Qijin Chen

Shanghai Branch, Hefei National Laboratory for Physical Sciences at Microscale,
the University of Science and Technology of China,
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EDUCATION

Ph.D., University of Chicago Chicago, IL 2000
Theoretical Condensed Matter Physics

M.S., Institute of Physics, Chinese Academy of Sciences (CAS) Beijing, China 1995
Experimental Condensed Matter Physics

B.S. (*with honor*), Univ. of Science and Technology of China (USTC) Hefei, China 1992
Nuclear and Particle Physics/Theoretical Physics

PROFESSIONAL EMPLOYMENTS

University of Science and Technology of China Hefei & Shanghai, China 2019–present
Distinguished Professor, Hefei National Laboratory for Physical Sciences at Microscale

Zhejiang University Hangzhou, China 2008–2019
Distinguished Professor, Zhejiang Institute of Modern Physics and Department of Physics

University of Chicago Chicago, IL 2004–2008
Research associate and Research Scientist, James Franck Institute

Argonne National Lab & University of Notre Dame Argonne, IL Summer, 2004
Visiting Fellow, Institute for Theoretical Sciences

Johns Hopkins University Baltimore, MD 2002 -2004
Postdoctoral Fellow, Department of Physics and Astronomy. Advisor: Zlatko Tesanovic

National High Magnetic Field Laboratory Tallahassee, FL 2000-2002
Postdoctoral Research Associate, Condensed Matter Theory Group Advisor: J. Robert Schrieffer

University of Chicago Chicago, IL 1997-2000
Research Assistant, James Franck Institute Advisor: Kathryn Levin

Institute of Physics, Chinese Academy of Sciences Beijing, China 1993-1995
Research Assistant, State Key Laboratory of Surface Physics Advisor: Zhangda Lin

HONORS AND AWARDS

- 2009, “Changjiang Scholar” Professorship, Ministry of Education, China
- 1997, *First Prize in Natural Sciences*, Chinese Academy of Sciences (Jointly with Z.D. Lin, K.A. Feng, J. Yang and B.W. Sun), *the most prestigious award of CAS*.
- 2004, Visiting Fellow, Institute for Theoretical Sciences, Argonne Nat'l Lab & Univ. of Notre Dame.
- 1991, Guo Moruo Prize, (*the most prestigious award for students*), USTC.
- 1999, Young Investigator Travel Award, M^{2}S-HTSC-VI conference (Houston, Feb. 2000).
- 1996, Robert G. Sachs Summer Research Fellow, University of Chicago.

- 1993, Outstanding Graduate Student Award, Chinese Academy of Sciences.
- 1992, Outstanding Graduate of Higher Educational Institutions, Anhui Province, China.
- 1992, Outstanding Graduate, USTC.
- 1988, Samuel C.C. Ting First-Year Undergraduate Physics and Biology Award, USTC.
- 1987-1992, Outstanding Student Award, USTC.

RESEARCH INTERESTS

- Superfluidity and related physics in atomic Fermi gases, optical lattices and quantum simulation
- Strongly correlated electrons, high temperature superconductivity (and ruthenate, organic, and heavy fermion and Fe based pnictide superconductors)
- Topological insulators
- Graphene, nano physics, magnetism and spintronics, as well as quantum computing

ACADEMIC SERVICES

- Referee for Scientific Reports, since 2015.
- Referee for Physical Review A and B and Physical Review Letters, since 2000.
- Referee for Physical Review E, since 2011.
- Referee for EuroPhysics Letters, since 2008.
- Referee for Physica C, since 2004.
- Referee for Chinese Physics Letters, since 2009.
- Co-organizer, MRSEC seminars, University of Chicago, 1999.
- Member, Graduate Admissions Committee, Department of Physics, University of Chicago, 1999.
- Session chair, APS March meeting, Seattle, WA, 2001.
- Session chair, APS March meeting, Denver, CO, 2007.
- Organizer, Department of Physics Colloquium, Zhejiang University, Hangzhou, 2009-2010
- Member, Executive Committee, International Collaborative Center for Quantum Matter, Hangzhou, Since 2009.
- Co-organizer, 2009 Hangzhou Workshop on Quantum Matter, Hangzhou, China, October 12-15, 2009.
- Co-organizer, 2010 Hangzhou Workshop on Quantum Matter, Hangzhou, China, May 18-22, 2010.
- Co-organizer, 2010 Workshop on Quantum Condensation, Hsinchu, Taiwan, August 9-22, 2010.
- Co-organizer, 2011 Workshop on Quantum Condensation, Hong Kong, July 4-15, 2011.
- Co-organizer, 2011 Chinese Physical Society Fall Meeting, Hangzhou, China, September 15-18, 2011.
- Chair, 2013 Hangzhou Workshop on Quantum Matter, Hangzhou, China, April 22-25, 2013.
- Organizer (and Chair), 2016 Hangzhou Symposium on Degenerate Fermi Gases, June 27-30, 2016.
- Co-organizer, 2018 Hangzhou Workshop on Quantum Matter, Hangzhou, China, October 8-10, 2018.
- Review/Interview panelist, National Awards for Science and Technology, Beijing 2015.
- Reviewer, Changjiang Scholar program, Ministry of Education of China, since 2009.

- Reviewer of grant applications, National Science Foundation of China, since 2010.
- Reviewer of grant applications, Natural Science Foundation of Zhejiang, Shandong, Heilongjiang, Beijing, and Hunan Provinces.
- Member of Editorial Board, Fundamental Journal of Modern Physics, since 2011.
- Committee Member, Division of Condensed Matter Theory and Statistical Physics, Chinese Physical Society, 2011-2013.
- Member, Board of Faculty, Department of Physics, Zhejiang University
- Member, Committee on Human Resources, Department of Physics, Zhejiang University
- Member, Committee on Teaching, Department of Physics, Zhejiang University (-2014)
- Member, Committee on Academic Degrees, Department of Physics, Zhejiang University
- Member, Committee on Research and Planning, Department of Physics, Zhejiang University (2014)
- In charge of the Program of International Collaborations and Academic Exchanges, Department of Physics, Zhejiang University, 2012-2013.

TEACHING EXPERIENCE

Professor, Department of Physics, Zhejiang University Hangzhou, China

- Topics in Theoretical Physics (Spring, annually 2009-2019)
- Mechanics (Fall/Winter, annually 2009-2019)
- Advanced Statistical Mechanics (Spring, 2019, with Prof. Xin Wan)

Teaching Assistant, Department of Physics, University of Chicago Chicago, IL 1995-1999

- General Physics I, II, III (Sidney Nagel, Heinrich Jaeger, Renee Ong, Melvyn Shochet)
- Solid State Physics (P236, Susan Coppersmith)
- Graduate physics, Quantum Mechanics II (P342, Robert Geroch)
- Graduate physics, Quantum Mechanics III (P343, Paul Wiegmann).

PROFESSIONAL MEMBERSHIPS

- Special invited member, American Association for the Advancement of Science, 1995-2007
- American Physical Society, since 1996
- New York Academy of Sciences, 2001-2004

RESEARCH HIGHLIGHTS

Research areas: Strongly correlated systems, quantum matter, esp. superfluidity and superconductivity, from high temperature superconductors to ultracold atomic gases.

Developed a pairing fluctuation theory that self-consistently includes the contribution of pairing fluctuations in fermion self energy. It can address the wide-spread abnormal pseudogap phenomena in high Tc superconductors, and has become one of several major schools of high Tc theories, since it was published in Phys. Rev. Lett. **81**, 4708 (1998). Based on a BCS-BEC crossover scenario, this theory is a natural generalization of BCS theory to short coherence length superconductors. It is one (of very few theories) that can generate a cuprate phase diagram, in (semi-)quantitative agreement with experiment. It provides a natural explanation for the mysterious quasi-universal behavior of the temperature dependence of the penetration

depth for different doping concentrations in cuprate superconductors. It also provides a unified picture for the anomalous diamagnetic response, Nernst effect, and unusual behavior of the Hall coefficient throughout the entire cuprate phase diagrams.

Applied successfully the pairing fluctuation theory to address *quantitatively* experiments in ultracold Fermi gases, including the phase diagram, the thermodynamic transitions, density profile, rf spectroscopy, etc. First introduced the pseudogap concept into the atomic Fermi gas field, which has now been established experimentally.

Explored and predicted exotic new quantum phenomena associated with pairing and superfluidity with unusual parameters or configurations, including physics in mixed dimensionality, and in lattice-continuum mixed systems.

Published about 80 SCI papers, with H-index = **27** and an overall SCI citation of over 2700.

Top five most cited *theory* papers :

1. J. Kinast, A. Turlapov, J.E. Thomas, **Q.J. Chen**, J. Stajic, and K. Levin, Heat capacity of a strongly interacting Fermi gas, **Science 307**, 1296 (2005) (Science Express, doi:10.1126/science.1109220). [Times cited: > 325]
2. **Q.J. Chen**, J. Stajic, S.N. Tan, and K. Levin, *BCS-BEC crossover: From high temperature superconductors to ultracold superfluids*, Physics Reports **412**, 1-88 (2005). [Times cited: > 566]
3. J. Stajic, J.N. Milstein, **Q.J. Chen**, M.L. Chiofalo, M.J. Holland, and K. Levin, *Nature of superfluidity in ultracold Fermi gases near Feshbach resonances*, Phys. Rev. A 69, 063610 (2004). [Times cited > 86]
4. **Q.J. Chen**, I. Kosztin, B. Jank´o, and K. Levin, *Superconducting transitions from the pseudogap state: d-wave symmetry, lattice, and low-dimensional effects*, Phys. Rev. B **59**, 7083 (1999). [Times cited > 83]
5. **Q.J. Chen**, I. Kosztin, B. Jank´o, and K. Levin, *Pairing fluctuation theory of superconducting properties in underdoped to overdoped cuprates*, Phys. Rev. Lett. **81**, 4708 (1998). [Times cited: > 184]

PUBLICATIONS (See a separate file or http://jfi.uchicago.edu/~qchen/Publications.pdf for a list.)

INVITED TALKS (See a separate file or http://jfi.uchicago.edu/~qchen/Presentations.pdf for a list.)