# Curriculum Vitae

(with full publication list)

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## Daw-Wei Wang

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### EDUCATION:

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| 1995-2000 | **Ph.D.** in Theoretical Physics, **University of Maryland**, College Park, MD<br>Thesis Advisor: Professor S. Das Sarma |
| 1991-1995 | **B.S.** in Physics, **National Tsing-Hua University**, Hsinchu, Taiwan |

### RESEARCH APPOINTMENT:

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|---|---|
| 2010-present | Professor, Department of Physics, National Tsing-Hua University, Hsinchu, Taiwan, ROC |
| 2009 Fall | Visiting Scholar, Joint Quantum Institute of University of Maryland, College Park, USA |
| 2005-2010 | Associate Professor, Department of Physics, National Tsing-Hua University, Hsinchu, Taiwan, ROC |
| 2004-2005 | Visiting Scientist, National Center for Theoretical Science, Hsinchu, Taiwan, ROC |
| 2002-2004 | Postdoctoral Fellow, Harvard University, Cambridge, MA, USA |
| 2000-2002 | Postdoctoral Research Associate, University of Maryland, College Park, MD |

### TEACHING EXPERIENCE:

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|---|---|
| 2010-present | Professor, Department of Physics, National Tsing-Hua University, Hsinchu, Taiwan, ROC |
| 2005-2010 | Associate Professor, Department of Physics, National Tsing-Hua University, Hsinchu, Taiwan, ROC |
| 1995-1996 | Teaching Assistant, Department of Physics, University of Maryland, College Park |

### ACADEMICAL AWARD:

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| 2011 | NSC Project for Outstanding Young Scholars (2011-2015) |
| 2008 | 2008 Daniel Tsui Fellowship, Center for Theoretical and Computatioal Physics, Hong Kong University, Hong Kong |
| 2008 | Ta-You Wu Memorial Award, National Science Coucil, Taiwan |
| 2008 | Research Award for Junior Research Investigators, Academia Sinica, Taiwan |
| 2007 | Junior Faculty Research Award 2008, National Tsing-Hua University, Taiwan |
| 2007 | Young Theorist Award 2007, National Center for Theoretical Science, Taiwan |
| 1996 | Secured the highest grade in the physics Ph.D. qualifying exam at University of Maryland, College Park |
| 1992-1993 | The Dr. Samuel J. J. Ding Physics Scholarship, National Ministry of Education, Taiwan |

**RESEARCH INTERESTS:**

My research is mainly to develop theories in different strongly correlated many-body systems, including ultracold atoms/molecules, quantum Hall systems, one dimensional systems, and (high $T_c$) superconductivity, etc. In recent years I am mostly working in the many-body theory of ultracold atoms, especially about the ground state properties, low energy excitations, localization effects, Bose-Fermi mixture, and quantum dynamics. The dipolar interaction induced many-body phases as well as the finite temperature effects in the systems of polar molecules is my research focus in the next few years. This new systems of ultracold (below mK) polar molecules is expected to be experimentally realized very soon in the next couple of years, and shall bring important and new understanding in strongly correlated physics.

**Invited PRESENTATION IN INTERNATIONAL CONFERENCE and WORKSHOP:**

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| Aug. 2011 | the 7th Joint Meeting of Chinese Physicists Worldwide, Oversea Chinese Physics Association, Kaohsiung, Taiwan |
| Jan. 2011 | Conference on Research Frontiers in Ultra-Cold Atomic and Molecular Gases, Goa, India (hosted by Abdus Salam International Center for Theoretical Science, Italy) |
| Sep. 2010 | the 34th Conference of Theoretical Physics, Ustron, Poland |
| Sep. 2009 | International Workshop on Dipolar Gases, University of Stuttgart, Stuttgart, Germany |
| Aug. 2009 | the 6th Joint Meeting of Chinese Physicists Worldwide, Oversea Chinese Physics Association, Lanzhou, China |
| Dec. 2008 | Hong Kong Forum of Physics, Center for Computational and Theoretical Physics, Hong Kong University, Hong Kong |
| Jun. 2007 | First International Conference on Quantum Manipulation of Photons and Atoms, Chinese Academy of Sciences, Beijing, China |
| May 2005 | 4th Asia-Pacific Workshop on Strongly Correlated Systems, Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing, China |
| Mar. 1998 | Invited Talk, March Meeting of American Physics Society, Los Angles, USA |

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## FULL PUBLICATION LIST

H index: $> 15$ (upto year 2011)


[1] D.-W. Wang, Y.C. Chou and T.M. Hong, "Possible Origin of Convection Flow in Granular Systems", Europhys. Lett., **35**, 333 (1996).

[2] S. Das Sarma and D.-W. Wang, "Resonant Raman Scattering by Elementary Electronic Excitations in Semiconductor Structures", Phys. Rev. Lett. **83**, 816 (1999).

[3] S. Das Sarma and D.-W. Wang, "Many-Body Renormalization of Semiconductor Quantum Wire Excitons: Absorption, Gain, Binding, and Unbinding", Phys. Rev. Lett. **84**, 2010 (2000).

[4] D.-W. Wang, A.J. Millis, and S. Das Sarma, "Where Is the Luttinger Liquid in One Dimensional Semiconductor Quantum Wire Structures?", Phys. Rev. Lett. **85**, 4570 (2000).

[5] D.-W. Wang, A.J. Millis, and S. Das Sarma, "Coulomb Luttinger Liquid", Phys. Rev. B **64**, 193307 (2001).

[6] D.-W. Wang and S. Das Sarma, "Many-body Effects on Excitonic Optical Properties of Photoexcited Semiconductor Quantum Wire Structures", Phys. Rev. B **64**, 195313 (2001).

[7] D.-W. Wang and S. Das Sarma, "Elementary Electronic Excitations in One-dimensional Continuum and Lattice Systems", Phys. Rev. B **65** 035103 (2002).

[8] D.-W. Wang and S. Das Sarma, "Resonant Raman Scattering by Charge Density and Single Particle Excitations in Semiconductor Nanostructures: A Generalized Interband-Resonant Random-Phase-Approximation Theory", Phys. Rev. B **65**, 125322 (2002).

[9] D.-W. Wang, E. Demler, S. Das Sarma, and B.I. Halperin, "Magnetoplasmon Excitations and Spin Density Instabilities in an Integer Quantum Hall Systems with a Tilted magnetic Field", Phys. Rev. B **66**, 195334 (2002).

[10] E. Demler, D.-W. Wang, S. Das Sarma, and B.I. Halperin, "Quantum Hall Stripe Phases at Integer Filling Factors", Solid Sate Commun. **123**, 243 (2003).

[11] D.-W. Wang, E. Demler, and S. Das Sarma, "Spontaneous Symmetry Breaking and Exotic Quantum Orders in Integer Quantum Hall systems under a Tilted Magnetic Field", Phys. Rev. B **68**, 165303 (2003).

[12] D.-W. Wang, A.J. Millis, and S. Das Sarma, "Comment on "Dynamic correlations of the spinless Coulomb Luttinger liquid [Phys. Rev. B **65**, 125109 (2002)]" ", Phys. Rev. B **69**, 167101 (2004).

[13] D.-W. Wang, E. Demler, and M. Lukin, "Disordered Bose-Einstein condensates in quasi-one-dimensional magnetic microtraps", Phys. Rev. Lett. **92**, 076802 (2004). (This paper has been selected for the March 1, 2004 issue of Virtual Journal of Nanoscale Science and Technology.)

[14] D.-W. Wang, A.J. Millis, and S. Das Sarma, "Theory of resonant Raman scattering in one-dimensional electronic systems", Phys. Rev. B. **70**, 165101 (2004).

[15] D.-W. Wang, A.J. Millis and S. Das Sarma, "Collective modes and Raman scattering in one dimensional electron systems", Solid State Commun. **131**, 637-645 (2004). (Invited review article for *New Advances on Collective Phenomena in One-dimensional Systems.*)

[16] L. Mathey, D.-W. Wang, W. Hofstetter, M.D. Lukin, and E. Demler, "Luttinger liquid of polarons in one-dimensional boson-fermion mixtures", Phys. Rev. Lett. **93**, 120404 (2004).

[17] A. Polkovnikov and D.-W. Wang, "Effect of quantum fluctuations on the dynamics of Bose-Einstein condensates in optical lattices", Phys. Rev. Lett. **93**, 070401 (2004).

[18] D.-W. Wang, M.D. Lukin, and E. Demler, "Engineering Superfluidity in Bose-Fermi Mixtures of Ultracold Atoms", Phys. Rev. A, **72**, R051604 (2005).

[19] D.-W. Wang, E.G. Mishchenko, and E. Demler, "Pseudospin ferromagnetism in coupled quantum wires", Phys. Rev. Lett. **95**, 086802 (2005).

[20] D.-W. Wang, "Strong coupling theory of superfluidity in Bose-Fermi mixtures", Phys. Rev. Lett. **96**, 140404 (2006).

[21] D.-W. Wang, M.D. Lukin and E.Demler, "Quantum fluids of self-assembled chains of polar molecules", Phys. Rev. Lett. **97**, 180413 (2006).

[22] D.-W. Wang, "Quantum phase transitions of polar molecules in bilayer system", Phys. Rev. Lett. **98**, 06043 (2007).

[23] L. Mathey, D.-W. Wang, "Phase diagrams of one-dimensional Bose-Fermi mixtures of ultra-cold atoms", Phys. Rev. A **75**, 013612(2007).

[24] D.-W. Wang, "Magnetic disorder and dynamical properties of a Bose-Einstein condensate in atomic waveguides", cond-mat/0605691.

[25] G. Pupillo, A. Griessner, A. Micheli, M. Ortner, D.-W. Wang, and P. Zoller, "Cold Atoms and Molecules in Self-Assembled Dipolar Lattices", Phys. Rev. Lett. **100**, 050402 (2008).

[26] D.-W. Wang, "An effective many-body theory for strongly interacting polar molecules", New J. Phys. **10**, 053005 (2008).

[27] Yi-Ya Tian, Pochung Chen, and D.-W. Wang, "Universal dynamics of quantum spin decoherence in a spin bath", Phys. Rev. B **77**, 174434 (2008).

[28] Chi-Ming Chang, Wei-Chao Shen, Chen-Yen Lai, Pochung Chen, and Daw-Wei Wang, "Interaction-induced first-order correlation between spatially separated one-dimensional dipolar fermions", Phys. Rev. A **79**, 053630 (2009).

[29] Sheng-Min Shih and Daw-Wei Wang, "Pseudopotential of an interaction with a power-law decay in two-dimensional systems", Phys. Rev. A **79**, 065603 (2009).

[30] Yi-Ping Huang, Daw-Wei Wang, "Quantum phase diagrams of fermionic dipolar gases in a planar array of one-dimensional tubes", Phy. Rev. A **80**, 053610 (2009).

[31] Daw-Wei Wang, "Momentum distribution of noncondensate particles near the superfluid-to-Mott-insulator transition of bosonic atoms in a uniform optical lattice", Phys. Rev. A **80**, 063620 (2009).

[32] C.-H. Lin, Y.-T. Hsu, H. Lee, and D.-W. Wang, "Interaction-induced ferroelectricity in the rotational states of polar molecules", Phys. Rev. A **81**, 031601(R) (2010).

[32] Chao-Chun Huang, Daw-Wei Wang, and Wen-Chin Wu, "Condensate wave function and elementary excitations of bosonic polar molecules: Beyond the first Born approximation", Phys. Rev. A **81**, 043629 (2010).

[33] Bin Wang, Daw-Wei Wang, and S. Das Sarma, "Bose-Fermi solid and its quantum melting in a one-dimensional optical lattice", Phys. Rev. A **82**, 021602(R) (2010).

[34] Shiang Fang, Ray-Kuang Lee, and Daw-Wei Wang, "Quantum fluctuations and condensate fraction during the time-of-flight expansion", Phys. Rev. A **82**, 031601(R) (2010).

[35] Yi-Ya Tian and Daw-Wei Wang, "Confinement induced quantum melting and polarization cooling for a 2D dipolar crystal", Euro. Phys. Lett., **91**, 66006 (2010).

[36] Andrew C. Potter, Erez Berg, Daw-Wei Wang, Bertrand I. Halperin, Eugene Demler, "Superfluidity and dimerization in a multilayered system of fermionic polar molecules", Phys. Rev. Lett. **105**, 220406 (2010).

[37] Shiang Fang, Chia-Ming Chung, Ping Nang Ma, Pochung Chen, and Daw-Wei Wang, "Quantum Criticality from in-situ Density Imaging", Phys. Rev. A **83**, 031605(R) (2011).

[38] B. Wunsch, N. T. Zinner, I. B. Mekhov, S.-J. Huang, D.-W. Wang, and E. Demler, "Few-Body Bound States in Dipolar Gases and Their Detection", Phys. Rev. Lett. **107**, 073201 (2011).

[39] N. T. Zinner, B. Wunsch, I. B. Mekhov, S.-J. Huang, D.-W. Wang, and E. Demler, "Few-Body Bound Complexes in One-dimensional Dipolar Gases and Non-Destructive Optical Detection", Phys. Rev. A **84**, 063606 (2011).

[40] N. T. Zinner, B. Wunsch, D. Pekker, and D.-W. Wang, "BCS-BEC crossover in bilayers of cold fermionic polar molecules", Phys. Rev. A **85**, 013603 (2012).