

# CURRICULUM VITAE

Steven R. White

## PERSONAL

Born December 26, 1959 in Lawton, Oklahoma

Citizenship: USA

Married, four children

## EDUCATION

B.A. University of California, San Diego, Physics, Mathematics, and Economics  
(triple major, summa cum laude), June 1982.

Ph.D. Cornell University, Physics; completed–September, 1987; conferred–January 1988.  
Thesis topic: New Methods for Electronic Structure Calculations  
Thesis advisors: Professors John W. Wilkins and Kenneth G. Wilson

## ACADEMIC HONORS

*UCSD* (1978-1982)

Regents' Scholar (1978-1982)

President's Undergraduate Fellow (1981)

Provost's Scholarship Award (1982) (the top academic award for Warren  
College, UCSD)

*Cornell University* (1982-1987)

NSF Fellowship (1982-1985)

Andrew D. White Supplementary Fellowship (1982-1985)

*UCSB* (1987-1989)

IBM Postdoctoral Fellowship (1988-1989)

*UCI* (1989-present)

Fellow, American Physical Society (1999)

Councillor, Division of Computational Physics, APS, 2000-2003

Rahman Prize in Computational Physics, American Physical Society (2003)

Fellow, American Association for the Advancement of Science (2008)

Physical Review Letters Milestone Paper of 1992 (2008)

Perimeter Institute Distinguished Visiting Research Chair (2012)

Member, American Academy of Arts and Sciences (Elected 2016)

## PROFESSIONAL EMPLOYMENT

10/79 to 8/82: Research Assistant, Dept. of Chemistry, UCSD. (Publications 1 and 2)  
Supervisor: Professor Kent R. Wilson.

9/82 to 9/87: NSF Fellow and graduate research assistant in the Laboratory of Atomic  
and Solid State Physics, Cornell University.

10/87 to 8/89: Postdoctoral research associate and IBM Fellow in the Department of  
Physics, University of California, Santa Barbara. Supervisor: Douglas J. Scalapino.

9/89 to 6/93: Assistant Professor of Physics, University of California, Irvine.

7/93 to 6/97: Associate Professor of Physics, University of California, Irvine.

7/97 to present: Professor of Physics, University of California, Irvine.

## PUBLICATIONS

1. P.H. Berens, S.R. White, and K.R. Wilson, "Molecular dynamics and spectra. II. Diatomic Raman," *J. Chem. Phys.* **75**, 515 (1981).
2. D.R. Fredkin, A.Komornicki, S.R. White, and K.R. Wilson, "Ab Initio infrared and Raman spectra," *J. Chem. Phys.* **78**, 7077 (1983).
3. S.R. White and M. Barma, "Field-induced drift and trapping in percolation networks," *J. Phys.* **A17**, 2995 (1984).
4. S.R. White, J.W. Wilkins, and K.G. Wilson, "Renormalization group approach for electronic structure," *Phys. Rev. Lett.* **56**, 412 (1986).
5. S.R. White and J.W. Wilkins, "Fermion simulations in systems with negative weights," *Phys. Rev.* **B37**, 5024 (1988).
6. S.R. White, J.W. Wilkins, and M.P. Teter, "The finite element method for electronic structure," *Phys. Rev.* **B39**, 5819 (1989).
7. S.R. White, R.L. Sugar, and R.T. Scalettar, "An algorithm for the simulation of many electron systems at low temperatures," *Phys. Rev.* **B38**, 11665 (1988).
8. S.R. White, D.J. Scalapino, R.L. Sugar, N.E. Bickers, and R.T. Scalettar, "Attractive and repulsive pairing interaction vertices for the 2D Hubbard Model," *Phys. Rev.* **B39**, 839 (1989).
9. N.E. Bickers, D.J. Scalapino, and S.R. White, "Conserving approximations for strongly correlated electron systems: Bethe-Salpeter equation and dynamics for the two-dimensional Hubbard model," *Phys. Rev. Lett.* **62**, 961 (1989).
10. D.J. Scalapino, R.L. Sugar, S.R. White, N.E. Bickers, and R.T. Scalettar, "Numerical Simulations: Some Results for the 2- and 3-D Hubbard Models and a 2-D Electron Phonon Model," *Physica Scripta* **T27**, 101 (1989).
11. S.R. White, D.J. Scalapino, R.L. Sugar, E.Y. Loh, J.E. Gubernatis, and R.T. Scalettar, "Numerical study of the two-dimensional Hubbard model," *Phys. Rev.* **B40**, 506 (1989).
12. R.T. Scalettar, E.Y. Loh, J.E. Gubernatis, A. Moreo, S.R. White, D.J. Scalapino, R.L. Sugar, and E. Dagotto, "Phase Diagram of the 2D Negative- $U$  Hubbard Model," *Phys. Rev. Lett.* **62**, 1407 (1989).
13. E.Y. Loh, J.E. Gubernatis, R.T. Scalettar, S.R. White, and R.L. Sugar, "Stable matrix-multiplication algorithms for low temperature numerical simulations of fermions," in *Workshop on Interacting Electrons in Reduced Dimension*, edited by D. Baeriswyl and D.K. Campbell, Plenum Press, New York, 1989.
14. S.R. White, D.J. Scalapino, R.L. Sugar, and N.E. Bickers, "Monte Carlo calculation of dynamical properties of the two-dimensional Hubbard model," *Phys. Rev. Lett.* **63**, 1523 (1989).
15. A. Moreo, D.J. Scalapino, R.L. Sugar, S.R. White, and N.E. Bickers, "Numerical study of the two-dimensional Hubbard model for various band fillings," *Phys. Rev.* **B41**, 2313 (1990).
16. E.Y. Loh, J.E. Gubernatis, R.T. Scalettar, S.R. White, D.J. Scalapino, and R.L. Sugar, "The sign problem in the numerical simulation of many electron systems," *Phys. Rev.* **B41**, 9301 (1990).
17. S.R. White, "Low temperature properties of the two-dimensional Hubbard model," in *International Workshop on Quantum Simulations of Condensed Matter Phenomena*, edited by J.D. Doll and J.E. Gubernatis (World Scientific, New Jersey, 1990).
18. S.R. White, "The Average Spectrum Method for the Analytic Continuation of Imaginary-time data," in *Computer Simulations in Condensed Matter Physics III*, ed. D.P. Landau, K.K. Mon, and H.B. Schüttler (Springer Verlag, Heidelberg, Berlin, 1990).

19. R.T. Scalettar, D.J. Scalapino, R.L. Sugar, and S.R. White, "Antiferromagnetic, Charge-Transfer, and Pairing Correlations in the 3-band Hubbard Model," *Phys. Rev.* **B44**, 770 (1991).
20. N.E. Bickers and S.R. White, "Conserving approximations for strongly fluctuating electron systems. II. Numerical results and Parquet extension," *Phys. Rev.* **B43**, 8044 (1991).
21. R.T. Scalettar, D.J. Scalapino, R.L. Sugar, and S.R. White, "Quantum Monte Carlo Simulations of a CuO<sub>2</sub> Model," *The International Journal of Supercomputer Applications* **5**, 36 (1991).
22. S.R. White, "Spectral Weight Function for the two-dimensional Hubbard Model," *Phys. Rev.* **B44**, 4670 (1991).
23. S.R. White, "Formation of Gaps in the two-dimensional Hubbard Model. Half-filled case," *Phys. Rev.* **B46**, 5678 (1992).
24. S.R. White, "Numerical Renormalization Group for finite Hubbard lattices," *Phys. Rev.* **B45**, 5752 (1992).
25. S.R. White, S. Chakravarty, M. Gelfand, and S. Kivelson, "Pair-Binding in Small Hubbard Molecules", *Phys. Rev.* **B45**, 5062 (1992).
26. A. Moreo, D.J. Scalapino, and S.R. White, "Quasi-Particle gap in a two-dimensional Kosterlitz-Thouless Superconductor", *Phys. Rev.* **B45**, 7544 (1992).
27. S.R. White, "Real Space Numerical Renormalization Groups for Hubbard Models," in *Computational Approaches in Condensed-Matter Physics*, edited by S. Miyashita, M. Imada, and H. Takayama (Springer Verlag, Heidelberg, 1992), p. 97-104.
28. S.R. White and R.M. Noack, "Real Space Quantum Renormalization Groups," *Phys. Rev. Lett.* **68**, 3487 (1992).
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30. D.J. Scalapino, S.R. White, and S.C. Zhang, "Superfluid density and the Drude weight of the Hubbard model," *Phys. Rev. Lett.* **68**, 2830 (1992).
31. G.S. Feng and S.R. White, "Numerical study of the spectral weight of the half-filled Hubbard model," *Phys. Rev.* **B46**, 8691 (1992).
32. M. Vekic and S.R. White, "Pseudogap Formation in the Half-filled Hubbard Model," *Phys. Rev.* **B47**, 1160 (1993).
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34. N. Bulut, D.J. Scalapino, and S.R. White, "Comparison of Monte Carlo and Diagrammatic Calculations for the Two-Dimensional Hubbard Model," *Phys. Rev.* **B47**, 2742 (1993).
35. N. Bulut, D.J. Scalapino, and S.R. White, "Effective Particle-Particle Interaction in the Two-Dimensional Hubbard Model," *Phys. Rev.* **B47**, 6157 (1993).
36. D.J. Scalapino, S.R. White, and S.C. Zhang, "Insulator, Metal, or Superconductor: The Criteria," *Phys. Rev.* **B47**, 7995 (1993).
37. R.M. Noack and S.R. White, "The Real-Space Renormalization Group and Anderson Localization," *Phys. Rev.* **B47**, 9243 (1993).
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  45. N. Bulut, D.J. Scalapino, and S.R. White, "The Effective Electron-Electron Interaction in the Two-Dimensional Hubbard Model," *Phys. Rev.* **B50**, 9623 (1994).
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  51. N. Bulut, D.J. Scalapino, and S.R. White, "Quasiparticle Dispersion in the Cuprate Superconductors and the 2D Hubbard Model," *Phys. Rev.* **B50**, 7215 (1994).
  52. N. Bulut, D.J. Scalapino, and S.R. White, "Electronic Properties of the Insulating Half-Filled Hubbard Model," *Phys. Rev. Lett.* **73**, 748 (1994).
  53. S.R. White, R.M. Noack, and D.J. Scalapino, "Resonating Valence Bond Theory of Coupled Heisenberg Chains," *Phys. Rev. Lett.* **73**, 886 (1994).
  54. R.M. Noack, S.R. White and D.J. Scalapino, "The Density Matrix Renormalization Group for Fermion Systems," in *Computer Simulations in Condensed Matter Physics VII*, Eds. D.P. Landau, K.K. Mon, and H.B. Schüttler (Springer Verlag, Heidelberg, Berlin, 1994), p. 85-98.
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  56. S.R. White, R.M. Noack, and D.J. Scalapino, "Density Matrix Renormalization Group Calculations for Doped Hubbard Ladders," *Journal Of Low Temperature Physics*, **99**, 593 (1995).
  57. D.J. Scalapino, R.L. Sugar, R.M. Noack, S.R. White, R.T. Scalettar, M. Vekic, and J.W. Cannon, "Insulating States of Correlated Electrons," *Journal Of Low Temperature Physics*, **99**, 487 (1995).
  58. Steven R. White, "Equivalence of the antiferromagnetic Heisenberg ladder to a single  $S = 1$  chain," *Phys. Rev.* **B53**, 52 (1996).
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65. Steven R. White and D.J. Scalapino, "Hole and Pair Structures in the  $t$ - $J$  model," *Phys. Rev.* **B55**, 6504 (1997).
66. Steven R. White, "Notes on the Density Matrix Renormalization Group: Application to Ladder Systems", in *Strongly Correlated Magnetic and Superconducting Systems: Proceedings of the El Escorial Summer School*, Eds. G. Sierra, M.A. Martin-Delgado, (Springer Verlag, Heidelberg, Berlin, 1997), p. 88-108.
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72. Eric Jeckelmann and Steven R. White, "Density matrix renormalization group study of the polaron problem in the Holstein model", *Phys. Rev.* **B57**, 6376 (1998).
73. Chunli Zhang, Eric Jeckelmann, Steven R. White, "Density Matrix Approach to Local Hilbert Space Reduction", *Phys. Rev. Lett.* **80**, 2661 (1998)
74. J. Bonca, J.E. Gubernatis, M. Guerrero, Eric Jeckelmann, and Steven R. White, "Stripes in a three-chain Hubbard ladder: a comparison of density-matrix renormalization group and constrained-path Monte Carlo results", *Phys. Rev.* **B61**, 3251 (2000).
75. Steven R. White and D.J. Scalapino, "Energetics of Domain Walls in the 2D  $t$ - $J$  model" *Phys. Rev. Lett.* **81**, 3227 (1998)
76. D.J. Scalapino and Steven R. White, "Superconducting condensation energy and an antiferromagnetic exchange-based pairing mechanism", *Phys. Rev.* **B58**, 8222 (1998).
77. Eric Jeckelmann, D.J. Scalapino, and Steven R. White, "Comparison of different ladder models", *Phys. Rev.* **B58**, 9492 (1998).
78. Steven R. White, "Strongly correlated electron systems and the density matrix renormalization group", *Physics Reports* **301**, 187 (1998). (Lectures from "Fundamental Problems in Statistical Mechanics. 9th International Summerschool, Altenberg, Germany, 15-29 Aug. 1997.)
79. Steven R. White and R. L. Martin, "Ab initio quantum chemistry using the density matrix renormalization group", *J. Chem. Phys.* **110**, 4127 (1999).
80. G. Sierra, M.A. Martin-Delgado, S.R. White, D.J. Scalapino, J. Dukelsky, "Diagonal ladders: A class of models for strongly coupled electron systems", *Phys. Rev.* **B59**, 7973 (1999).
81. Chunli Zhang, Eric Jeckelmann, Steven R. White, "Dynamical properties of the one-dimensional Holstein model," *Phys. Rev.* **B60**, 14092 (1999).
82. Eric Jeckelmann, Chunli Zhang, and Steven R. White, "Metal-insulator transition in the one-dimensional Holstein model at half filling," *Phys. Rev.* **B60**, 7950 (1999).
83. Steven R. White and D.J. Scalapino, "Competition between stripes and pairing in a  $t$ - $t'$ - $J$  model," *Phys. Rev.* **B60**, R753 (1999).

84. Till D. Kühner and Steven R. White, “Dynamical correlation functions using the density matrix renormalization group,” *Phys. Rev.* **B60**, 335 (1999).
85. Steven R. White, “How It All Began: A personal Account”, in *Density-Matrix Renormalization: A New Numerical Method in Physics*, Eds. I. Peschel, X. Wang, M. Kaulke, and K. Hallberg, (Springer Verlag, Heidelberg, Berlin, 1999), p. IX-XVI.
86. R.M. Noack and Steven R. White, “The Density Matrix Renormalization Group”, in *Density-Matrix Renormalization: A New Numerical Method in Physics*, Eds. I. Peschel, X. Wang, M. Kaulke, and K. Hallberg, (Springer Verlag, Heidelberg, Berlin, 1999), p. 27-66.
87. Eric Jeckelmann, Chunli Zhang, and Steven R. White, “Density-Matrix Methods for Electron-Phonon Systems”, in *Density-Matrix Renormalization: A New Numerical Method in Physics*, Eds. I. Peschel, X. Wang, M. Kaulke, and K. Hallberg, (Springer Verlag, Heidelberg, Berlin, 1999), p. 337-344.
88. Steven R. White, “Electronic Structure using DMRG”, in *Density-Matrix Renormalization: A New Numerical Method in Physics*, Eds. I. Peschel, X. Wang, M. Kaulke, and K. Hallberg, (Springer Verlag, Heidelberg, Berlin, 1999), p. 237-246.
89. Till D. Kühner, Steven R. White, and H. Monien, “One-dimensional Bose-Hubbard Model with nearest-neighbor interaction”, *Phys. Rev.* **B61**, 12474 (2000).
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91. Steven R. White and D.J. Scalapino, “Phase separation and stripe formation in the 2D  $t-J$  model: a comparison of numerical results”, *Phys. Rev.* **B61**, 6320 (2000).
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93. Stefan Rommer, Steven R. White and D.J. Scalapino, “Phase separation in t-J ladders”, *Phys. Rev. B* **61**, 13424 (2000).
94. S. Daul, D. J. Scalapino, and Steven R. White “Effect of the W term for a t-U-W Hubbard ladder”, *Phys. Rev. B* **61**, 15526 (2000).
95. S. Daul, I. Ciofini, C. Daul, and Steven R. White, “Full-CI Quantum Chemistry Using the Density Matrix Renormalization Group”, *International Journal of Quantum Chemistry* **79**, 331(2000).
96. Steven R. White and Rajiv R.P. Singh, “Comment on ‘Kagome Lattice Antiferromagnet Stripped to its Basics’”, *Phys. Rev. Lett.* **85**, 3330 (2000).
97. D. Poilblanc, O. Chiappa, J. Riera, S. R. White, and D. J. Scalapino, “Evolution of the spin gap upon doping a 2-leg ladder”, *Phys. Rev. B* **62**, R14633 (2000).
98. D.J. Scalapino and Steven R. White, “n-leg ladders:  $d_{x^2-y^2}$  pairing and striped domain walls,” *Physica C* **341**, 367 (2000).
99. Steven R. White and D.J. Scalapino, “Why do stripes form in doped antiferromagnets and what is their relationship to superconductivity?”, submitted to *Comments in Condensed Matter Physics*.
100. Steven R. White and D.J. Scalapino, “DMRG Studies of Stripes and Pairing in the t-J Model”, in *Open Problems in Strongly Correlated Electron Systems*, Eds. J. Bonca, P. Prelovsek, A. Ramsak, and S. Sarkar, (Kluwer, Dordrecht, 2001), p. 141-150.
101. Thomas Siller, Matthias Troyer, T.M. Rice, and Steven R. White, “A Bosonic model of hole pairs”, *Phys. Rev. B* **63**, 195106 (2001).
102. D.J. Scalapino and Steven R. White, “Numerical results for the Hubbard model: Implications for the high T-c pairing mechanism”, *Found. Phys.* **31**, 27 (2001).
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112. Steven R. White and D.J. Scalapino, "Stripes on a 6-leg Hubbard ladder", *Phys. Rev. Lett.* 91, 136403 (2003).
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69.	464
62.	442
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150.	394
16.	326
28.	294
36.	287
89.	274
50.	255
20.	243
75.	219
12.	219
64.	204
79.	199
84.	191
15.	185
72.	184
30.	174
8.	160
6.	142
51.	133
65.	126
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