin Chen, Ioan Kosztin, Boldizsar Janko, **Ying-Jer Kao**, Andrew Iyengar, The origin of the pseudogap phase: Precursor superconductivity versus a competing energy gap scenario, J. Phys. Chem. Solids, **63**, 2233 (2002), Proceedings of SNS 01. (SCI, IF:1.164, Times Cited: 3)
6. Q.J. Chen, **Y.-J. Kao**, A.P. Iyengar, K. Levin, Magnetic field effects on T_c and the pseudogap onset temperature in cuprate superconductors, Int. J. Mod. Phys. B, **16**,3176 (2002).(SCI, IF:0.437, Times Cited: 0)
7. **Ying-Jer Kao**, Qimiao Si and K. Levin, Commensurate and incommensurate structure of the neutron cross section in LaSrCuO and YBaCuO, Physica C. **341-348**, 2165 (2000). (SCI,IF: 0.792, Times Cited: 0)

- **Preprints**

1. Hsueh-Wen Chang, Yun-Da Hsieh, **Ying-Jer Kao**, Detection of symmetry-protected topological phases in one dimension with multiscale entanglement renormalization, arXiv:1305.2663.
2. Ti-Yen Lan, Yun-Da Hsieh, **Ying-Jer Kao**, High-precision Monte Carlo study of the three-dimensional XY model on GPU, arXiv:1211.0780.

Presentations

- **Invited Conference Presentations**
  Since 2012

1. *Quantum Impurity in a Luttinger Liquid: Subleading corrections*, Tensor-Network Methods: Structure, Applications and Holography, Stony Brook, 12/11-15, 2017.
2. *Tree Tensor Network Strong Disorder Renormalization Group on a Disordered Antiferromagnetic Ising Chain in External Fields*, International Conference on Computational Physics 10, Macau, China, 01/16 - 20, 2017.
3. *Tree Tensor Network Strong Disorder Renormalization Group on a Disordered Antiferromagnetic Ising Chain in External Fields*, The 3rd Workshop on Tensor Network States: Algorithms and Applications, Okazaki, 1/11-14, 2016.
4. *Field induced ordering in dipolar spin ice*, The 16th Japan- Korea-Taiwan Workshop on Strongly Correlated Electron Systems,U of Tokyo, 2/18-21, 2016.
5. *Tree Tensor Network Strong Disorder Renormalization Group on a Disordered Antiferromagnetic Ising Chain in External Fields*, The 6th Workshop on Quantum Many-Body Computation, CSRC, Beijing, China, 4/21-24, 2016.
6. *Tree Tensor Network Strong Disorder Renormalization Group on a Disordered Antiferromagnetic Ising Chain in External Fields*, From Quantum Field Theories to Numerical Methods, Nordita, Stockholm, 5/2-27, 2016.
7. *Field induced ordering in dipolar spin ice*, School on Current Frontiers in Condensed Matter Research, ICTS, Bangalore, 6/20-29, 2016.
8. *Tree Tensor Network Strong Disorder Renormalization Group on a Disordered Antiferromagnetic Ising Chain in External Fields*, International Workshop on Tensor Networks and Quantum Many-Body Problems (TNQMP2016), ISSP, U of Tokyo, July, 2016.

9. *Quantum quench through a topological phase transition*, 2015 symposium on quantum many-body computation methods, Shanghai Chiao-Tung University, Shanghai, China, 04/19 - 21, 2015.
10. *Half-Magnetization Plateau of a Dipolar Spin Ice in a* [100] *Field*, International Conference on Computational Physics 9, Singapore, 01/07 - 09, 2015.
11. *Quantum Impurity in Luttinger Liquid: Universal Conductance with Entanglement Renormalization*, Numerical and analytical methods for strongly correlated systems, Benasque, Spain, 08/24 - 09/14, 2014.
12. *Uni10: the Universal Tensor Network Library*, Conference on Computational Physics, Boston, USA, 08/11-14, 2014.
13. *Conductance Tensors of Quantum Multiwire Junctions through Entanglement Renormalization*, the 7th ISSP International Workshop and Symposium at Institute of Solid-State Physics, University of Tokyo, Tokyo, Japan, 06/03 - 21, 2013.
14. *Detection of symmetry-protected topological phases in one dimension with multi-scale entanglement renormalization*, Workshop on Computational Physics, Sun Yat-Sen University, Guangzhou, China, 04/26-27, 2013.
15. *Tensor Network Study of Symmetry-Protected Topological Orders*, 2013 Conference on Advanced Topics and Auto Tuning in High Performance Scientific Computing, NTU, Taipei, 03/27-29, 2013
16. *Detection of symmetry-protected topological phases in one dimension with multi-scale entanglement renormalization, Workshop on Disordered and Topological Systems*, Zhejiang University, Hangzhou, China, 03/18-24, 2013.
17. *Detection of symmetry-protected topological phases in one dimension using MERA*, Mini-Workshop on Recent Developments in DMRG and TNS, NTU, Taipei, 12/10, 2012.
18. *Application of GPU in computational physics*,Workshop on GPU applications and technologies, NTHU, Hsin-Chu, 09/14, 2012.
19. *Inversion Symmetric MERA*, Workshop on Correlations and Entanglement in Many-body Systems Out of Equilibrium, NCTS, Hsin-Chu, 09/10-13, 2012.
20. *Tuning the disorders in superglasses*, Workshop on Complex Quantum Systems: Non-Ergodicity, Glassiness and Localization, ICTP, Trieste, Italy, 08/27-31, 2012.
21. *Tuning the disorders in superglasses*, APTCP Focus Program on Quantum Condensation (QC12), Pohang, Korea, 08/13-24, 2012.
22. *Tuning the disorders in superglasses*, Workshop on Computational Physics, Lanzhou, China, 04/26-27, 2012.
23. *Quantum antagonism of ferromagnetic order*, Impurities and Textures in Unconventional Magnets, Dresden, Germany, 04/02-04, 2012.
24. *Numerical Simulations of Quantum Phases*, PSROC 2012, Chia-Yi, Taiwan,01/17-19, 2012.

- **Invited Seminars/Colloqua**
  Since 2010

1. *Dipolar spin ice in magnetic field*, Institute of Physics, National Chiao-Tung University, 06/04, 2015.
2. *From Program to Package*, Department of Computer Science, National Tsing-Hua University, 06/03, 2015.
3. *Quantum quench through a topological phase transition*, Beijing Normal University, Beijing, 04/24, 2015.
4. *Quantum quench through a topological phase transition*, Beijing Computational Science Research Center, Beijing, 04/23, 2015.
5. *Quantum quench through a topological phase transition*, Institute of Advanced Study, Tsing-Hua University, Beijing, 04/22, 2015.
6. *Uni10: the universal tensor network library*, Perimeter Institute for Theoretical Physics, 08/05, 2014.

7. *Superconductivity and Superfluidity*, Interdisciplinary Science Degree Program, College of Science, National Chiao Tung University, 05/02, 2014.
8. *Geometrically frustrated spin ice: from magnetic monopole to Higgs*, Department of Physics, National Chung-Hsing University, 05/18, 2013.
9. *Numerical studies of classical and quantum matters: from Kosterlitz-Thouless transition to Topological Order*, Department of Physics, National Taiwan University, 03/06/2013.
10. *Quantum order by disorder in a semiclassical spin ice*, Department of Physics, National Taiwan Normal University, 04/13, 2011.