Curriculum Vitae
Ying-Jer Kao

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Education

- 2001 M.S., Ph.D., Department of Physics, University of Chicago
  Thesis Advisor: Prof. Kathryn Levin
  Thesis: *Probing the mechanism of high-temperature superconductivity: spin dynamics and pair-breaking effects*
- 1993 B.S., Department of Physics, National Taiwan University

Positions

- 02/2005 - present **Assistant Professor**
  Department of Physics, National Taiwan University.
- 09/2003 - 01/2005 **Postdoctoral Fellow**
  Department of Physics, University of Toronto, Canada.
- 10/2001 - 08/2004 **Postdoctoral Fellow**
  Department of Physics and Astronomy, University of Waterloo, Canada.

Visiting Positions

- 08/2007-09/2007 Member, Kavli Institute of Theoretical Physics, University of California, Santa Barbara, Research program on "Moments and Multiplets in Mott Materials".
- 06/2007 Member, Max Planck Institute for Physics of Complex Systems, Dresden, Workshop on "Unconventional Phases and Phase Transitions in Strongly Correlated Electron Systems"

Teaching

- 222 D2910 Manybody Theory, Spring 2005, Fall 2006
- 222 D2920 Special Topics in Manybody Theory, Fall, 2005
- 222 M1610 Statistical Mechanics (I), Srping 2006, 2007
- 202 21201 Mechanics (I), Fall 2007, 2008
- 202 21202 Mechanics (II), Spring 2007, 2008

Students

- Chen, Yu-Chun (M. S., 2007)
- Chen, Jun-Gu (M. S., 2008)
- Liu, Cheng-Wei (M. S., 2008)
- Su, Yu-Cheng (current graduate student)
- Lo, Ya-Ling (current graduate student)

- Chou, Yang-Zhi (current graduate student)
- Ko, Ta (current graduate student)
- Hsiao, Hsin-Chi (current graduate student)
- Huang, Ting-Chung (undergraduate project student, Feb-Oct, 2007)

Grants

- "Numerical Studies of Quantum Phase Transitions", NSC-97-2628-M-002-011-MY3, 2008/8/31-2011/7/31, P.I., NT$ 5,075,000
- "Strongly Correlated Quantum Magnetic Systems (3/3)", NSC-96-2112-M-002-010-, 2007/8/1-2008/7/31, P.I., NT$ 862,000
- "Strongly Correlated Quantum Magnetic Systems (2/3)", NSC-95-2112-M-002-023-, 2006/8/1-2007/10/31, P.I., NT$1,134,000
- "Strongly Correlated Quantum Magnetic Systems (1/3)", NSC-94-2112-M-002-047-, 2005/8/1-2006/10/31, P.I., NT$1,255,000
- "Nanomagnetism, Nanoscopic Transport, and Spin-Related Phenomenon in Zero- and One-Dimensional Self-Assembled Novel Hetero-Nanostructure (3/3)", NSC-97-2120-M-002-047-, 2008/08/01- 2009/07/31, Co P.I., NT$8,000,000
- "Nanomagnetism, Nanoscopic Transport, and Spin-Related Phenomenon in Zero- and One-Dimensional Self-Assembled Novel Hetero-Nanostructure (2/3)", NSC-96-2120-M-002-011-, 2007/08/01- 2008/07/31, Co P.I., NT$13,340,000
- "Nanomagnetism, Nanoscopic Transport, and Spin-Related Phenomenon in Zero- and One-Dimensional Self-Assembled Novel Hetero-Nanostructure (1/3)", NSC-95-2120-M-002-015-, 2006/8/1- 2007/10/31, Co P.I., NT$ 10,660,000

Honors

- NTU Excellence in Teaching Award(2008).
- NSC P.I. salary suppliment, 08/01/2008-07/31/2011, NT$ 120,000.
- NSC P.I. salary suppliment, 08/01/2007-07/31/2008, NT$ 120,000.
- NSC P.I. salary suppliment, 08/01/2006-07/31/2007, NT$ 120,000.
- NSC P.I. salary suppliment, 08/01/2005-07/31/2006, NT$ 120,000.

Services

- **At NTU**
  - Admission & Examination Committee (2007-)
- **Outside NTU**
  - Program Committee of Computational Physics Conference 2009.
  - Executive Committee of NCTS "Novel Quantum Phenomena in Condensed Matter" focus group (2007-), coordinator (2008-)
  - Organizer: "Numerical Methods in Strongly Correlated Electron Systems", Taipei, Taiwan, August, 2006, and "Mini-workshop on strong correlations in condensed matter", Hsin-Chu, Taiwan, December, 2007.
  - Referee for journals: Phys. Rev. Lett., Phys. Rev. B, Physica C, and Chinese J. Phys.
  - Grant reviewer for National Science Council proposals.

Research Interests

- Condensed matter theory
- Storngly correlated electron systems
- Quantum magnetism
- Geometrically frustrated magnetic systems
- Spin dependent transport

Publications

- **Refereed Journal Articles**

J1. 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:7.072, Times Cited:0)

J2. 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:3.107, Times Cited: 0)

J3. **Ying-Jer Kao**, Roger G. Melko, A short-loop algorithm for quantum Monte Carlo simulations, Phys. Rev. E, **77**, 036708(2008). (SCI, IF:2.438, Times Cited:0)

J4. 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:3.107, Times Cited: 3)

J5. **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:3.107, Times Cited: 1)

J6. 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: 7.072, Times Cited: 8)

J7. **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:3.107, Times Cited: 9)

J8. 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:3.107, Times Cited: 5)

J9. 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:7.072,Times Cited: 8)

J10. **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:3.107, Times Cited: 10)

J11. **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:3.107, Times Cited: 3)

J12. **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:3.107, Times Cited: 9)

J13. **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:3.107, Times Cited: 6)

J14. **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:3.107, Times Cited: 64)

J15. 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:3.107, Times Cited: 29)

- **Conference Proceedings**

C1. 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:2.038, Times Cited: 6)

C2. **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)

C3. 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)

C4. 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)

C5. 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)

C6. **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**

P1. Ling Wang, **Ying-Jer Kao**, Anders W. Sandvik, Plaquette Renormalization Scheme for Tensor Network States, arXiv:0901.0214, submitted to Phys. Rev. E.

Presentations

- **Invited Conference Presentations**

1. Recent trends in Strongly Correlated Systems, Indian Association for the Cultivation of Science, Kalkota, India, March 2-4, 2009, *Variational Approaches to Quantum Spin Systems based on Tensor Networks.*
2. Workshop on GPU computing, Center for Quantum Science and Engineering, National Taiwan University, January 16, 2009, *GPU and quantum spin systems.*
3. NCTS topic program on "Superconductivity and Magnetism at Nanoscale: Effects of quantum fluctuations and disorder", Hsin-Chu, Taiwan, December 16-19, 2007, *Matrix-Product States in Strongly Correlated Systems.*
4. Thouless Theoretical Physics Mini-Workshop, National Taiwan University, Taiwan, October 19-20, 2007, *Supersolids in lattice boson models.*
5. KITP Workshop on "Moments and Multiplets in Mott Material Workshop", Santa Barbara, USA, August 13, 2007 - December 14, 2007:*Supersolids in lattice boson models.*
6. Summer Workshop on Novel Quantum Phenomena in Condensed Matter, Hua-Lien, Taiwan, July 13-15, 2007: *Supersolids in lattice boson models.*

7. PSROC annual meeting, National Central University, Taiwan, January 23-25, 2007: *Pyrochlore in a Field.*
8. The 6th Taiwan-Korea-Japan symposium on Strongly Correlated Electron Systems and the 4th Oxide workshop, Hua-Lien, Taiwan, December 1-3, 2005: *Electronic nematic order.*

- **Invited Seminars/Colloqua**

1. Department of Physics, National Taiwan University, Theoretical Physics Seminar, March 18, 2009: *Variational Approaches to Quantum Spin Systems based on Tensor Networks.*
2. Institute of Solid State Physics, University of Tokyo, Seminar, April 25, 2008: *Supersolidity from defect condensation in the extended boson Hubbard model.*
3. Department of Physics, National Taiwan University, Colloquium, February 14, 2008: *The quest for exotism.*
4. Department of Physics, National Taiwan University, Theoretical Physics Seminar, December 19, 2007: *Supersolids in lattice boson models.*
5. Institute of Physics, Academia Sinica, Colloquium, December 5, 2007: *Supersolids in lattice boson models.*
6. Department of Physics, National Tsing-Hua University, Condensed Matter Seminar, December 4, 2007: *Supersolids in lattice boson models.*
7. NCTS "Mesoscopic and Spin Physics" Focus Group, National Taiwan University, Theory Seminar, May 7, 2007: *Exotic phases in the Bose-Hubbard model with longer-range interactions.*
8. Department of Physics, Chung-Yuan University, Colloquium, October 24, 2006: *Condensed Matter Physics: Unfinished Revolution.*
9. Department of Physics, National Chung-Cheng University, Colloquium, October 5, 2006: *Condensed Matter Physics: Unfinished Revolution.*
10. Department of Physics, Chinese Culture University, Undergraduate Seminar, May 18, 2006: *Condensed Matter Physics: Unfinished Revolution.*
11. Department of Physics, National Central University, Colloquium, May 16, 2006: *Exotic Phases in Strongly Correlated Systems.*
12. Institute of Physics, National Chiao-Tung University, Colloquium, April 27, 2006: *Exotic Phases in Strongly Correlated Systems.*
13. Material Science Division, Oak Ridge National Laboratory, Condensed Matter Seminar, February 8,2006: *Electronic Nematic Order.*
14. Department of Physics, National Dong Hwa University, Colloquium, December 5, 2005: *Exotic Phases in Strongly Correlated Systems.*
15. Department of Physics, National Taiwan University, Condensed Matter Seminar, November 21, 2005: *Exotic Phases in Strongly Correlated Systems.*
16. Department of Physics, National Sun Yat-Sen University, Colloquium, June 16, 2005: *Exotic Phases in Strongly Correlated Systems.*
17. Department of Physics, National Tsing-Hua University, Condensed Matter Seminar, May 10, 2005: *U(1) Spin Liquid in a 3D Heisenberg Magnet.*
18. NCTS SCES Focus Group, National Taiwan University, Theory Seminar, February 21, 2005: *Anisotropic Spin Excitations in Superconductors.*

References

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