

# Biographical Data - Louis H. Kauffman

## 1 Education

1. Ph.D., Princeton University, 1972 (Advisor - William Browder)
2. B.S., Massachusetts Institute of Technology, 1966

## 2 Employment and Teaching

1. July 18 to July 31, 2010, Visiting Researcher (in program for research in pairs with Sofia Lambropoulou) at MFO - Mathematisches Research Institute Oberwolfach.
2. July 15-17, 2010, Visiting Researcher at Kavli Institute, UK.
3. June 6 - 11, 2010, Visiting Researcher at Institute Dagstuhl Germany.
4. June 14 - 21, 2009, Visiting Researcher at NTUA - National Technical University Athens
5. June 1 - 13, 2009, Visiting Research (in program for research in pairs with Vassily Manturov) at MFO - Mathematisches Research Institute Oberwolfach.
6. May 2009, Director of Summer School and Conference on Knot Theory, The International Center for Theoretical Physics in Trieste, May 11 - May 29, 2009.
7. July 2008, Visiting Researcher, Instituto Superior Tecnico (IST) Lisbon.

8. July 2008, Visiting Researcher, Max Planck Institute, Leipzig, Germany
9. June 2008, Visiting Researcher, National Technical University, Athens, Greece
10. May 2008, Visiting Researcher, Mathematisches Institut, Oberwolfach, Germany
11. August 8-24, 2007 Visiting Lecturer in The 17th Jyväskylä Summer School, Jyväskylä, Finland.
12. July 7-18, 2007, Visiting Researcher at Univ de Pernambuco, Recife, Brazil.
13. May 29 to June 13, 2006. Visiting Researcher at NTUA, Athens, Greece.
14. May 13 to May 26, 2007 Visiting Researcher ICTP, Trieste.
15. January 2-14, 2007 Visiting Researcher at Univ de Pernambuco, Recife, Brazil.
16. December 10-15, 2006, Visiting Researcher at Perimeter Institute, Waterloo Canada.
17. October 24 to November 3, 2006. Visiting Researcher at NTUA, Athens, Greece.
18. June 10 to June 23, 2006 Visiting Researcher at NTUA, Athens, Greece.
19. May 31 to June 10, 2006 Visiting Researcher at Instituto Superior Técnico, Lisbon, Portugal.
20. May 14 to May 27, 2006, Visiting Researcher (Research in Pairs with V. Manturov) at Oberwolfach Institute.
21. December 2005, Visiting Researcher, NTUA, Athens.
22. July 2 to July 22, 2005, Visiting Researcher, ISI, Torino.
23. May 2005, Visiting Researcher, Independent University, Moscow.

24. May 14 to May 27, 2005, Visiting Researcher (Research in Pairs with S. Lambropoulou) at Oberwolfach Institute.
25. December 2004, Visiting Researcher, ISI, Torino
26. December 2004, Visiting Researcher, Universite Littoral, Calais, France
27. November 2004 and December 2004, Visiting Researcher, Newton Institute, Cambridge, England
28. October 2004, Visiting Professor Academia Sinica, Taiwan
29. October 2004, Visiting Professor Nankai Institute, Tianjin, China
30. May 2004, Visiting Professor IUM, Moscow, Russia
31. May 2004, Visiting Professor Universite de Caen, Caen, France
32. September 2003 - August 2004, Visiting Professor, University of Waterloo and Perimeter Institute for Theoretical Physics, Waterloo, Canada.
33. January 2002 - July 2002, Visiting Professor, Stanford University and SLAC Physics Theory Group, Stanford, CA.
34. August 2001 - Visiting Researcher, NCTS - National Center for Theoretical Sciences, National Tsing-Hua University Hsinchu, Taiwan.
35. July 2001 - Visiting Lecturer, SUNY Potsdam - NSF Undergraduate Research Program.
36. June 2001 - Visiting Researcher National Technical University, Athens, Greece.
37. Fall 2000 - Visiting Researcher at Newton Institute, Cambridge, UK
38. August 2000 - Visiting Researcher National Technical University, Athens, Greece.
39. August 2000 - Visiting Researcher, Academia Sinica, Taipei, Taiwan and National Center for Theoretical Sciences, Hsinchu, Taipei.

40. June and July 2000 - Visiting Professor, State University of New York at Potsdam, Potsdam, New York.
41. June 2000 - Visiting Lecturer, University of Pisa, Pisa Italy
42. December 1999 - Visiting Professor, Mathematics Dept., Univ. Littoral, Calais, France.
43. July 1999 - Visiting Researcher, Institute for Theoretical Physics, Academia Sinica, Taipei, Taiwan and Physics Institute, National Tsing Wa University, Hsinching, Taiwan
44. June 1999 - Visiting Researcher, Institute for Theoretical Physics, University of California at Santa Barbara
45. October-November 1998 - Visiting Researcher at Mittag-Leffler Institute, Djursholm, Sweden
46. August 1998 - Visiting Researcher Physics Dept. Frei Universitat, Berlin, Gemany
47. Fall 1997 - Visiting Professor at Institut Henri Poincare, Paris, France.
48. Summer 1997 - Visiting Professor at the University of Queensland, Brisbane, Australia.
49. Summer 1996- Visiting Lecturer at Centre de Recerca Mathematica, Bellaterra, Spain, July 1996.
50. Summer 1995 - Visiting Professor at Univ. de Pernambuco, Recife, Brasil.
51. Fall 1993 - Visiting Professor at University College, Swansea, Wales.
52. Summer 1992 - Member of the Isaac Newton Institute for Mathematical Sciences, Cambridge, England
53. Summer 1992 - Visiting Professor at the Univ. de Pernambuco, Recife, Brasil.
54. Fall 1991 - Member of the Research Institute for Mathematical Sciences (RIMS), Kyoto Univ., Kyoto, Japan.

55. Spring 1991 - Member, MSRI-Berkeley, CA.
56. Dec. 1990 - Visiting Professor at the Steklov Institute, Leningrad, USSR
57. Winter 1989 - Member, MSRI-Berkeley, CA.
58. 1988-1989 - Visiting Professor, IHES-Bures Sur Yvette, France.
59. Summer 1987 - Visiting Professor , Univ. de Pernambuco, Recife, Brasil
60. W/Fall 1986 - Visiting Professor, Univ. of Iowa, Iowa City, Iowa.
61. Fall 1985 - Visiting Professor, ISI and Univ Politecnico, Torino, Italy.
62. Fall 1985 - Visiting Professor, Univ. di Bologna, Bologna, Italy.
63. Winter 1984- Visiting Professor, Univ. de Zaragoza, Zaragoza, Spain.
64. Summer 1980-81 - Visiting Lecturer, Naropa Institute, Boulder, Colorado.
65. 1976-1977 - Visiting Professor, Univ. of Michigan, Ann Arbor, Michigan.
66. Summers 1973,1975,1978,1980-82 - Visiting Scholar, Univ. of Calif. at Berkeley.
67. 1984-1987 - Visiting Professor (five courses over this period) School of the Art Institute, Chicago, Ill.
68. 1984-85,1989 - Lecturer , Adler Planetarium, Chicago, Illinois.
69. 1985-present Professor , Univ. of Illinois at Chicago.
70. 1977-1985 - Associate Professor, Univ. of Illinois at Chicago.
71. 1971-1977 - Assistant Professor , Univ. of Illinois at Chicago.
72. 1969-1970 - Teaching Assistant, Princeton Univ., Princeton, New Jersey.

### 3 Professional Honors

1. Woodrow Wilson Fellow (Honorary), 1968
2. National Science Foundation Fellow, 1966-1969
3. Princeton National Fellow, 1966-1969
4. Lester R. Ford Award of the Mathematical Association of America (1978) in expository writing for the article "Immersion and Mod-2 Quadratic Forms" (American Mathematical Monthly 84, (1977), pp. 168-185).
5. Speaker in AMS Short Course on Knot Theory and Natural Science, AMS Meeting, Baltimore, Maryland, January 1992.
6. Invited hour address at AMS meeting, Dayton, Ohio, November 1992.
7. Warren McCulloch Memorial Award for Outstanding Contributions to the Field of Cybernetics - 1993 (awarded by the American Society for Cybernetics)
8. University Scholar Award - University of Illinois at Chicago, 1993-1996.
9. Visiting Lecturer, The Fifth William J. Spencer Lecture, Kansas State University, Manhattan, Kansas, March 8, 1994.
10. Invited Hour Address at AMS Meeting in Mexico, October 1994.
11. Invited Lecturer-"The Porcelli Lectures", Louisiana State University, Oct. 5-9, 1995.
12. Organizer and Speaker in AMS Short Course - The Interface of Knots and Physics - San Francisco, January 1995.
13. Recipient of the Alternative Natural Philosophy Association Award for 1996.
14. Invited Lecturer -"Poincare Lectures" Fields Institute, Toronto, April 8-9, 1996.

15. Invited Lecturer- "33rd KAM Lecture" Charles University, Prague, March 1999.
16. Speaker in AMS Short Course on Quantum Computing - Washington, D.C., January 2000.
17. Winner of best Conference Paper with "Time imaginary value, paradox sign and space" in Computing Anticipatory Systems, CASYS - Fifth International Conference, Liege, Belgium (2001) ed. by Daniel Dubois, AIP Conference Proceedings Volume 627 (2002).
18. Kent Nagle Lecturer, University of South Florida, February 15-19,2006.
19. Heinz von Foerster Lecture, University of Vienna, Austria, November 11-14, 2006.
20. James Simons Lecturer, University of the State of New York at Stony Brook, November 16-22, 2006.
21. MAA Polya Lecturer, 2008 - 2010.

## 4 Professional Organizations

Member of

1. AMS
2. MAA
3. Sigma Xi
4. American Society for Cybernetics, (President, 2005 - 2008).

## 5 Editorships

1. Editor-in-Chief and Founding Editor, Journal of Knot Theory and its Ramifications, World Scientific Publishers (1991- present)

2. Editor of Book Series on Knots and Everything, World Scientific Publishers (1991- present)
3. Associate Editor Annals of Combinatorics
4. Member, Editorial Board of the Journal – Cybernetics and Human Knowing , 1995- present (Kauffman also writes a column for this journal entitled "Virtual Logic")

## 6 Grant Support

1. NSF Grant GP 28487 (V. Guggenheim, PI), 1971-1972
2. NSF Grant MPS 73-088855-A02, 1975-1978
3. NSF Grant DMS-8701772, 1987-1989
4. NSF Grant DMS-8822602, 1989-1991
5. NSF Grant DMS-9205277, 1992-1994
6. NSF Grant DMS-2528707, 1995-1998
7. NSF Grant DMS-9802859, 1998-2001
8. Subcontract - Program in Mathematics and Molecular Biology, University of California at Berkeley, Berkeley, Calif. (1989-present)
9. UIC University Scholar Grant 1994-1997.
10. NSA Grant -Knots and Graphs- MDA904-97-1-0015, 1997-1999
11. CoPI - Quantum Computing - Darpa Grant , 2001 - 2005.
12. 2003-2006 NSF Grant DMS-0245588 (Virtual Knot Theory)
13. 2009-20010 NSF Award DMS-0925541 (Travel Support for ICTP Conference)

## 7 Selected Publications

### 7.1 Papers

1. Scattering of electromagnetic waves from two concentric spheres when the outer shell has a variable refractive index. (with M. Kerker and W. Farone), *Journal of the Optical Society of America*. 56 (1966), 1053-1056.
2. Cyclic branched coverings and  $0(n)$ -manifolds. *Proceedings of the Second Conference on Compact Transformation Groups (Univ. Massachusetts, Amherst, Mass., 1971), Part I*, pp. 416–429. *Lecture Notes in Math.*, Vol. 298, Springer, Berlin, 1972.
3. An invariant of link concordance. *Proc. Topology Conf. Virginia Polytech. Inst. and State Univ.*, ed. by Raymond R. Dickman Jr. and Peter Fletcher, *Lecture Notes in Math.*, Vol. 375, Springer Verlag, Berlin, 1973, pp. 153-157.
4. Link manifolds and periodicity. *Bull. Amer. Math. Soc.* 79 (1973), 570–573.
5. Link manifolds. *Michigan Math. J.* 21 (1974), 33–44.
6. Products of knots. *Bull. Amer. Math. Soc.* 80 (1974), 1104–1107.
7. An invariant of link concordance. *Topology Conference (Virginia Polytech. Inst. and State Univ., Blacksburg, Va., 1973)*, pp. 153–157. *Lecture Notes in Math.*, Vol. 375, Springer, Berlin, 1974.
8. Branched coverings, open books and knot periodicity. *Topology* 13 (1974), 143–160.
9. Periodicity of branched cyclic covers. (with Alan Durfee) *Math. Ann.* 218 (1975), no. 2, 157–174.
10. Signature of links. (with L. Taylor) *Trans. Amer. Math. Soc.* 216 (1976), 351–365.
11. Differential geometry of the torus and torus knots. (with Steve Jordan) *Delta (Waukesha)* 6 (1976), no. 1, 1–15.

12. A central example seminar. (with Steve Jordan) *Internat. J. Math. Ed. Sci. Tech.* 7 (1976), 351-365.
13. Immersions and mod-2 quadratic forms. (with Tom Banchoff) *Amer. Math. Monthly* 84 (1977), no. 3, 168–188.
14. Products of knots, branched fibrations and sums of singularities. (with Walter Neumann) *Topology* 16 (1977), no. 4, 369–393.
15. Signature of branched fibrations. *Knot theory (Proc. Sem., Plans-sur-Bex, 1977)*, pp. 203–217, *Lecture Notes in Math.*, 685, Springer, Berlin, 1978.
16. Twist spinning revisited. (with Deborah Goldsmith) *Trans. Amer. Math. Soc.* 239 (1978), 229–251.
17. Weaving patterns and polynomials. *Topology Symposium, Siegen 1979 (Proc. Sympos., Univ. Siegen, Siegen, 1979)*, pp. 88–97, *Lecture Notes in Math.*, 788, Springer, Berlin, 1980.
18. Planar surface immersions. *Illinois J. Math.* 23 (1979), no. 4, 648–665.
19. The Conway polynomial. *Topology* 20 (1981), no. 1, 101–108.
20. Levine’s theorem - a remark. *Low-Dimensional Topology (Bangor, 1979)*, pp. 67–69, *London Math. Soc. Lecture Note Ser.*, 48, Cambridge Univ. Press, Cambridge-New York, 1982.
21. The Arf invariant of classical knots. *Combinatorial methods in topology and algebraic geometry (Rochester, N.Y., 1982)*, 101–116, *Contemp. Math.*, 44, Amer. Math. Soc., Providence, R.I.
22. Combinatorics and knot theory. *Low-dimensional topology (San Francisco, Calif., 1981)*, 181–200, *Contemp. Math.*, 20, Amer. Math. Soc., Providence, R.I., 1983.
23. Transformations in special relativity. *Intl. J. Theo. Phys.* 24 (1985), 223–236.
24. State Models and the Jones Polynomial, *Topology* 26 (1987), pp. 395-407.

25. New invariants in the theory of knots. *Asterisque* Vol. 163-164 (1988) 137 - 219 and *Amer. Math. Monthly* Vol. 95, No. 3. March (1988) 195-242.
26. Statistical Mechanics and the Jones Polynomial, In *Braids, Contemp. Math. Pub.* 78, American Mathematical Society (1988), pp. 263-297.
27. (with J. Hart and D. Sandin) Ray tracing deterministic 3-D fractals. In *Proceedings of SIGGRAPH* (1989).
28. Polynomial invariants in knot theory. Braid group, knot theory and statistical mechanics, 27-58, *Adv. Ser. Math. Phys.*, 9, World Sci. Publishing, Teaneck, NJ, 1989.
29. A Tutte Polynomial for signed graphs. *Discrete Appl. Math.* 25 (1989) no. 1-2, pp. 105-127.
30. An invariant of regular isotopy, *Trans. AMS* 318, No. 2 (1990), pp. 417-471.
31. Invariants of graphs in three-space. *Trans. AMS* 311, No. 2, Feb. 1989, 697-710.
32. Problems in knot theory. *Open problems in topology*, 487-522, North-Holland, Amsterdam, 1990.
33. Statistical mechanics and the Jones polynomial. *New problems, methods and techniques in quantum field theory and statistical mechanics*, 175-209, *Ser. Adv. Statist. Mech.*, 6, World Sci. Publishing, River Edge, NJ, 1990.
34. Spin networks and knot polynomials, *Intl. J. Mod. Phys. A*, Vol. 5, No. 1, (1990), pp. 93-115.
35.  $SL(2)_q$  - Spin Networks. *Twistor Newsletter* #32, pp. 10-14. (March 1991).
36. Map coloring and the vector cross product. *J. Comb. Theo. B*, vol. 48, no.2, April 1990, p. 145-154.

37. Knots, Spin Networks and 3-Manifold Invariants. In Knots 90. ed. by A. Kawauchi. Pub. W. de Gruyter. 1992. pp. 271-287.
38. (with S. Lins) A 3-manifold invariant by state summation. (announcement 1991).
39. (with H. Saleur) Free fermions and the Alexander-Conway polynomial. Comm. Math. Phys. 141, 293-327 (1991).
40. (with P. Vogel) Link polynomials and a graphical calculus. J. Knot Theo. and Ramif. , Vol 1, #1, p. 59-104. (1992)
41. Map Coloring, q-Deformed Spin Networks, and Turaev-Viro Invariants for 3-Manifolds. Intl. J. Mod. Phys. B, Vol. 6, Nos. 11, 12 (1992), p. 1765-1794.
42. Knots and physics. article in book - New Scientific Applications of Geometry and Topology. Proceedings of Symposia in Applied Mathematics, Vol. 45. edited by D.W.Sumners. AMS Pub. (1992), p. 131-246.
43. (with H. Saleur) An algebraic approach to the planar coloring problem. Comm. Math. Phys., 150, pp. 1-26 (1993).
44. (with F. Jaeger and H. Saleur). The Conway polynomial in  $R^3$  and Thickened Surfaces - A new determinant formula. ( in J. Comb. Theory 1994)
45. (with D. Radford) A necessary and sufficient condition for a finite-dimensional Drinfeld double to be a ribbon Hopf algebra. (in the J. of Algebra).
46. (with J. Simon, K. Wolcott, P. Zhao) Invariants of theta-curves and other graphs in 3-space. Topology and its Applications 49 (1993), 193-216.
47. (with J. Goldman). Knots tangles and electrical networks. ( Advances in Applied Mathematics 14, 267-306 (1993))

48. From knots to quantum groups (and back). In Proceedings of the CRM Workshop on Hamiltonian Systems, Transformation Groups and Spectral Transform Methods. ed. by J.Harnad and J.E. Marsden. Les Publications CRM (1990). pp. 161-176. Expanded version in the book Quantum Groups, edited by T. Curtright, D. Fairlie and C. Zachos., World Sci. (1991).
49. (with C. Anezeris, A.P. Balachandran and A.M. Srivastava). Novel statistics for strings and string 'Chern Simons' terms. Int. J. Mod. Phys. A, Vol. 6, No. 14 (1991), pp. 2519-2558.
50. Spin Networks, Topology and Discrete Physics. ( in the second edition of "Braid Group, Knot Theory and Statistical Mechanics" ed. by Yang and Ge, World Sci. Pub. (1994))
51. Gauss Codes , Quantum Groups and Ribbon Hopf algebras, Reviews in Mathematical Physics, Vol. 5, No.4 (1993), 735-773.
52. (with D. Radford) Invariants of 3-manifolds derived from finite dimensional Hopf algebras. Journal of Knot Theory and its Ramifications, Vol.4, No. 1 (1995), pp. 131-162.
53. (with R. Baadhio). Link manifolds and global gravitational anomalies. Reviews in Mathematical Physics, Vol. 5, No. 2 (1993), 331-343.
54. (with L. Crane and D. Yetter). Evaluating the Crane-Yetter invariant. (In Quantum Topology, ed. by Kauffman and Baadhio), pp. 131-138.
55. Introduction to quantum topology. In Quantum Topology, ed. by Kauffman and Baadhio. World Sci. Pub. (1993), pp. 1-77.
56. (with S. Lins). Computing Turaev-Viro invariants for 3-manifolds. Manuscripta Math. 72, pp. 81-94 (1991).
57. (with G.K.Francis). Air on the Dirac Strings (in the proceedings of the conference held in honor of Wilhelm Magnus - 1992) AMS Contemporary Mathematics Series No. 169 (1994), pp.261-276.
58. (with Y. Margarshak) Vassiliev Invariants and a Proposal for the Study of RNA Structure . In Knots and Applications - ed. by L.Kauffman, World Sci. Pub. (1994),

59. (with Y. Magarshak). Graph invariants and the topology of RNA folding. *Journal of Knot Theory and its Ramifications*, Vol3,No.3, pp. 233-246.
60. Knot Logic. In *Knots and Applications* ed. by L. Kauffman, World Scientific Pub. (1994), pp. 1-110.
61. Vassiliev Invariants and the loop states of quantum gravity. In the *Proceedings of the Quantum Gravity Conference held at Univ. of Calif. at Riverside, May 1993 - "Knots and Quantum Gravity"*, ed. by John Baez, Oxford University Press. (1994) ,pp. 77-95.
62. Space and time in computation, topology and discrete physics, In "*Proceedings of the Workshop on Physics and Computation - PhysComp '94*, Nov. 1994, Dallas, Texas. IEEE Computer Society Press, pp. 44-53.
63. Functional Integration and the Theory of Knots. *Journal of Mathematical Physics*, Vol. 36 (5), May 1995, pp. 2402-2429.
64. On Finiteness of Certain Vassiliev Invariants, (with Masahico Saito and Steve Sawin), *Journal of Knot Theory and Its Ramifications*, Vol. 6, No. 2 (1997), pp. 291-297.
65. Discrete Physics and the Derivation of Electromagnetism from the Formalism of Quantum Mechanics, (with H. P. Noyes) , *Proceedings of the Royal Soc. London A*, Vol. 452 (1996), pp. 81-95.
66. Quantum Electrodynamic Birdtracks. *Twistor Newsletter* No. 41. (1996)
67. Hopf algebras and invariants of 3-manifolds. *Journal of Pure and Applied Algebra*, Vol. 100 (1995), pp. 73-92.
68. Knots and complex systems. In *Complex Systems and Binary Networks*, ed. by Waelbroeck et al., Springer-Verlag (1995), pp. 33-76.
69. Discrete physics and the Dirac equation (with H. P. Noyes), *Physics Lett. A*, No. 218 (1996), pp. 139-146.

70. Tangle complexity and the topology of the Chinese rings. in "Mathematical Approaches to Biomolecular Structure and Dynamics" edit. by Mesirov, Shulten and Sumners. IMA Volume 82, Springer Verlag (1996).
71. Knot Theory and Statistical Mechanics, International Journal of Modern Physics B, Vol. 11, Nos. 1,2 (1997), pp. 39-49.
72. Noncommutativity and discrete physics. - announcement in "PhysComp96- Proceedings of the Fourth Workshop on Physics and Computation, Boston University, 22-24 Nov. 1996." edited by Toffoli and Biafore, New England Complex Systems Institute Pub.(1996). (to appear in Physica D: Nonlinear Phenomena, Elsevier Pub.)
73. Invariants of links and 3-manifolds via Hopf algebras. in the Proceedings of the Conference on Geometry and Topology - Aarhus - Summer 1995, Marcel Dekker Pub. 1996.
74. State Sum Invariants of 4-Manifolds (with L. Crane and D. Yetter) - Journal of Knot Theory and Its Ramifications, Vol.6 No. 2 (April 1997), pp. 177-234.
75. Rational Tangles. (with Jay Goldman), Advances in Applied Math. , Vol. 18, (1997), pp. 300-332.
76. Knots and Electricity. In the Proceedings of Knots '96 (Tokyo), World Sci. Pub.,1997. pp. 213 - 230.
77. Knots and Diagrams. In Lectures at Knots '96 (Tokyo) ed. by S. Suzuki, World Sci. Pub. (1997), pp. 123-194.
78. Functional Integration and the Theory of Knots. pp. 2402 - 2429. J. Math. Physics. May 1995. Vol 36 No. 5. Special Issue on Functional Integration. Amer. Inst. of Physics. Special Editor Cecile DeWitt Morette.
79. An Introduction to Knot Theory and Functional Integrals. In Functional Integration - Basics and Applications. edited by C. DeWitt Morette and Pierre Cartier and Antoine Folacci. Nato ASI Series B: Physics Vol. 361. Plenum Press. pp. 247 - 308. (1997)

80. Hypercomplex Fractal Distance Estimation. (with Yumei Dang) In the proceedings of "Fractal '97 - Fourth International Working Conference, April 8-11, Denver, Colorado, USA. "Fractal Frontiers" ed. by Novak and Dewey, World Scientific (1997). pp. 117-130.
81. Untangling knots by stochastic energy optimization (with Milana Huang and Robert Grezewszczyk) - In Proceedings of IEEE Conference on Visualization, (1996), pp. 279-286.
82. Self-repelling knots and local energy minima. (with Milana Huang and Robert Grezewszczyk) Topology and geometry in polymer science (Minneapolis, MN, 1996), 29–36, IMA Vol. Math. Appl., 103, Springer, New York, 1998.
83. Diagrammatics, Singularities and Their Algebraic Interpretations. (with Scott Carter and Masahico Saito) - Lecture Notes. 10-th Brazilian Topology Meeting, Sao Carlos, July 22-26, 1996, Mat. Contemp. 13 (1997) pp. 21-115.
84. An elementary proof that all spanning surfaces of a link are tube-equivalent.(with Dror Bar-Natan and Jason Fulman) J. Knot Theory Ramifications 7 (1998), no. 7, 873–879.
85. Centrality and the KRH invariant. (with David Radford and Steve Sawin) J. Knot Theory Ramifications 7 (1998), no. 5, 571–624.
86. Spin networks and topology. The geometric universe (Oxford, 1996), 277–289, Oxford Univ. Press, Oxford, 1998.
87. Spin networks and the bracket polynomial. Knot theory (Warsaw, 1995), 187–204, Banach Center Publ., 42, Polish Acad. Sci., Warsaw, 1998.
88. Diagrammatics, singularities, and their algebraic interpretations. (with Scott Carter and Masahico Saito) 10th Brazilian Topology Meeting (Sao Carlos, 1996). Mat. Contemp. 13 (1997), 21–115.
89. Statistical Mechanics and Knot Theory - In "Knot Theory and Its Applications – Special Issue of Chaos Solitons and Fractals edited by

- C. Adams and M. Nasche, Vol. 9, Number 4/5, April/May (1998), pp. 599-621.
90. Quantum Algebra Structures on  $n \times n$  Matrices. (with David Radford) Journal of Algebra. Vol 213, (1999). pp. 405 - 436.
  91. Witten's Integral and the Kontsevich Integral. in "Particles Fields and Gravitation" edited by Jakub Remblelinski – Published by the American Institute of Physics (1998). pp. 368 - 381.
  92. Noncommutativity and Discrete Physics, Physica D 120 (1998), pp. 125 - 138.
  93. Space and time in computation and discrete physics, Intl. J. Gen. Systems , Vol. 27, Nos 1-3 (1998), pp. 249 -273.
  94. Hearst, John E., Kauffman, Louis H. and McClain, W. Martin. A simple mechanism for the avoidance of entanglement during chromosome replication. Trends in Genetics, June 1998, Vol. 14, No. 6, pp. 244-247.
  95. Fourier Knots. (in the book "Ideal Knots" edited by Stasiak, Katrich and Kauffman, World Sci. Pub. 1998, pp. 364-373)
  96. Virtual Knot Theory , European J. Comb. (1999) Vol. 20, 663-690.
  97. Functional Integration and the Kontsevich Integral. In the Proceedings of the APCTP-Nankai Symposium on Yang-Baxter Systems, Non-Linear Models and their Applicatons. This conference was held in Seoul, Korea in October 1998.
  98. Quantum algebra structures on  $n \times n$  matrices, (with D. Radford) Journal of Algebra Vol. 213, pp. 405-436 (1999).
  99. Combinatorics and Topology - Francois Jaeger's Work in Knot Theory Annales de L'Institut Fourier Universite Joseph Fourier, Grenoble, Tome 49(1999)-Faisicule 3, 927-953.
  100. On the Links-Gould Invariant of Links(with D. De Witt and J. Links) , JKTR, Vol. 8, No. 2 (1999), 165-199.

101. Structures and Diagrammatics of Four Dimensional Topological Lattice Field Theories(with S. Carter and M. Saito), *Advances in Math.* Vol. 146 (1999), 39-100.
102. Knots and Graphs I - Arc Graphs and Colorings (with F. Harary), *Advances in Applied Math.* Vol. 22 (1999), 312-337.
103. Nodi e Fisica, *Enciclopedia Italiana* (1999), 450-462.
104. Right Integrals and Invariants of Three-Manifolds, *Proceedings of Conference in Honor of Robion Kirby's 60th Birthday, Geometry and Topology Monographs*, Vol. 2, 215-232.
105. A Survey of Virtual Knot Theory in "Proceedings of Knots in Hellas '98", *World Sci. Pub.* 2000 , pp. 143-202.
106. Path Integrals and Discrete Physics , in *Aspects I in Proceedings of ANPA 19*, Keith Bowden Editor, pp. 33-40.
107. Louis H. Kauffman and David E. Radford, A Separation Result for Quantum Coalgebras with an Application to Pointed Quantum Coalgebras of Small Dimension, *J. of Algebra*, Vol. 225 (1999), 161-200.
108. On two proofs for the existence and uniqueness of integrals for finite-dimensional Hopf algebras (with D. Radford), *AMS Contemp. Math. Series*, Volume 267, (2000), 177-194.
109. (with David Radford) Quantum algebras, quantum coalgebras, invariants of 1-1 tangles and knots. *Comm. Algebra 28* (2000), no. 11, 5101-5156.
110. Knot theory and the heuristics of functional integration. *Physica A* 281 (2000) 173-200.
111. On the Map Theorem. *Discrete Math.* 229 (2001) 171-184.
112. Functional Integration, Kontsevich Integral and Formal Integration. *J. Korean Math. Soc.* 38 (2001), No. 2, pp. 437-468.

113. Louis H. Kauffman, An introduction to knot theory. in "An Introduction to the Geometry and Topology of Fluid Flows" ed. by Renzo Ricca, pp. 77-104. (2001) Kluwer Pub.
114. Louis H. Kauffman and David E. Radford. Oriented quantum algebras and invariants of knots and links. *Journal of Algebra* 246, pp. 253-291 (2001).
115. Louis H. Kauffman and David E. Radford. Oriented quantum algebras, categories and invariants of knots and links. *JKTR*, Vol. 10, No. 7 (2001), pp. 1047-1084.
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### 7.3 Papers Submitted

1. (with Kumud Bhandari, H. A. Dye) Lower bounds on virtual crossing number and minimal surface genus. (submitted to proceedings of Heidelberg Conference on Topology, December 2008). (to appear)
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3. An Upper Bound on the Number of Reidemeister Moves Required to Unknot an Unknot. Allison Henrich, Louis H. Kauffman. math.GT. arXiv:1006.4176
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6. arXiv:1003.5426 Quantum Algorithms for the Jones Polynomial. Louis H. Kauffman, Samuel J. Lomonaco Jr. math.GT.
7. arXiv:1001.0354 Topological Quantum Information, Khovanov Homology and the Jones Polynomial. Louis H. Kauffman. math.GT (physics.math-ph).
8. arXiv:0910.5891 Quantum Knots and Lattices, or a Blueprint for Quantum Systems that Do Rope Tricks. Samuel J. Lomonaco, Louis H. Kauffman. physics.quant-ph.
9. arXiv:0909.1672 Anyonic Topological Quantum Computation and the Virtual Braid Group. H. A. Dye, Louis H. Kauffman. physics.quant-ph (math.GT).
10. arXiv:0909.1080 NMR Quantum Calculations of the Jones Polynomial. Raimund Marx, Amr Fahmy, Louis Kauffman, Samuel Lomonaco, Andreas Sprl, Nikolas Pomplun, John Myers, Steffen J. Glaser. physics.quant-ph.
11. arXiv:0907.3178 Remarks on Khovanov Homology and the Potts Model. Louis H. Kauffman. math.GT (physics.math-ph).

## 7.4 A Selection of Papers In Preparation

1. Introduction to Virtual Knot Theory
2. Introduction to Khovanov Homology
3. What is a Knot Diagram?
4. A Categorical Model for the Virtual Braid Group (with Sofia Lambropoulou)
5. Rational collapses to knots and links (with Sofia Lambropoulou)
6. A Surgery Formulation of the Kuperberg Invariant (with Fernando Souza)
7. Jones Polynomials of Infinite Knots

8. Gap Migration and a possible role of knot dynamics in the process of RNA splicing. (with Yuri Magarshak)
9. Formal Implicate Automata (with G. Berkowitz)

## **7.5 A Selection of Books in Preparation**

1. “Virtual Knot Theory”.
2. “Topology, Knots and DNA”, monograph (with Sofia Lambropoulou), Cambridge University Press.
3. “Notes on Knots and Functional Integration” (to be published by the AMS)
4. “The Sarasota Hexalogue” (L. H. Kauffman - editor) (conference transcript)
5. “Low Dimensional Topology and Modern Physics”, monograph (with Sofia Lambropoulou), Verlag Walter de Gruyter.

## **7.6 Special Publications Related to Cybernetics**

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25. The Robbins Problem - Computer Proofs and Human Proofs, In Kybernetes - The International Journal of Systems and Cybernetics – Special Issue - Gordon Pask, remembered and celebrated: Part I, editors Bernard Scott and Ranulph Glanville, Vol. 30, No. 5/6 (2001), pp. 726-751.
26. (with Christina Weiss) Virtual logic - the key to Frege. Cybernetics and Human Knowing, Vol. 8, No. 4, 2001, 75-86.
27. Reflexivity and Eigenform – The Shape of Process. - Kybernetes, Vol 4. No. 3, July 2009.
28. Reflexivity, Eigenform and Foundations of Physics. In Reflexivity, Proceedings of ANPA 30, Arleta D. Ford, Editor , Published by ANPA, June 2010, pp. 158-222.

## 8 Teaching

1. Seminar on Quantum Topology (relationships among topology, quantum groups, field theory – emphasis on invariants of links and three manifolds): I organized this seminar in the fall of 1989. It ran successfully, with active participation from graduate students and faculty in our mathematics department, our physics department, and other universities (University of Chicago, Northwestern University, De Paul University). The present incarnation of this seminar is our joint seminar on quantum groups and topology, organized by myself and Dave Radford.
2. Graduate course on Topological Visualization spring 1991.
3. Graduate course on Knots and Quantum Groups, 1992,1994,1996. This is a course of my own design. It parallels the structure of my book Knots and Physics.
4. Extension course on Fractals and Recursive Forms, 1992.
5. Graduate course on Topological Quantum Field Theory, spring 1993, 1998.
6. Graduate course on Topological Visualization, spring 1994, spring 1997.
7. Graduate course on Knots, and Singularities of Complex Hypersurfaces, spring 1999.
8. Graduate courses on knot theory, spring 2000, spring 2001, spring 2003.
9. (2003-2004) One year graduate course on knot theory at the University of Waterloo, Waterloo, Canada.
10. (2006,2007,2008,2009) Graduate Courses in Knot Theory and Quantum Information, UIC.

## 9 Graduate Students

1. Wayne Zage, "Hyberbolic Geometry and the Luneberg Theory of the Binocular Visual Space", D.A. (1977) (co-advisor with D. Foulser).

2. Steven Winker, "Quandles, Knot Invariants and the n-fold Branched Cover" , Ph.D. - Univ. of Ill. at Chicago (PhD. 1984).
3. Randall Weiss, "Detecting Ribbon Knots", Ph.D. - Univ. of Ill. at Chicago (PH.D. 1987).
4. John Mathias (Ph.D. 1995)
5. Yumei Dang (Ph.D. 1996)
6. Advised Joanna Mason and Milana Huang (graduate students in the electronic visualization lab lab) on a joint project with myself and Dan Sandin about computer visualization of surfaces in 4-space. Mason received masters degree (4d visualization) in 1995. Huang received masters degree (knot energies) in 1996.
7. Advised Alan Verlo ( graduate student in the electronic visualization lab) in a joint project about computer visualization of deformations of surfaces. Verlo received masters degree in 1995.
8. Fernando Souza "On the three-manifold invariants derived from Hopf objects" (Ph.D. 2002)
9. David Hrencecin"On filamentations and virtual knot invariants" (Ph.D. 2001)
10. Heather Dye"Detection and characterization of virtual knot diagrams" (Ph.D. 2003)
11. Daniel Carillo (present Masters student)
12. Aaron Kaestner (present PhD student)

## 10 Co-authors

1. Milton Kerker, Clarkson Univ.
2. William Farone, Clarkson Univ.
3. Deborah Goldsmith, Univ. of Mich.

4. Alan Durfee, Smith College
5. Larry Taylor, Notre Dame
6. Pierre Vogel, Nanntes
7. Jay Goldman, Dept. of Mathematics, Univ. of Minn.
8. Sostenes Lins, Univ. de Pernambuco, Recife, Brasil
9. David Radford, Dept. of Mathematics, Univ. of Ill. at Chicago
10. Hubert Saleur, Dept. of Physics, Yale University
11. Jon Simon, Dept. of Mathematics, Univ. of Iowa, Iowa City, Iowa
12. Yuri Magarshak, Dept. of Biomathematical Sciences, Mt. Sinai, New York, New York.
13. Louis Crane, Dept. Mathematics, Kansas State University, Manhattan, Kansas
14. David Yetter, Dept. Mathematics, Kansas State University, Manhattan, Kansas
15. Dan Sandin, Electonic Visualization Laboratory, Univ. of Ill. at Chicago
16. John Hart, Electonic Visualization Laboratory, Univ. of Ill. at Chicago
17. George Francis, Dept. of Math., Univ. of Ill. at Chanpaign-Urbana
18. Pierre Noyes, Stanford Linear Accelerator, Standford, CA.
19. John Hearst, Univ. of Calif. at Berkeley
20. Milana Huang, Univ. of Ill. at Chicago
21. Robert Grzeszczuk, Univ. of Chicago
22. Yumei, Dang, Univ. of Ill. at Chicago
23. Frank Harary, New Mexico State University

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28. Masahico Saito, Univ. of South Florida
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32. Jason Fulman, Dartmouth College
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34. Chopin Soo, NCTS, Hsinchu, Taiwan
35. Christina Weiss, Bielefeld, Germany
36. Sofia Lambropoulou, National Technical University, Athens, Greece.
37. Samuel Lomonaco Jr., UMBC, Maryland.
38. Hector Sabelli, Chicago.
39. David Hrencecin, UIC Chicago.
40. Heather Dye, UIC Chicago and West Point.
41. Yong Zhang, Beijing.
42. Mo Lin Ge, Nankai Insititute.
43. Roger Fenn, Sussex, UK.
44. Vassily O. Manturov, Moscow State Univ., Moscow, Russia.
45. Tomas Liko.