Chen-Yen Lai

Curriculum Vitae

University of California Riverside
Department of Physics and Astronomy
Riverside, CA 92521

Phone: +1 (951) 565-0938

Email: clai007@ucr.edu

EDUCATION

- **University of California Riverside**, Department of Physics and Astronomy, Riverside, CA.
  PhD Candidate, Theoretical Physics Studies,
  Started Sep 2009, Expected Graduation Jun 2014.
  - Thesis Title: Unconventional Density Wave and Superfluidity in Cold Atom Systems
  - Thesis Advisor: Dr. Shan-Wen Tsai
  - Committee Member: Dr. Vivek Aji and Dr. Kirill Shtengel
- **National Tsing Hua University**, Department of Physics, Hsinchu, Taiwan.
  Master of Science in Physics,
  Started Sep 2005, Degree awarded Jul 2007.
  - Thesis Title: Spin Qubit Decoherence by Spin Bath – A Time-Dependent DMRG Study
  - Thesis Advisor: Dr. Pochung Chen
- **National Sun Yat-Sen University**, Department of Physics, Kaohsiung, Taiwan.
  Bachelor of Science in Physics,
  Started Sep 2001, Degree awarded Jun 2005.

RESEARCH EXPERIENCE

- **University of California Riverside**, Department of Physics and Astronomy, Riverside, CA, USA.
  Graduate Student (Sep. 2009 - Jun 2014)
  - Dr. Shan-Wen Tsai
    We use the functional renormalization group to study strongly correlated systems realized in cold atom experiments. From spin-polarized(imbalanced) system to multiple species mixtures, our studies show a general mechanism of emergence of unconventional d-wave density wave which come from density imbalance and screening. We also found these bond order waves in a dipolar fermion system where long-range interaction plays an important role. We proposed possible experimental setup for engineering and detecting of the new phases. Our work provides a clear picture and direction for finding the unconventional density wave instabilities, and are important to cold atom and strongly correlated theory communities.
- **National Tsing Hua University**, Department of Physics, Hsinchu, Taiwan.
  Research Assistant (Sep. 2008 - Jul 2009)
  - Dr. Pochung Chen
    By means of the well-developed tensor product states, we investigated the magnetization process of frustrated spin-1/2 spin-dimer models on a square lattice. We found clear evidence of a supersolid phase over a finite regime of magnetic field. Our work sheds light on the search for the supersolid phase in real frustrated spin-dimer compounds.
- **National Tsing Hua University**, Department of Physics, Hsinchu, Taiwan.
  Graduate Student (Sep. 2005 - Jul 2007)

– Dr. Pochung Chen
Study of single- or two-spin decoherence via interaction with a general Heisenberg spin bath by means of time-dependent density matrix renormalization group(tDMRG). We have shown that both the decoherence and the entanglement strongly depend on the phase of the underlying spin bath. We also demonstrated that spin baths can induce entanglement for an initially disentangled pair of qubits. Finally, we mapped out the finite disentanglement time for all of the phases in the phase diagram of the spin bath by calculating concurrence.

TEACHING EXPERIENCE

- **University of California Riverside**, Riverside, CA, USA.
Lower Level General Physics Laboratory TA

  – Prepared, lectured, and supervised undergraduate general physics lab sessions.

  Upper Level Undergraduate Course Discussion TA

  – Prepared and lectured undergraduate course discussion sessions of *Introduction to condensed matter physics*.

  Upper Level Graduate Course Discussion TA

  – Prepared and lectured graduate core course discussion sessions of *Electromagnetism* and *Statistical Mechanics*.

- **National Tsing Hua University**, Hsinchu, Taiwan.
General Physics Discussion TA

  – Prepared and lectured undergraduate general physics discussion sessions.

AWARDS AND HONORS

- *Outstanding Teaching Assistant for the 2010-2011 academic year*
Presented by the faculty of the Department of Physics and Astronomy and by the Graduate Division at University of California Riverside.

- *2008 Annual Student Journal Paper Award*
Presented by the Department of Physics at National Tsing Hua University for excellence in graduate student research work.

COMPUTER SKILLS AND LANGUAGES

- Proficient in LaTeX, Microsoft Excel, Powerpoint.

- Working knowledge: Python, C, Fortran, and Unix Bash Scripting.

- Conversational use of English and Mandarin Chinese.

RESEARCH INTERESTS

- Strongly Correlated Fermionic System
- Multiple-Orbital/Species Physics
- Low-Dimensional Physics
- Quantum Many-Body phases
- Unconventional Density Wave and Superconductivity
- Renormalization Group Method
- Computational Physics

LIST OF REFEREES

- Dr. Shan-Wen Tsai, Ph.D Thesis Advisor
  Department of Physics and Astronomy
  University of California Riverside
  Riverside, CA 92521 USA
  e-mail: shan-wen.tsai@ucr.edu
- Dr. Pochung Chen, Master Thesis Advisor
  Department of Physics
  National Tsing Hua University
  Hsinchu, Taiwan
  e-mail: pcchen@phys.nthu.edu.tw
- Dr. David K Campbell
  Department of Physics
  Boston University
  Boston, MA 02215
  e-mail: dkcampbe@bu.edu
- Dr. Vivek Aji
  Department of Physics and Astronomy
  University of California Riverside
  Riverside, CA 92521 USA
  e-mail: vivekj@ucr.edu