

Robert L. Jaffe

Center for Theoretical Physics, 6-411
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, Massachusetts 02139-4307 USA

(617) 253-4858
(FAX) (617) 253-8674
jaffe@mit.edu

PERSONAL

Born May 23, 1946 in Bath, Maine; United States Citizenship
Married to Diana M. Bailey, Principal of Diana Bailey Architecture, Inc.
Children: Dr. Rebecca C. Jaffe and Samuel P. Jaffe

EDUCATION

Stanford University 1968–1972
Ph.D. (Physics) 1972
M.S. (Physics) 1971

Princeton University 1964–1968
A.B. *summa cum laude* (Physics) and Valedictorian 1968

Public Schools, Stamford, Connecticut 1951–1964

PROFESSIONAL EXPERIENCE

Massachusetts Institute of Technology
Morningstar Professor of Physics 2000–PRESENT
Margaret MacVicar Faculty Fellow 1998–PRESENT
Director of the Center for Theoretical Physics 1998–2004
Professor of Physics and Chairman of the Faculty 1993–1995
Professor of Physics 1983–PRESENT
Associate Professor of Physics 1978–1983
Assistant Professor of Physics 1974–1978
Research Associate 1972–1974

Stanford Linear Accelerator Center
Research Associate 1972

VISITING POSITIONS

RIKEN/BNL Research Center, Brookhaven National Laboratory,
Senior Visiting Scientist 1997–1998
Harvard University, *Visiting Professor* 1995–1996
Boston University, *Visiting Professor* 1985–1986
Oxford University, *SERC Senior Visiting Fellow at the*
Department of Theoretical Physics 1983
Beijing University, *Visiting Lecturer* 1981
CERN, *Scientific Associate* 1979
Oxford University, *Senior Visiting Fellow at the Department of*
Theoretical Physics and Fellow of St. Catherine's College 1979
California Institute of Technology, *Visiting Associate in Theoretical Physics* 1976
Stanford Linear Accelerator Center, *Visiting Scientist* 1976

SELECTED PROFESSIONAL ACTIVITIES

- ◇ Fellow, American Association for the Advancement of Science
- ◇ Fellow, American Physical Society
- ◇ American Physical Society Panel on Public Affairs (2007–2012)
- ◇ Lahore University of Management and Science, School of Science and Engineering, Advisory Committee (2005–PRESENT) Chairman (2006–2010)
- ◇ Brookhaven Science Associates, Science and Technology Steering Committee (1998–2008) Chairman (2005–2008)
- ◇ AGS and RHIC Program Advisory Committee, Brookhaven National Laboratory (1996–2006)
- ◇ Overseer, Boston Museum of Science (1995–2004)
- ◇ Program Advisory Committee, Boston Museum of Science (1994–2004)
- ◇ Board of Directors, Future Problem Solvers of Massachusetts (1996–2000)
- ◇ Brookhaven National Laboratory Physics, ADD, AGS, NSLS and Instrumentation Visiting Committee (1992–1995)
- ◇ Editorial Board, Springer-Verlag, *Lecture Notes in Physics* (1990–2011)
- ◇ Organizer: Santa Fe QCD Study Group (1989–1993)
- ◇ Cofounder and Codirector: The Symposium at MIT (1987–1989)
- ◇ Associate Editor, *Nuclear Physics B* (1987–PRESENT)
- ◇ Physics Department Advisory Council, Princeton University (1986–1999), Chairman (1992–1998)
- ◇ AGS Program Advisory Committee, Brookhaven National Laboratory (1986–1990)
- ◇ Consultant, Los Alamos National Laboratory (1985–1995)
- ◇ Editorial Board, *Physical Review D* (1984–1986)
- ◇ Experimental Program Advisory Committee, Stanford Linear Accelerator Center (1983–1987)
- ◇ Brookhaven National Laboratory Physics and Accelerator Department Visiting Committee (1980)
- ◇ Executive Committee of the Division of Particles and Fields of the American Physical Society (1979–1980)
- ◇ MIT Press Editorial Board (1976–1984)
- ◇ Founder: Stanford Workshops on Political and Social Issues (1969)

FELLOWSHIPS

- ◇ Residency at the Rockefeller Foundation Study Center at Bellagio, Italy (2004)
- ◇ A. P. Sloan Foundation Fellow (1975–1979)
- ◇ Woodrow Wilson Foundation Fellow (1968–1970)
- ◇ National Science Foundation Predoctoral Fellow (1968–1971)

SELECTED INSTITUTE AND DEPARTMENT ACTIVITIES

- ◇ Science on Stage (2005–PRESENT)
- ◇ Advisory Board to the Catalyst Collaborative @ MIT (2006–PRESENT)
- ◇ Physics Council (1998–2004)
- ◇ Director of the Center for Theoretical Physics (1998–2004)

- ◇ Department of Physics Teaching Coordinator (1998–2000)
- ◇ Committee on the Undergraduate Program (1998–2001) – Chairman (2000–2001)
- ◇ Advisory Committee to the Office of Minority Education (1997–1999)
- ◇ Green Center for Physics, Center for Theoretical Physics Client Committee – Chair (1996 – 2006)
- ◇ Executive Committee for the Laboratory for Nuclear Science (1996–2004)
- ◇ Blue Ribbon Panel on the MIT Medical Department (1995–1996)
- ◇ MIT Committee on Campus Race Relations (1994–1998)
- ◇ Chairman of the MIT Faculty (1993–1995)
- ◇ Faculty Policy Committee (1992–1995) – Chairman (1993–1995)
- ◇ Steering Committee on the Strategic Review of Benefits (1992–1995)
- ◇ Corporation Joint Advisory Committee (1992–1995)
- ◇ Committee on the Undergraduate Program (1992–1994)
- ◇ Science Council Prize Committee (1988–1991)
- ◇ Wellesley-MIT Joint Committee – Chairman (1987–1990)
- ◇ Committee on Faculty Administration (1987–1990)
- ◇ Physics Department Education Committee (1986–2000)
- ◇ Symposium at MIT – Cofounder and member (1986–1994)
- ◇ Physics Department Committee on the Allocation of Teaching Resources – Chairman (1985–1986)
- ◇ School of Science Education Committee (1985–1988)
- ◇ Institute Committee on Educational Policy (1984–1985)
- ◇ Board of Directors of Technology Children’s Center (1983–1986)

INSTITUTE HONORS AND PRIZES

- ◇ Physics Department Buechner Teaching Prize (Jointly with Prof. Washington Taylor) (2007)
- ◇ Otto and Jane Morningstar Professor of Physics (2000)
- ◇ Margaret MacVicar Faculty Fellow (1998)
- ◇ Physics Department Buechner Teaching Prize (1997)
- ◇ Graduate Student Council Teaching Award (1988)
- ◇ Science Council Prize for Excellence in Teaching Undergraduates (1982–1983)

SUBJECTS LECTURED

- ◇ Physics of Energy (8.21) (originated subject jointly with W. Taylor)
Fall 2008, Fall 2009, Fall 2010
- ◇ Quantum Theory I & II (8.321/8.322)
Fall 1984–Spring 1985, Fall 1987–Spring 1988, Fall 2005–Spring 2006,
Fall 2006–Spring 2007
- ◇ Quantum Mechanics II (8.05)
Fall 2003
- ◇ Quantum Mechanics III (8.059) (originated subject)
Spring 1998, Spring 2002
- ◇ Quantum Mechanics II & III (8.05/59)
Fall 1996–Spring 1997
- ◇ Quantum Mechanics (8.04/5)
Fall 1988–Spring 1989

- ◇ Mechanics II (8.06)
Spring 1982, Spring 1983, Spring 1992, Spring 1993
- ◇ Modern Physics (8.09/8.10) (originated subject – jointly with G. Benedek)
Fall 1990–Spring 1991, Fall 1991–Spring 1992
- ◇ Relativity (8.20)
IAP 1992, IAP 1993, IAP 2003, IAP 2004
- ◇ Electrodynamics II (8.07)
Fall 1975, Fall 1976, Fall 1978
- ◇ Relativistic Quantum Field Theory (8.323)
Fall 1977, Fall 1980

BRIEF BIOGRAPHICAL SKETCH

Robert L. Jaffe is the Otto and Jane Morningstar Professor of Physics at MIT.

Jaffe is best known for his research on the quark substructure of matter. In the early 1970s he and his colleagues at MIT formulated the first consistent description of quark confinement, the “MIT Bag Model”. Together with John Ellis of CERN, Jaffe formulated a sum rule which relates polarized lepton scattering to the spin substructure of the nucleon. Tests of this sum rule sparked a renewal of interest in the hadron spin physics. His recent work in this area (in collaboration with Xiangdong Ji of the University of Maryland) includes the elucidation of the “transversity”, a novel quark spin observable accessible in hard scattering experiments. He has been deeply involved in the development of the spin physics program at Brookhaven National Lab. Jaffe also began the systematic study of exotic hadrons in the 1970s. He proposed that the scalar (spinless) mesons should be interpreted as two quark, two antiquark states, an interpretation which has only recently won wide acceptance. He and Kenneth Johnson (at MIT) launched the theory of glueballs – hadrons made entirely of the gluons which mediate confining forces. Together with Edward Farhi (also at MIT), Jaffe first described the properties of strange quark matter and explored its significance in astrophysics.

In the late 1990’s Jaffe, Farhi, and collaborators developed analytical and computational tools for the study of quantum vacuum energies – Casimir energies – with applications to problems ranging from micromachinery to beyond the Standard Model. Recently this work has taken a practical turn: In collaboration with Antonello Scardicchio (MIT, now Princeton) and Mehran Kardar (MIT), Jaffe developed powerful practical methods to determine the geometry dependence of Casimir forces as they affect micro-electro-mechanical systems (MEMS). Most recently, in collaboration with Thorsten Emig (CNRS-Saclay), Noah Graham (Middlebury), and Kardar, Jaffe has developed practical methods to compute electromagnetic Casimir forces and torques between compact objects of arbitrary shapes whether perfect conductors or dielectrics. This work promises to revolutionize the calculation of Casimir forces.

Jaffe continues to work on the physics of quarks and hadrons. In 2003 Jaffe and Frank Wilczek (MIT) reconsidered the importance of di-quark correlations in quantum chromodynamics. In 2005 and 2006 Jaffe and collaborators explored the importance of parity doubling in hadron spectroscopy, and categorized ordinary and extraordinary resonances in QCD.

Professor Jaffe received his AB, summa cum laude in Physics from Princeton, where he was Valedictorian of the Class of 1968. He received his MS and PhD degrees from Stanford in 1971 and 1972, respectively. At Stanford he founded the Stanford Workshops on Political and Social Issues.

In 1972 Jaffe came to MIT as a postdoctoral research associate in the Center for Theoretical Physics. He joined the faculty in 1974. From 1975 until 1979, he was an A. P. Sloan Foundation Research Fellow. Professor Jaffe has spent sabbatical years at the Stanford Linear Accelerator Center (1976), Oxford University and the European Center for Nuclear Research (1978–9), at Boston University (1986–7), and at Harvard University (1996–7). In 2004 Jaffe was a resident scholar at the Rockefeller Foundation Study Center at Bellagio, Italy. He has served on the program advisory committees of several national laboratories and for many years he was the chairman of the Advisory Council of the Physics Department of Princeton University. He now serves as Chair of the Science and Engineering Steering Committee of Brookhaven National Laboratory and a member of the Brookhaven Science Associates Board of Directors. Since 1996 he has been an advisor to and Visiting Scientist at the RIKEN-Brookhaven Research Center. Jaffe is a Fellow of the American Physical Society and the American Association for the Advancement of Science. He has been awarded the Science Council Prize for Excellence in Teaching Undergraduates (1983), the Graduate Student Council Teaching Award (1988), and the Physics Department Buechner Teaching Prize (1997). In January 1998, Jaffe was named a Margaret MacVicar Faculty Fellow (1998) in recognition of his contributions to MIT’s

teaching program. Since 2005 Jaffe has been collaborating on the development of a new private university of science and technology in Lahore Pakistan, as a member and chair of their external advisory committee. The new Lahore University of Management and Science, School of Science and Engineering will admit its first freshman class in the Fall of 2008.

Jaffe has been very active in MIT affairs. He was cofounder of the Symposium at MIT, an interdisciplinary faculty program dedicated to improving communication and the exchange of ideas within the faculty. He has served as chairman of MIT's Committee on the Undergraduate Program and its Faculty Policy Committee. In 1992 he was elected to a term as Chair of the MIT Faculty which concluded in June of 1995.

In 2000 Jaffe was named to the Morningstar Chair in MIT's School of Science.

SELECTED RESEARCH PUBLICATIONS

1. CASIMIR FORCE BETWEEN SHARP-SHAPED CONDUCTORS, (with M. F. Maghrebi, S. J. Rahi, T. Emig, N. Graham, and M. Kardar), **arXiv:1010.3223 [quant-ph]**.
2. SCATTERING THEORY APPROACH TO ELECTRODYNAMIC CASIMIR FORCES, (with S. J. Rahi, T. Emig, N. Graham, and M. Kardar), *Phys. Rev. D* **80** (2009) 085021 **arXiv:0908.2649 [quant-ph]**.
3. CASIMIR FORCES BETWEEN ARBITRARY COMPACT OBJECTS (with T. Emig, N. Graham and M. Kardar), *Phys. Rev. Lett.* **99** (2007) 170403 **arXiv:0707.1862 [cond-mat]** .
4. QUARK MASSES: AN ENVIRONMENTAL IMPACT STATEMENT, (with A. Jenkins and I. Kimchi), *Phys. Rev. D* **79** (2009) 065014 **arXiv:0809.1647 [hep-ph]**.
5. ORDINARY AND EXTRAORDINARY HADRONS, *AIP Conf. Proc.* **964** 2007 1, and *Prog. Theor. Phys. Suppl.* 168 2007 127, **arXiv:hep-ph/0701038**.
6. EXOTICA, *Phys Reports* **409** (2005) 1; *Nucl Phys Proc Suppl* **142** (2005) 343, **arXiv:hep-ph/0409065**. (TOPCITE 100+)
7. THE CASIMIR EFFECT AND GEOMETRIC OPTICS (with A. Scardicchio), *Phys Rev Lett* **92** (2004) 070402, **arXiv:quant-ph/0310194**.
8. DIQUARKS AND EXOTIC SPECTROSCOPY (with F. Wilczek), *Phys Rev Lett* **91** 232003, (JUL 2003), **hep-th/0307341**. (TOPCITE 500+)
9. CASIMIR ENERGIES IN LIGHT OF QUANTUM FIELD THEORY (with N. Graham, V. Khemani, M. Quandt, M. Scandurra and H. Weigel), *Phys Lett B* **572** (2003) 196, **hep-th/0207205**.
10. CALCULATING VACUUM ENERGIES IN RENORMALIZABLE QUANTUM FIELD THEORIES: A NEW APPROACH TO THE CASIMIR PROBLEM (with N. Graham, V. Khemani, M. Quandt, M. Scandurra, and H. Weigel), *Nucl Phys B* **645** (2002) 49, **hep-th/0207120**. (TOPCITE 100+)
11. INSIGHT INTO THE SCALAR MESONS FROM A LATTICE CALCULATION (with M. Alford), *Nucl Phys B* **578** (2000) 367, **arXiv:hep-lat/0001023**. (TOPCITE 100+)
12. ENERGY, CENTRAL CHARGE, AND THE BPS BOUND FOR (1+1)-DIMENSIONAL SUPERSYMMETRIC SOLITONS (with N. Graham), *Nucl Phys B* **544** (1999) 432, **hep-th/9808140**.
13. FINITE QUANTUM FLUCTUATIONS ABOUT STATIC FIELD CONFIGURATIONS (with E. Farhi, N. Graham, and P. Haagensen), *Phys Lett* **B427** (1998) 334, **hep-th/9802015**.
14. INTERFERENCE FRAGMENTATION FUNCTIONS AND THE NUCLEON'S TRANSVERSITY (with X. Jin and J. Tang), *Phys Rev Lett* **80** (1998) 1166, **hep-ph/9709322**. (TOPCITE 100+)
15. SPIN, TWIST AND HADRON STRUCTURE IN DEEP INELASTIC PROCESSES, talk given at Ettore Majorana International School of Nucleon Structure: The Spin Structure of the Nucleon, Erice, Italy, 3–10 Aug 1995, 178; Proceedings Erice 1995, *The Spin Structure of the Nucleon*, 42, **arXiv:hep-ph/9602236**. (TOPCITE 100+)
16. QCD SELECTION RULES IN POLARIZED HADRON COLLISIONS (with N. Saito), *Phys Lett* **B382** (1996) 165, **hep-ph/9604220**.
17. BOUND STATES IN TWISTING TUBES (with J. Goldstone), *Phys Rev* **B 45** (1992) 14100. (TOPCITE 100+)
18. CHIRAL ODD PARTON DISTRIBUTIONS AND POLARIZED DRELL-YAN (with Xiangdong Ji), *Phys Rev Lett* **67** (1991) 552. (TOPCITE 250+)
19. THE g_1 PROBLEM: DEEP INELASTIC ELECTRON SCATTERING AND THE SPIN OF THE PROTON (with A. Manohar), *Nucl Phys B* **337** (1990) 509. (TOPCITE 250+)

20. g_2 : THE NUCLEON'S OTHER SPIN-DEPENDENT STRUCTURE FUNCTION, *Comm Nucl Part Phys* **14** (1990) 239. (TOPCITE 100+)
21. QUALITATIVE FEATURES OF THE GLUEBALL SPECTRUM (with K. Johnson and Z. Ryzak), *Ann Phys* **168** (1986) 344.
22. STRANGE MATTER (with E. Farhi), *Phys Rev D* **30** (1984) 2379. (TOPCITE 500+)
23. THE BARYON NUMBER IN CHIRAL QUARK MODELS (with J. Goldstone), *Phys Rev Lett* **51** (1983) 1518. (TOPCITE 100+)
24. ON THE NUCLEAR DEPENDENCE OF ELECTROPRODUCTION (with E. G. Close, R. G. Roberts and G. G. Ross), *Phys Lett* **449** (1984). (TOPCITE 100+)
25. PARTON DISTRIBUTION FUNCTIONS FOR TWIST-FOUR, *Nucl Phys B* **229** (1983) 205. (TOPCITE 100+)
26. QUARK DISTRIBUTIONS IN NUCLEI, *Phys Rev Lett* **50** (1983) 228. (TOPCITE 100+)
27. TWIST-FOUR IN ELECTROPRODUCTION: CANONICAL OPERATORS AND COEFFICIENT FUNCTIONS (with M. Soldate), *Phys Rev D* **26** (1982) 49. (TOPCITE 100+)
28. NORMALIZING THE RENORMALIZATION GROUP ANALYSIS OF DEEP INELASTIC LEPTOPRODUCTION (with G. G. Ross), *Phys Lett* **93B** (1980) 313. (TOPCITE 100+)
29. THE SIGMA-TERM REVISITED, *Phys Rev D* **21** (1980) 3215. (TOPCITE 100+)
30. THE CONNECTION BETWEEN QUARK MODEL EIGENSTATES AND LOW-ENERGY SCATTERING (with F. E. Low), *Phys Rev D* **19** (1979) 2105. (TOPCITE 250+)
31. UNCONFINED QUARKS AND GLUONS (with A. De Rujula and R. C. Giles), *Phys Rev D* **17** (1978) 285. (TOPCITE 100+)
32. PERHAPS A STABLE DIHYPERON, *Phys Rev Lett* **38** (1977) 195, 617E. (TOPCITE 500+)
33. MULTIQUARK HADRONS I and II, *Phys Rev D* **15** (1977) 267, 281. (TOPCITE 1000+)
34. UNCONVENTIONAL STATES OF CONFINED QUARKS AND GLUONS (with K. Johnson), *Phys Rev* **60B** (1975) 201. (TOPCITE 250+)
35. MASSES AND OTHER PARAMETERS OF THE LIGHT HADRONS (with T. A. DeGrand, K. Johnson and J. Kiskis), *Phys Rev D* **12** (1975) 2060. (TOPCITE 1000+)
36. BARYON STRUCTURE IN THE BAG THEORY (with A. Chodos, K. Johnson and C. Thorn), *Phys Rev D* **10** (1974) 2599. (TOPCITE 500+)
37. A NEW EXTENDED MODEL OF HADRONS (with A. Chodos, K. Johnson, C. Thorn and V. F. Weiskopf), *Phys Rev D* **9** (1974) 3471. (TOPCITE 1000+)
38. A SUM RULE FOR DEEP INELASTIC ELECTROPRODUCTION FROM POLARIZED PROTONS (with J. Ellis), *Phys Rev D* **9** (1973) 1444. (TOPCITE 500+)

RECENT PUBLICATIONS FOR NON-SPECIALISTS

1. TIMES OF OUR LIVES in *Natural History*, NOVEMBER 2006.
2. AS TIME GOES BY in *Natural History*, OCTOBER 2006.
3. QUARKS, DIQUARKS, AND PENTAQUARKS in *Physics World*, JUNE 2004.

COMPLETE LIST OF PUBLICATIONS

225. CASIMIR FORCE BETWEEN SHARP-SHAPED CONDUCTORS, (with M. F. Maghrebi, S. J. Rahi, T. Emig, N. Graham, and M. Kardar), **arXiv:1010.3223 [quant-ph]**.
224. CRITICAL ELEMENTS FOR NEW ENERGY TECHNOLOGIES, (with J. Price, co-editor), *MIT Energy Initiative Report* (2010) .
223. GEOMETRY AND MATERIAL EFFECTS IN CASIMIR PHYSICS - SCATTERING THEORY, (with S. J. Rahi and T. Emig), **arXiv:1007.4355 [quant-ph]**.
222. CASIMIR FORCE AT A KNIFE'S EDGE, (with N. Graham, A. Shpunt, T. Emig, S. J. Rahi, and M. Kardar), *Phys. Rev. D* **81** (2010) 061701 **arXiv:0910.4649 [quant-ph]**.
221. REFLECTION ABOVE THE BARRIER AS TUNNELING IN MOMENTUM SPACE, *Am. J. Phys.* **78** (2010) 620 **arXiv:0910.4564 [quant-ph]**.
220. CASIMIR INTERACTIONS OF AN OBJECT INSIDE A SPHERICAL METAL SHELL, (with S. Zaheer, S. J. Rahi, and T. Emig), *Phys. Rev. A* **81** (2010) 030502 **arXiv:0908.3270 [quant-ph]**.
219. SCATTERING THEORY APPROACH TO ELECTRODYNAMIC CASIMIR FORCES, (with S. J. Rahi, T. Emig, N. Graham, and M. Kardar), *Phys. Rev. D* **80** (2009) 085021 **arXiv:0908.2649 [quant-ph]**.
218. CASIMIR MANIPULATIONS: THE ORIENTATION DEPENDENCE OF FLUCTUATION-INDUCED FORCES, (with T. Emig, N. Graham, and M. Kardar), *Phys. Rev. A* **79** (2009) 054901 **arXiv:0811.1597 [cond-mat.stat-mech]**.
217. QUARK MASSES: AN ENVIRONMENTAL IMPACT STATEMENT, (with A. Jenkins and I. Kimchi), *Phys. Rev. D* **79** (2009) 065014 **arXiv:0809.1647 [hep-ph]**.
216. CASIMIR FORCES BETWEEN CYLINDERS AND PLATES, (S. J. Rahi, T. Emig, and M. Kardar), *Phys. Rev. A* **78** (2008) 012104 **arXiv:0805.4241 [cond-mat.stat-mech]**.
215. TWO TYPES OF HADRONS, *Nucl. Phys. A* **804** (2008) 25.
214. CASIMIR FORCES BETWEEN ARBITRARY COMPACT OBJECTS: SCALAR AND ELECTROMAGNETIC FIELD (with T. Emig), *J. Phys. A* **41** (2008) 164001 **arXiv:0710.5104 [quant-ph]**.
213. CASIMIR FORCES BETWEEN COMPACT OBJECTS: I. THE SCALAR CASE (with N. Graham, R. L. Jaffe and M. Kardar), *Phys. Rev. D* **77** (2008) 025005 **arXiv:0710.3084 [cond-mat.stat-mech]**.
212. OPTICAL-APPROXIMATION ANALYSIS OF SIDEWALL-SPACING EFFECTS ON THE FORCE BETWEEN TWO SQUARES WITH PARALLEL SIDEWALLS (with S. Zaheer, A. Rodriguez and S. Johnson), *Phys. Rev. A*, **76** (2007) 063816, **arXiv:0709.0699 [quant-ph]**.
211. CASIMIR FORCES BETWEEN ARBITRARY COMPACT OBJECTS (with T. Emig, N. Graham and M. Kardar), *Phys. Rev. Lett.* **99** (2007) 170403 **arXiv:0707.1862 [cond-mat]** .
210. CASIMIR FORCES IN A PISTON GEOMETRY AT ZERO AND FINITE TEMPERATURES (with M. P. Hertzberg, M. Kardar and A. Scardicchio), *Phys. Rev. D* **76** (2007) 045016 **arXiv:0705.0139 [quant-ph]**.
209. CASIMIR FORCES IN A PISTON GEOMETRY AT ZERO AND FINITE TEMPERATURES (with M. P. Hertzberg, M. Kardar and A. Scardicchio), *Phys Rev D* **76** (2007) 045016, **arXiv:0705.0139 [quant-ph]**.
208. ORDINARY AND EXTRAORDINARY HADRONS, *AIP Conf. Proc.* **964** 2007 1, and *Prog. Theor. Phys. Suppl.* 168 2007 127, **arXiv:hep-ph/0701038**.
207. PION DECOUPLING AND SU(2)_L x SU(2)_R RESTORATION IN THE HADRON SPECTRUM (with D. Pirjol and A. Scardicchio), *Phys Rev D* **74** (2006) 057901.
206. LIFE AND DEATH AMONG THE HADRONS, *AIP Conf Proc* **792** (2005) 97.

205. PARITY DOUBLING AMONG THE BARYONS, *Phys Rept* **435** (2006) 157, [arXiv:hep-ph/0602010](#).
204. CASIMIR INTERACTION BETWEEN A PLATE AND A CYLINDER (with T. Emig, M. Kardar and A. Scardicchio), *Phys Rev Lett* **96** (2006) 080403, [arXiv:cond-mat/0601055](#).
203. WHY MASSLESS PIONS PRECLUDE $SU(2)_L \times SU(2)_R$ RESTORATION IN THE HADRON SPECTRUM (with D. Pirjol and A. Scardicchio), *Phys Rev Lett* **96** (2006) 121601, [arXiv:hep-ph/0511081](#).
202. CASIMIR FORCES IN A CLOSED GEOMETRY (with M. P. Hertzberg, M. Kardar, A. Scardicchio), *Phys Rev Lett* **95** (2005) 250402, [arXiv:quant-ph/0509071](#).
201. VERNON HUGHES AND THE QUEST FOR THE PROTON'S SPIN in *In Memory of Vernon Willard Hughes* (E. W. Hughes and F. Iachello, eds.) (World Scientific, Singapore, 2004) 78.
200. COLOR NON-SINGLET SPECTROSCOPY, *Phys Rev D* **72** (2005) 074508, [arXiv:hep-ph/0507149](#).
199. CASIMIR EFFECTS: AN OPTICAL APPROACH II. LOCAL OBSERVABLES AND THERMAL CORRECTIONS (with A. Scardicchio), *Nucl Phys B* **743** (2006) 249, [arXiv:quant-ph/0507042](#).
198. THE CASIMIR EFFECT AND THE QUANTUM VACUUM, *Phys Rev D* **72** (2005) 021301, [arXiv:hep-th/0503158](#).
197. CASIMIR BUOYANCY (with A. Scardicchio), *JHEP* **0506** (2005) 006, [arXiv:hep-th/0501171](#).
196. THE CASIMIR ENERGY FOR A HYPERBOLOID FACING A PLATE IN THE OPTICAL APPROXIMATION (with O. Schroeder and A. Scardicchio), *Phys Rev A* **72** (2005) 012105, [arXiv:hep-th/0412263](#).
195. EXOTICA, *Phys Reports* **409** (2005) 1; *Nucl Phys Proc Suppl* **142** (2005) 343, [arXiv:hep-ph/0409065](#).
194. QUARKS, DIQUARKS AND PENTAQUARKS (with F. Wilczek), *Phys World* **17** (2004) 25.
193. IMPLICATIONS OF THE PRESENT BOUND ON THE WIDTH OF THE $\Theta(1540)^+$ (with A. Jain), *Phys Rev D* **71** (2005) 034012, MIT-CTP-3523, [arXiv:hep-ph/0408046](#).
192. CASIMIR EFFECTS: AN OPTICAL APPROACH I. FOUNDATIONS AND EXAMPLES (with A. Scardicchio), *Nucl Phys B* **704** (2005) 552, [arXiv:quant-ph/0406041](#).
191. COMMENT ON hep-ph/0404212 ON 'EXOTIC ANTI-DECUPLET OF BARYONS: PREDICTION FROM CHIRAL SOLITONS', [arXiv:hep-ph/0405268](#).
190. CASIMIR EFFECTS: FROM THE TABLETOP TO THE STANDARD MODEL, *Acta Phys Polon B* **34** (2003) 5691.
189. COMMENT ON 'EXOTIC ANTI-DECUPLET OF BARYONS: PREDICTIONS FROM CHIRAL SOLITONS', *Eur Phys J C* **35** (2004) 221, [arXiv:hep-ph/0401187](#).
188. A PERSPECTIVE ON PENTAQUARKS (with F. Wilczek), *Eur Phys J C* **33** (2004) S38, [arXiv:hep-ph/0401034](#).
187. SYSTEMATICS OF EXOTIC CASCADE DECAYS (with F. Wilczek), *Phys Rev D* **69** (2004) 114017, [arXiv:hep-ph/0312369](#).
186. THE CASIMIR EFFECT AND GEOMETRIC OPTICS (with A. Scardicchio), *Phys Rev Lett* **92** (2004) 070402, [arXiv:quant-ph/0310194](#).
185. THE DIRICHLET CASIMIR PROBLEM (with N. Graham, V. Khemani, M. Quandt, O. Schroeder and H. Weigel), *Nucl Phys B* **677** (2004) 379, [arXiv:hep-th/0309130](#).
184. THE CASIMIR EFFECT FOR FERMIONS IN ONE DIMENSION (with P. Sundberg), *Ann. Phys. (N.Y.)* **309** (2004) 442, [arXiv:hep-th/0308010](#).

183. DIQUARKS AND EXOTIC SPECTROSCOPY (with F. Wilczek), *Phys Rev Lett* **91** (2003) 232003, [arXiv:hep-th/0307341](#).
182. UNNATURAL ACTS: UNPHYSICAL CONSEQUENCES OF IMPOSING BOUNDARY CONDITIONS ON QUANTUM FIELDS, *AIP Conf Proc* **687** (2003) 3, [arXiv:hep-th/0307014](#).
181. SCALAR MESONS AS $\bar{Q}^2 Q^2$ INSIGHT FROM THE LATTICE (with M. Alford), *AIP Conf Proc* **688** (2004) 208, [arXiv:hep-lat/0306037](#).
180. CASIMIR EFFECTS: FROM GROUNDED PLATES TO THE STANDARD MODEL, *Prepared for Continuous Advances in QCD 2002 / ARKADYFEST (honoring the 60th birthday of Prof. Arkady Vainshtein), Minneapolis, Minnesota, 17-23 May 2002*.
179. HEAVY FERMION QUANTUM EFFECTS IN $SU(2)_L$ GAUGE THEORY (with E. Farhi, N. Graham, V. Khemani and H. Weigel), *Nucl Phys B* **665** (2003) 623, [arXiv:hep-th/0303159](#).
178. QUANTUM MECHANICS ON MANIFOLDS EMBEDDED IN EUCLIDEAN SPACE (with P.C. Schuster), *Ann Phys* **307** (2003) 132-143 [arXiv:hep-th/0302216](#).
177. CASIMIR ENERGIES IN LIGHT OF QUANTUM FIELD THEORY (with N. Graham, V. Khemani, M. Quandt, M. Scandurra and H. Weigel), *Phys Lett B* **572** (2003) 196, [arXiv:hep-th/0207205](#).
176. CALCULATING VACUUM ENERGIES IN RENORMALIZABLE QUANTUM FIELD THEORIES: A NEW APPROACH TO THE CASIMIR PROBLEM (with N. Graham, V. Khemani, M. Quandt, M. Scandurra, and H. Weigel), *Nucl. Phys. B* **645** (2002) 49. [arXiv:hep-th/0207120](#).
175. CASIMIR EFFECTS IN RENORMALIZABLE QUANTUM FIELD THEORIES (with N. Graham and H. Weigel), *Int J Mod Phys A* **17** (2002) 846, [arXiv:hep-th/0201148](#).
174. OPEN QUESTIONS IN HIGH ENERGY SPIN PHYSICS, *Int J Mod Phys A* **18** (2003) 1141, [arXiv:hep-ph/0201068](#).
173. SEARCHING FOR QUANTUM SOLITONS IN A (3+1)-DIMENSIONAL CHIRAL YUKAWA MODEL (with E. Farhi, N. Graham, and H. Weigel), *Nucl Phys* **B630** (2002) 241, [arXiv:hep-th/0112217](#).
172. DELOCALIZATION OF THE AXIAL CHARGE IN THE CHIRAL LIMIT, *Phys Lett* **B529** (2002) 105, [arXiv:hep-ph/010815](#).
171. GETTING TO KNOW YOUR CONSTITUENTS, *SLAC Beam Line* **30N2** (2000) 34.
170. FINITE ENERGY SUM RULES IN POTENTIAL SCATTERING (with N. Graham, M. Quandt, and H. Weigel), *Ann Phys* **293** (2001) 240, [arXiv:quant-ph/0104136](#).
169. QUANTUM ENERGIES OF INTERFACES (with N. Graham, M. Quandt, and H. Weigel), *Phys Rev Lett* **87** (2001) 131601, [arXiv:hep-th/0103010](#).
168. THE SPIN STRUCTURE OF THE NUCLEON: THEORETICAL OVERVIEW, *Physics with an Electron Polarized Light-Ion Collider*, R. Milner, ed., (AIP Conference Proceedings 588, Melville, NY, 2001), 54, [arXiv:hep-ph/0102281](#).
167. SPIN: PROGRESS AND PROSPECTS, *Spin 2000: 14th International Spin Physics Symposium*, K. Hatanaka, T. Nakano, K. Imai, and H. Ejim, eds., (AIP Conference Proceedings 570, Melville, NY, 2001), [arXiv:hep-ph/0101280](#).
166. THE THEORY OF THE NUCLEON SPIN, *Phil Trans Roy Soc Lond* **A359** (2001) 391, [arXiv:hep-ph/0008038](#).
165. FRACTIONAL AND INTEGER CHARGES FROM LEVINSON'S THEOREM (with E. Farhi, N. Graham, and H. Weigel), *Nucl Phys B* **595** (2001) 536, [arXiv:hep-th/0007189](#).

164. HEAVY FERMION STABILIZATION OF SOLITONS IN (1+1)-DIMENSIONS (with E. Farhi, N. Graham, and H. Weigel), *Nucl Phys B* **585** (2000) 443, [arXiv:hep-th/0003144](#).
163. INSIGHT INTO THE SCALAR MESONS FROM A LATTICE CALCULATION (with M. Alford), *Nucl Phys B* **578** (2000) 367, [arXiv:hep-lat/0001023](#).
162. COLOR, SPIN, AND FLAVOR-DEPENDENT FORCES IN QUANTUM CHROMODYNAMICS, *The Gregory Breit Centennial Symposium* (World Scientific, Singapore, 2001), 125, [arXiv:hep-th/0001123](#), V. Hughes, F. Iachello, D. Kusnezov, eds.
161. A HEAVY FERMION CAN CREATE A SOLITON: A (1+1)-DIMENSIONAL EXAMPLE (with E. Farhi, N. Graham, and H. Weigel), *Phys Lett* **B475** (2000) 335, [arXiv:hep-th/9912283](#).
160. REVIEW OF SPECULATIVE ‘DISASTER SCENARIOS’ AT RHIC (with W. Busza, J. Sandweiss, and F. Wilczek), *Rev Mod Phys* **72** (2000) 1125, [arXiv:hep-ph/9910333](#).
159. THE CASIMIR ENERGY IN A SEPARABLE POTENTIAL (with L.R. Williamson), *Ann Phys* **282** (2000) 432, [arXiv:hep-th/9907199](#).
158. CHI(2) PRODUCTION IN POLARIZED P P COLLISIONS AT RHIC: MEASURING DELTA G AND TESTING THE COLOR OCTET MODEL (with D. Kharzeev), *Phys Lett* **B455** (1999) 306, [arXiv:hep-th/9903280](#).
157. DIRAC PARTICLES IN TWISTED TUBES (with P. Ouyang and V. Mohta), *Ann Phys* **275** (1999) 297, [arXiv:hep-th/9901108](#).
156. FERMIONIC ONE LOOP CORRECTIONS TO SOLITON ENERGIES IN (1+1) DIMENSIONS (with N. Graham), *Nucl Phys B* **549** (1999) 516, [arXiv:hep-th/9901023](#).
155. ONE THEORIST’S PERSPECTIVE ON FOUR ERAS OF ELECTRON PROTON SCATTERING, talk given at the Sid Drell Symposium, Stanford, CA, 31 July 1998, [arXiv:hep-ph/9811327](#).
154. ENERGY, CENTRAL CHARGE, AND THE BPS BOUND FOR (1+1)-DIMENSIONAL SUPERSYMMETRIC SOLITONS (with N. Graham), *Nucl Phys B* **544** (1999) 432, [arXiv:hep-th/9808140](#).
153. UNAMBIGUOUS ONE LOOP QUANTUM ENERGIES OF (1+1)-DIMENSIONAL BOSONIC FIELD CONFIGURATIONS (with N. Graham), *Phys Lett* **B435** (1998) 145, [arXiv:hep-th/9805150](#).
152. QUARK AND GLUON ORBITAL ANGULAR MOMENTUM AND SPIN IN HARD PROCESSES (with S. Bashinskii), *Nucl Phys B* **536** (1998) 303, [arXiv:hep-ph/9804397](#).
151. FINITE QUANTUM FLUCTUATIONS ABOUT STATIC FIELD CONFIGURATIONS (with E. Farhi, N. Graham, and P. Haagenen), *Phys Lett* **B427** (1998) 334, [arXiv:hep-th/9802015](#).
150. THE DOUBLE SCATTERING CONTRIBUTION TO $b_1(x, Q^2)$ IN THE DEUTERON (with K. Bora), *Phys Rev D* **57** (1998) 6906, [arXiv:hep-ph/9711323](#).
149. INTERFERENCE FRAGMENTATION FUNCTIONS AND THE VALENCE QUARK SPIN DISTRIBUTIONS IN THE NUCLEON (with X. Jin and J. Tang), *Phys Rev D* **57** (1998) 5920, [arXiv:hep-ph/9710561](#).
148. CAN TRANSVERSITY BE MEASURED?, *Deep Inelastic Scattering Off Polarized Targets, Physics with Polarized Protons at HERA*, 167, [arXiv:hep-ph/9710465](#).
147. INTERFERENCE FRAGMENTATION FUNCTIONS AND THE NUCLEON’S TRANSVERSITY (with X. Jin and J. Tang), *Phys Rev Lett* **80** (1998) 1166, [arXiv:hep-ph/9709322](#).
146. QUARK STATES NEAR A THRESHOLD (with S. Bashinskii), *Nucl Phys A* **625** (1997) 167, [arXiv:hep-ph/9610395](#).
145. WEAK HYPERON PRODUCTION IN eP SCATTERING (with X. Jin), *Phys Rev D* **55** (1997) 5636, [arXiv:hep-ph/9612316](#).

144. POLARIZED LAMBDA'S IN THE CURRENT FRAGMENTATION REGION, *Phys Rev D* **54** (1996) 6581, [hep-ph/9605456](#).
143. QCD SELECTION RULES IN POLARIZED HADRON COLLISIONS (with N. Saito), *Phys Lett* **B382** (1996) 165, [arXiv:hep-ph/9604220](#).
142. THE CONTEXT OF HIGH-ENERGY SPIN PHYSICS, address presented at the Adriatico Research Conference, Trends in Collider Spin Physics, ICTP, Trieste, Italy, 5–7 December 1995, and at the RIKEN Symposium, Spin Structure of the Nucleon, RIKEN, Wako-shi, Saitama, Japan, 18–20 December 1995, [arXiv:hep-ph/9603422](#).
141. SPIN, TWIST AND HADRON STRUCTURE IN DEEP INELASTIC PROCESSES, talk given at Ettore Majorana International School of Nucleon Structure: The Spin Structure of the Nucleon, Erice, Italy, 3–10 Aug 1995, 178; Proceedings Erice 1995, *The Spin Structure of the Nucleon*, 42, [arXiv:hep-ph/9602236](#).
140. BOUND STATES AND THRESHOLD RESONANCES IN QUANTUM WIRES WITH CIRCULAR BENDS (with K. Lin), *Phys Rev* **B54** (1996) 5750, [arXiv:cond-mat/9601004](#)
139. GLUON SPIN IN THE NUCLEON, *Phys Lett* **B365** (1996) 359, [arXiv:hep-ph/9509279](#).
138. THE SPIN OF THE NUCLEON, *Physics Today*, September 1995.
137. SOFFER'S INEQUALITY (with G. Goldstein and X. Ji), *Phys Rev D* **52** (1995) 5006, [arXiv:hep-ph/9501297](#)
136. PROBING QUARK FRAGMENTATION FUNCTIONS FOR SPIN-1/2 BARYON PRODUCTION IN UNPOLARIZED e^+e^- ANNIHILATION (with K. Chen, G. R. Goldstein, X. Ji) *Nucl Phys B* **445** (1995) 380, [arXiv:hep-ph/9410337](#).
135. HEAVY QUARK FRAGMENTATION INTO HEAVY MESONS (with L. J. Randall), *Nucl Phys B* **412** (1994) 79.
134. NOVEL QUARK FRAGMENTATION FUNCTIONS AND THE NUCLEON'S TRANSVERSITY DISTRIBUTION (with X. Ji), *Phys Rev Lett* **71** (1993) 2547.
133. THE STABILITY OF SMALL STRANGELETS (with E. P. Gilson), *Phys Rev Lett* **71** (1993) 332.
132. POLARIZED $q \rightarrow \Lambda$ FRAGMENTATION FUNCTIONS FROM $e^+e^- \rightarrow \Lambda + X$ (with M. Burkardt), *Phys Rev Lett* **70** (1993) 2537.
131. SPIN STRUCTURE FUNCTIONS, in *Frontiers of High Energy Spin Physics*, proceedings of the 10th International Symposium on High Energy Spin Physics, Nagoya (1992), T. Hasegawa *et al.*, eds. (Universal Academy Press, Tokyo, 1993).
130. SPIN, TWIST AND HADRON STRUCTURE IN DEEP INELASTIC PROCESSES in *QCD and Hadron Structure*, proceedings of the GK-Workshop Kloster Banz, 1992.
129. STRANGE AND UNUSUAL ASPECTS OF THE NUCLEON in *Proceedings of the International Symposium on Hypernuclear and Strange Particle Physics*, *Nucl Phys* **A547** (1992) 17c.
128. SPIN STRUCTURE FUNCTIONS in *Baryons '92*, M. Gai, ed., (World Scientific, Singapore, 1993)
127. BOUND STATES IN TWISTED AHARONOV-BOHM TUBES, (with G. Dunne) *Ann Phys (NY)* **223** (1993) 180.
126. POLARIZED PROTONS AT RHIC (with D. Underwood, A. Yokosawa, G. Bunce, Y. Makdisi, M. Tannenbaum, S. Y. Lee, J. Soffer, J. Collins, S. Heppelmann and R. W. Robinett), *Particle World* **3** (1992) 1.

125. STRANGELETS, in *Strange Quark Matter in Physics and Astrophysics*, J. Madsen and P. Haensel, eds., *Nucl Phys (Proc Suppl)* **24B** (1991) 8.
124. BOUND STATES IN TWISTING TUBES (with J. Goldstone), *Phys Rev B* **45** (1992) 14100.
123. CHIRAL ODD PARTON DISTRIBUTIONS AND POLARIZED DRELL-YAN PROCESSES (with X. Ji), *Nucl Phys B* **375** (1992) 527-560.
122. CHIRAL ODD PARTON DISTRIBUTIONS AND POLARIZED DRELL-YAN (with Xiangdong Ji), *Phys Rev Lett* **67** (1991) 552.
121. CHIRAL ODD PARTON DISTRIBUTIONS, in *Spin and Isospin in Nuclear Interactions*, S. W. Wissink, C. D. Goodman and G. E. Walker, eds. (to be published by Plenum).
120. WHEN IS FIELD THEORY EFFECTIVE? (with P. F. Mende), *Nucl Phys B* **369** (1992) 189.
119. THE SPIN ON THE SEA IN A SIMPLE QUARK MODEL (with H. J. Lipkin), *Phys Lett B* **266** (1991) 458.
118. LIMITS ON THE VALIDITY OF EFFECTIVE FIELD THEORY IN QCD, in *Nuclear Physics in the 1990's*, D. H. Feng, *et al.*, eds., *Nucl Phys A* **522** (1991) 365c-376c.
117. THE SPIN STRUCTURE OF THE NUCLEON, in *Paris '90, Colloque de Physique* **51** (1991) C6-149 (Les Éditions de Physique, Les Illis, 1991).
116. INEFFECTIVE FIELD THEORY, in *QCD 90: Proceedings of the Montpellier Conference*, S. Narison, ed., *Nuclear Physics B (Proc Suppl)* **23B** (1991) 175.
115. TWIST-FOUR CORRECTIONS TO DEEP INELASTIC LEPTON SCATTERING FROM A POLARIZED SPIN-1 TARGET (with P. Hoodbhoy and E. Sather), *Phys Rev D* **43** (1991) 3071.
114. STUDIES OF THE TRANSVERSE SPIN-DEPENDENT STRUCTURE FUNCTION $g_2(x, Q^2)$ (with Xiangdong Ji), *Phys Rev D* **43**, (1991) 724.
113. INEFFECTIVE FIELD THEORY: WHEN QUARKS ARE REQUIRED IN QCD, *Phys Lett B* **245** (1990) 221.
112. g_2 : THE NUCLEON'S OTHER SPIN-DEPENDENT STRUCTURE FUNCTION, *Comm Nucl Part Phys* **14** (1990) 239.
111. THE g_1 PROBLEM: DEEP INELASTIC ELECTRON SCATTERING AND THE SPIN OF THE PROTON (with A. Manohar), *Nucl Phys B* **337** (1990) 509.
110. STRANGER THAN FICTION: THE STRANGENESS RADIUS AND MAGNETIC MOMENT OF THE NUCLEON, *Phys Lett B* **229** (1989) 275.
109. A NUCLEAR GLUONOMETER (with A. Manohar), *Phys Lett B* **223** (1989) 218.
108. BOUND STATES OF THE DIRAC EQUATION OUTSIDE A HARD SPHERE (with A. Manohar), *Ann Phys (NY)* **192** (1989) 321.
107. SPIN STRUCTURE FUNCTIONS, in *Proceedings of the Topical Conference on Electronuclear Physics with Internal Targets* (SLAC, January 1989).
106. CONCENTRATION LIMITS ON TERRESTRIAL STRANGE MATTER FROM HEAVY ISOTOPE SEARCHES (with E. Blackman), *Nucl Phys B* **324** (1989) 205.
105. THE NEXT EMC EFFECT, in *Nuclear and Particle Physics on the Light Cone*, M. B. Johnson and L. Kisslinger, eds. (World Scientific, Singapore, 1989).
104. IMPLICATIONS OF QCD FOR NUCLEAR PHYSICS, *Nucl Phys A* **478** (1988) 3c.

103. DEEP INELASTIC SCATTERING FROM ARBITRARY SPIN TARGETS (with A. Manohar), *Nucl Phys B* **321** (1989) 343.
102. CONFERENCE SUMMARY TALK, in *Intersections Between Particle and Nuclear Physics* (Rockport, ME, 1988), G. M. Bunce, ed. (AIP, New York, 1988).
101. NOVEL EFFECTS IN DEEP INELASTIC SCATTERING FROM SPIN-ONE HADRONS (with P. Hoodbhoy and A. Manohar), *Nucl Phys B* **312** (1989) 571.
100. FLAVOR MIXING VIA DYNAMICAL CHIRAL SYMMETRY BREAKING, in *Physics and Astrophysics of Quark-Gluon Plasma*, B. Sinha and S. Raha, eds. (World Scientific, Singapore, 1988).
99. STRANGENESS MIXING AND QUENCHING IN THE NAMBU-JONA-LASINIO MODEL (with V. Bernard and U.-G. Meißner), *Nucl Phys B* **308** (1988) 753.
98. CONSTRAINTS FROM THE DRELL-HEARN-GERASIMOV SUM RULE IN CHIRAL MODELS OF COMPOSITE FERMIONS (with Z. Ryzak), *Phys Rev D* **37** (1988) 2015.
97. IMPLICATIONS OF QCD FOR NUCLEAR PHYSICS, in *Particles and Nuclei, Proceedings of the XI International Conference on Particles and Nuclei, 'Panic 87'*, S. Homma, M. Morita, K. Nakai and T. Yamazaki, eds. (North Holland, Amsterdam, 1988).
96. FLAVOR MIXING VIA DYNAMICAL CHIRAL SYMMETRY BREAKING (with V. Bernard and U.-G. Meißner), *Phys Lett* **198B** (1987) 92.
95. THE AXIAL ANOMALY AND THE SUM RULES FOR SPIN-DEPENDENT ELECTROPRODUCTION, *Phys Lett* **193B** (1987) 101.
94. THE PATTERN OF CHIRAL SYMMETRY BREAKING AND THE STRANGE QUARK CONTENT OF THE PROTON (with C. Korpa), *Comm Nucl Part Phys* **17** (1987) 163.
93. COMPOSITENESS BELOW 1 TeV, in *Probing the Standard Model, Proceedings of the XIV SLAC Summer Institute on Particle Physics*, (SLAC Report No. 312, SLAC, Stanford, 1987).
92. THE PRODUCTION OF POLARIZED PARTICLES IN THE DECAY OF KAONIC ATOMS (with D. W. Düsedau), *Phys Lett* **196B** (1987) 425.
91. RADIOACTIVITY IN STRANGE QUARK MATTER (with M. S. Berger), *Phys Rev* **C35** (1987) 213.
90. THE STRONGLY COUPLED STANDARD MODEL, in *Proceedings of the IX Kazimierz Symposium* (1986).
89. QUARK EXCHANGE IN NUCLEI AND THE EMC EFFECT (with P. Hoodbhoy). *Phys Rev D* **35** (1987) 113.
88. $P\bar{P}$ -PHYSICS IN THE MILLI-TeV REGION, in *Proceedings of the First Workshop on Antimatter Physics at Low Energy*, B. E. Bonner and L. S. Pinsky, eds (Fermilab, Batavia, 1986).
87. THE STRONGLY COUPLED STANDARD MODEL (with M. Claudson and E. Farhi), *Phys Rev D* **34** (1986) 873.
86. The EMC EFFECT TODAY, in *Workshop on Nuclear Chromodynamics: Quarks and Gluons in Particles and Nuclei*, S. Brodsky and E. J. Moniz, eds. (World Scientific, Singapore, 1986).
85. THE SELF-ENERGY OF A CONFINED MASSIVE QUARK (with S. Goldhaber and T. H. Hansson), *Nucl Phys B* **277** (1986) 674.
84. SPECTRAL FUNCTION SUM RULES FOR THE W BOSON IN THE WEAK AND STRONG COUPLING VERSIONS OF THE STANDARD MODEL (with S. A. Devyanin), *Phys Rev* **D33** (1986) 2615.
83. QUALITATIVE FEATURES OF THE GLUEBALL SPECTRUM (with K. Johnson and Z. Ryzak), *Ann Phys* **168** (1986) 344.

82. Is Cygnus X-3 STRANGE? (with G. Baym, E. W. Kolb, L. McLerran and T. P. Walker), *Phys Lett* **160B** (1985) 181; and in *New Particles* 1985, V. Barger, D. Cline and F. Halzed, eds. (World Scientific, Singapore, 1986).
81. SEARCH FOR STRANGE MATTER BY HEAVY ION ACTIVATION (with E. Farhi), *Phys Rev D* **32**, 2452 (1985).
80. DEEP INELASTIC SCATTERING WITH APPLICATION TO NUCLEAR TARGETS, in *Relativistic Dynamics and Quark Nuclear Physics*, M. B. Johnson and A. Picklesimer, eds. (Wiley, New York, 1986).
79. QCD and BEYOND, Summary Talk at the XX Rencontre de Moriond, in *QCD and Beyond, Proceedings of the XX Rencontre de Moriond*, J. Tran Thanh Van, eds. (C.N.R.S., Paris, 1985).
78. INTERPRETATION OF UNUSUAL EVENTS FROM CERN and DESY (with L. J. Hall and J. L. Rosner) [complete version], *Phys Rep* **125** (1985) 103.
77. SEMICLASSICAL QUANTIZATION OF THE DIBARYON SKYRMION (with C. Korpa), *Nucl Phys B* **258** (1985) 468.
76. SHORT DISTANCE PHENOMENA IN NUCLEAR PHYSICS (book review), *American Scientist* **72** (1984) 509.
75. HIGH-ENERGY PHYSICS: WHERE ARE WE NOW?, in *Antiproton 1984, Proceedings of the VII European Symposium on Antiproton Interactions* Durham (Institute of Physics, Adam Hilger, Ltd., Bristol, 1985).
74. CONVERGENCE PROPERTIES OF THE MULTIPLE REFLECTION EXPANSION (with L. C. Vintro), *Ann Phys (NY)* **162** (1985) 212.
73. CHANGE OF CONFINEMENT SCALE IN NUCLEI: PREDICTIONS FOR STRUCTURE FUNCTIONS CONFRONT ELECTROPRODUCTION DATA (with F. E. Close, R. G. Roberts and G. G. Ross), *Phys Rev D* **31** (1985) 1004.
72. INTERPRETATION OF UNUSUAL EVENTS FROM CERN and DESY (with L. J. Hall and J. L. Rosner), in *Proceedings of the 1984 Snowmass Workshop on Physics at the SSC*, Rene Donaldson and Jorge G. Morfin, eds. (American Physical Society, New York, 1984).
71. STRANGE MATTER (with E. Farhi), *Phys Rev D* **30** (1984) 2379.
70. HUNTING A HIDDEN HADRON: IS THERE A SCALAR GLUEBALL BELOW 1 GEV? (with M. Pennington and S. Sharpe), *Phys Rev D* **30** (1984) 1013.
69. ON THE NUCLEAR DEPENDENCE OF ELECTROPRODUCTION (with E. G. Close, R. G. Roberts and G. G. Ross), *Phys Lett* **449** (1984).
68. The EMC EFFECT: LOOKING AT THE QUARKS IN THE NUCLEUS, *Comm Nucl Part Phys* **13** (1984) 39.
67. ASYMPTOTIC REALMS OF PHYSICS, in *Essays in Honor of Francis E. Low*, A. Guth, K. Huang and R. L. Jaffe, eds. (MIT Press, Cambridge, 1983).
66. THE BARYON NUMBER IN CHIRAL QUARK MODELS (with J. Goldstone), *Phys Rev Lett* **51** (1983) 1518.
65. THE SELF-ENERGY OF A CONFINED QUARK (with S. Goldhaber and T. H. Hansson), *Phys Lett* **131B** (1983) 445.
64. PARTON DISTRIBUTION FUNCTIONS FOR TWIST-FOUR, *Nucl Phys B* **229** (1983) 205.
63. THE MULTIPLE REFLECTION EXPANSION FOR CONFINED SCALAR, Dirac AND GAUGE FIELDS (with T. H. Hansson), *Ann Phys (NY)* **151** (1983) 204.

62. CAVITY QUANTUM CHROMODYNAMICS (with T. H. Hansson), *Phys Rev* **D28** (1983) 882.
61. QUARK DISTRIBUTIONS IN NUCLEI, *Phys Rev Lett* **50** (1983) 228.
60. THE PARTON MODEL AT TWIST-FOUR, *Phys Lett* **116B** (1982) 437.
59. HOW TO ANALYZE LOW-ENERGY SCATTERING, in *Asymptotic Realms in Physics*, A. Guth, K. Huang and R. L. Jaffe, eds. (MIT Press, Cambridge, 1983).
58. TWIST-FOUR IN ELECTROPRODUCTION: CANONICAL OPERATORS AND COEFFICIENT FUNCTIONS (with M. Soldate), *Phys Rev D* **26** (1982) 49.
57. QUARKS, COLOR AND CONFINEMENT, in *The McGraw-Hill Yearbook of Science and Technology* (McGraw-Hill, New York, 1981).
56. HIGHER-TWIST IN ELECTROPRODUCTION: A SYSTEMATIC QCD ANALYSIS (with M. Soldate), in *Perturbative Quantum Chromodynamics* (Tallahassee, 1981), D. W. Duke and J. F. Owens, eds.
55. OPERATORS IN A TRANSLATION INVARIANT TWO-DIMENSIONAL BAG MODEL, *Ann Phys* (NY) **132** (1981) 32.
54. CAN QUARKS HAVE INTEGER CHARGE? (with B. Iijima), *Phys Rev* **D24** (1981) 117.
53. NORMALIZING THE RENORMALIZATION GROUP IN DEEP INELASTIC LEPTOPRODUCTION, in *High Energy Physics — 1980 XX International Conference*, (Madison, Wisconsin), L. Durand and L. G. Pondrom, eds.
52. MORE ON UNCONFINED QUARKS AND GLUONS (with A. De Rujula and R. C. Giles), *Phys Rev D* **22** (1980) 227.
51. APPLICATIONS OF THE BAG MODEL, in *Lectures at the XIX Schladming Winter School*, *Acta Phys Austr* Suppl. XXII **269** (1980).
50. THE SIGMA-TERM REVISITED, *Phys Rev D* **21** (1980) 3215.
49. NORMALIZING THE RENORMALIZATION GROUP ANALYSIS OF DEEP INELASTIC LEPTOPRODUCTION (with G. G. Ross), *Phys Lett* **93B** (1980) 313.
48. THE BAG, Lectures presented at the 1979 Erice Summer School, “Ettore Majorani,” in *Point-Like Structures Inside and Outside Hadrons*, (Plenum Press, New York, 1982), A. Zichichi, ed.
47. THE ELUSIVENESS OF MULTIQUARK HADRONS, in *Quarks, Gluons and Jets, Proceedings of the XIV Rencontre de Moriond*, J. Tran Thanh Van, ed. (C.N.R.S., Paris, 1979).
46. QUARK DYNAMICS, *Physica Scripta* **20** (1979) 235.
45. THE CONNECTION BETWEEN QUARK MODEL EIGENSTATES AND LOW-ENERGY SCATTERING (with F. E. Low), *Phys Rev D* **19** (1979) 2105.
44. AZIMUTHAL CORRELATIONS IN THE DECAY OF HEAVY QUARK ANTIQUARK BOUND STATES PRODUCED IN e^+e^- ANNIHILATION (with S.-Y. Pi), *Phys Rev D* **19** (1979) 3454.
43. THE NEW SPECTROSCOPY IN THE BAG MODEL, in *Phenomenology of Quantum Chromodynamics, Proceedings of the XIII Rencontre de Moriond*, J. Tran Thanh Van, ed. (C.N.R.S., Paris, 1978).
42. AZIMUTHAL CORRELATIONS IN e^+e^- JETS: A TEST OF QCD (with F. E. Low and S.-Y. Pi), *Phys Rev Lett* **41** (1978) 142.
41. $Q^2\bar{Q}^2$ RESONANCES IN THE BARYON-ANTIBARYON SYSTEM, *Phys Rev D* **17** (1978) 1444.
40. UNCONFINED QUARKS AND GLUONS (with A. De Rujula and R. C. Giles), *Phys Rev D* **17** (1978) 285.

39. A STUDY OF THE NEED FOR HIGH LUMINOSITIES AT ISABELLE (with V. Kistiakowsky, I. A. Pless and R. K. Yamamoto), in *1977 ISABELLE Summer Study*,
38. EXTRAORDINARY HADRONS, in *Quark Spectroscopy and Hadron Dynamics, Proceedings of the Summer Institute on Particle Physics, SLAC 1977*, M. C. Zipf, ed. (SLAC Report No. 204).
37. QUARK CHEMISTRY: CHARMONIUM MOLECULES (with A. DeRujula), in *Experimental Meson Spectroscopy, 1977*, E. Van Goeler and R. Weinstein, eds. (Northeastern University Press, Boston, 1977).
36. QUARK CONFINEMENT, *Nature* **268** (1977) 201.
35. A PRACTICAL MODEL OF QUARK CONFINEMENT (with K. Johnson), *Comm Nucl Part Phys* **7** (1977) 107.
34. PERHAPS A STABLE DIHYPERON, *Phys Rev Lett* **38** (1977) 195, 617E.
33. MULTIQUARK HADRONS II: METHODS, *Phys Rev D* **15** (1977) 281.
32. MULTIQUARK HADRONS I: THE PHENOMENOLOGY OF $Q^2 \bar{Q}^2$ MESONS, *Phys Rev D* **15** (1977) 267.
31. BARYON EXCITATIONS IN THE BAG MODEL, in *Proceedings of the Topical Conference on Baryon Resonances, Oxford 1976*, R. T. Ross and D. H. Saxon, eds. (Rutherford Laboratory, Chilton, Didcot, 1976).
30. SOME SPECTROSCOPIC PROBLEMS IN THE BAG MODEL OF QUARK CONFINEMENT, in *New Fields in Modern Physics, Proceedings of the XI Rencontre de Moriond*, J. Tran Thanh Van, ed. (C.N.R.S., Paris, 1976).
29. EXCITED STATES OF CONFINED QUARKS (with T. A. DeGrand), *Ann Phys (NY)* **100** (1976) 425.
28. SPECTRA OF NEW HADRONS (with J. Kiskis), *Phys Rev D* **13** (1976) 1255.
27. UNCONVENTIONAL STATES OF CONFINED QUARKS AND GLUONS (with K. Johnson), *Phys Rev* **60B** (1975) 201.
26. MASSES AND OTHER PARAMETERS OF THE LIGHT HADRONS (with T. A. DeGrand, K. Johnson and J. Kiskis), *Phys Rev D* **12** (1975) 2060.
25. LIGHT-CONE STRUCTURE IN AN APPROXIMATION TO THE BAG THEORY (with A. Patrascioiu), *Phys Rev D* **12** (1975) 1314.
24. DEEP INELASTIC STRUCTURE FUNCTIONS IN AN APPROXIMATION TO THE BAG THEORY, *Phys Rev D* **11** (1975) 1953.
23. A COMPARISON OF THE PARTON MODEL AND LIGHT-CONE ALGEBRA IN INCLUSIVE PROCESSES, presented at the Seminar on Quark and Parton Problems, Moscow, June 1974, MIT preprint CTP#433 (unpublished).
22. THE QUARK BAG THEORY (with K. Johnson), presented at the Seminar on Quark and Parton Problems, Moscow, June 1974, MIT preprint CTP#435 (unpublished).
21. BARYON STRUCTURE IN THE BAG THEORY (with A. Chodos, K. Johnson and C. Thorn), *Phys Rev D* **10** (1974) 2599.
20. A NEW EXTENDED MODEL OF HADRONS (with A. Chodos, K. Johnson, C. Thorn and V. F. Weisskopf), *Phys Rev D* **9** (1974) 3471.
19. A SUM RULE FOR DEEP INELASTIC ELECTROPRODUCTION FROM POLARIZED PROTONS (with J. Ellis), *Phys Rev D* **9** (1973) 1444.

18. SCALING, SHORT DISTANCES AND THE LIGHT CONE (with J. Ellis), Lectures presented at the 1973 Santa Cruz Summer School in Particle Physics, SLAC-PUB-1353 (unpublished).
17. THE PRODUCTION OF WEAK INTERACTION BOSONS IN HIGH ENERGY PROTON-PROTON COLLISIONS (with J. R. Primack), *Nucl Phys B* **61** (1973) 317.
16. DEEP INELASTIC PROCESSES WITH HADRONIC INITIAL STATES, in *Recent Advances in Particle Physics, Ann New York Acad Sci* **229** (1974) 225.
15. THE SCALING BEHAVIOR OF THE RATIO OF LONGITUDINAL TO TRANSVERSE TOTAL VIRTUAL PHOTOABSORPTION CROSS SECTIONS (with J. F. Gunion), *Phys Rev* **D8** (1973) 3215.
14. ON THE FINITENESS OF SCALING SUM RULES (with D. J. Broadhurst and J. F. Gunion), *Ann Phys (NY)* **81** (1973) 88.
13. DEEP INELASTIC SCATTERING AND STATIC PROPERTIES OF THE BARYONS IN THE QUARK GLUON MODEL (with D. J. Broadhurst and J. F. Gunion), *Phys Rev* **D8** (1973) 566.
12. RUDIMENTS OF LIGHT-CONE PHYSICS, presented at the 1972 Erice Summer School "Ettore Majorana," in *Highlights in Particle Physics*, A. Zichichi, ed (Edetrice Compositori, Bologna, 1973).
11. DEEP INELASTIC SCATTERING, THE SUBTRACTION OF DIVERGENT SUM RULES AND CHIRAL SYMMETRY BREAKING IN THE GLUON MODEL (with C. H. Llewellyn Smith), *Phys Rev D* **7** (1973) 2506.
10. RANGE, LIGHT-CONE DOMINANCE AND SCALING AT LOW Q^2 IN ELECTROPRODUCTION, *Ann Phys (NY)* **75** (1973) 545.
9. TEST FOR FRACTIONALLY CHARGED PARTONS FROM DEEP-INELASTIC Bremsstrahlung IN THE SCALING REGION (with S. J. Brodsky and J. F. Gunion), *Phys Rev D* **6** (1972) 2487.
8. LIGHT-CONE DOMINANCE IN THE PRESENCE OF SINGULARITIES ELSEWHERE IN COORDINATE SPACE, *Phys Rev D* **5** (1972) 2622.
7. A COMPARISON OF THE PARTON AND LIGHT-CONE ANALYSES OF HIGHLY INELASTIC LEPTONIC PROCESSES, *Phys Rev D* **5** (1972) 2622.
6. COORDINATE SPACE STRUCTURE IN THE PARTON MODEL, *Phys Lett* **37B** (1971) 517.
5. PHOTOPRODUCTION OF MASSIVE MUON PAIRS AT HIGH ENERGIES, *Phys Rev* **D4** (1971) 1507.
4. NON-CAUSAL DISPERSION RELATIONS AND A FUNDAMENTAL LENGTH (with M. Creutz), *Phys Rev D* **2** (1970) 2359.
3. A SET OF NUCLEAR MASS RELATIONS AND A RESULTANT MASS TABLE (with G. T. Garvey, W. J. Gerace, I. Talmi and I. Kelson), *Rev Mod Phys* **41** (1969) S1–S80.
2. FORM FACTORS FOR TWO NUCLEON TRANSFER REACTIONS (with W. J. Gerace), *Nucl Phys* **A125** (1969) 1.
1. THE EFFECT OF DEFORMED STATES ON β^- AND E^1 DECAYS TO THE 0 and 6.06 MeV 0^+ STATES OF ^{16}O , *Nucl Phys* **A121** (1968) 380.

INVITED CONFERENCE PRESENTATIONS

181. “Critical Elements for New Energy Technologies”, at the U.S. Department of Energy Trans-Atlantic Workshop on Rare-Earths and Critical Materials, Boston (November 2010).
180. “Unobtainium: Critical Elements for New Energy Technologies”, at the Boston Meeting of the Material Research Society (November 2010).
179. “Bumps on the Road to Transversity”, at the symposium “Garyfest”, at Jefferson National Accelerator Laboratory (October 2010).
178. “The Long Search for the Spin of the Proton”, at the symposium “90/50/10”, Brookhaven National Laboratory (June 2010)
177. R. L. Jaffe, “The Casimir Effect: Dynamical Manifestations of the Quantum Vacuum”, Colloquium at ICTP, Trieste, Italy (January 2010).
176. R. L. Jaffe, “Paradigm Lost: How Spin Undid the Quark Model”, Colloquium at the University of Trieste, Italy (January 2010).
175. R. L. Jaffe, “Quark Masses: An Environmental Impact Statement”, Colloquium at the Institute for Particle Physics Phenomenology, Durham, U. K. (August 2009).
174. R. L. Jaffe, “Paradigm Lost: How Spin Undid the Quark Model”, invited talk at the “RHIC Renaissance Celebration”, Brookhaven National Laboratory (July, 2009).
173. R. L. Jaffe, “Two Spin Sum Rules”, at the STAR Collaboration Meeting, MIT (July, 2009).
172. R. L. Jaffe, “The Casimir Effect: Dynamical Manifestations of the Quantum Vacuum”, Colloquium at the Universidad Autonoma de Madrid (UAM), Spain (June 2009)
171. R. L. Jaffe, “Quark Masses: An Environmental Impact Statement”, at the workshop, “Light Quark Masses and Hadron Physics”, at the Universidad Complutense de Madrid, Spain (June 2009).
170. “Teaching the ‘Physics of Energy’ at MIT”, at the Forum on Physics Education of the APS “April meeting”, Denver, CO (May 2009).
169. “The Time of Your Life (and other times): Beyond the Human Perspective of Time”, at the Symposium on “Humanities, Culture(s), Controversies”, University of Louisville, Louisville, KY (April 2009).
168. “The Casimir Effect: Physical Manifestations of the Quantum Vacuum”, Physics Colloquium, University of Massachusetts (April 2009)
167. “The Casimir Effect: Physical Manifestations of the Quantum Vacuum”, at the 11th National Symposium “Frontiers in Physics”, Government College University, Lahore, Pakistan (January 2009)
166. “Paradigm Lost: What Spin Did to the Quark Model”, at the Symposium for Gerry Bunce, Brookhaven National Laboratory (November 2008).
165. “Casimir Effects in Light of Quantum Field Theory”, at the KITP Workshop on Fluctuation Forces, KITP, U. C. Santa Barbara (October 2008).
164. R. L. Jaffe, “The Science of Quarks and Gluons”, at the First International Symposium on Science at J-Parc, Mito, Ibaraki, Japan (March 2008).
163. R. L. Jaffe, “The Casimir Effect: Physical Manifestations of the Quantum Vacuum”, Colloquium, NTNU, Trondheim, Norway (November 2007).
162. R. L. Jaffe, “The Casimir Effect: Physical Manifestations of the Quantum Vacuum”, University of Cologne Colloquium (November 2007).

161. R. L. Jaffe, “The Casimir Effect: Physical Manifestations of the Quantum Vacuum”, Physical Institute of Heidelberg University Colloquium (November 2007).
160. R. L. Jaffe, “The Casimir Effect: Physical Manifestations of the Quantum Vacuum”, Siegen University Colloquium (November 2007).
159. R. L. Jaffe, “Reflections on Collaboration with an Emerging Pakistani University”, at Leveraging American Experience for Building Research Universities in the Developing Countries, Stanford University, Stanford (September 2007)
158. “Casimir Forces between Arbitrary Compact Objects: Origins and Implications” at Quantum Field Theory under the Influence of External Conditions (QFEXT07), Leipzig, Sept 2007 (invited speaker).
157. “Gluon Spin Basics” at the International School of Physics “Enrico Fermi” *Strangeness and Spin in Fundamental Physics*, Varenna, Italy, June 2007 (invited lecturer).
156. “Ordinary and Extraordinary Hadrons” at *QCD@Work*, Bari, Italy, June 2007 (invited speaker).
155. “Casimir energies, stresses, and forces: When are they well defined and how can they be estimated?” at the workshop: *Dispersion Forces and Nano-Electro-Mechanical Systems* at the Lorentz Center, Leiden, The Netherlands, Dec 2006 (invited speaker).
154. “Ordinary and Extraordinary Hadrons” at the Yukawa International Symposium (YKIS) 2006, *New Frontiers in QCD — Exotic Hadrons and Hadronic Matter*, Kyoto, Nov 2006 (invited speaker).
153. “What is the Point: A Perspective on 21st Century Science, at the Conference *Running Hot! Science in New Zealand*, Christchurch, New Zealand, Nov 2006 (keynote speaker).
152. “Neglected Symmetry: Parity Doubling among the Baryons”, at the Conference on the Intersections between Particle and Nuclear Physics (CIPANP) 2006, Puerto Rico, May 2006 (invited speaker).
151. “Neglected Symmetry: Parity Doubling among the Baryons”, at the 7th workshop *Continuous Advances in QCD*, Minnesota, May 2006 (invited speaker).
150. “Exotic Spectroscopy,” at the 4th Circum-Pan-Pacific Spin Conference, INT University of Washington, Seattle, Washington (invited speaker) August 2003.
149. “Three Mysteries of QCD” at the Workshop on Hadron Structure at J-PARC, Tsukuba, Japan (invited speaker), (November 2005).
148. “Color Non-Singlet Spectroscopy” at *Pentaquark 2005*, Jefferson Lab, Newport News, VA (invited speaker), (October 2005).
147. “Casimir Physics” at the 12th Irish Quantum Field Theory Meeting, Dublin, Ireland (invited speaker), (May 2005).
146. “Multiquark Dynamics” Lectures at the 10th LNF Spring School, “Bruno Touschek”, Frascati, Italy (invited lecturer), (May 2005).
145. “Life and Death Among the Hadrons,” at *DIS05*, Madison, WI (invited speaker), (April 2005).
144. “On Vector Dominance” at *Hadrons and Strings*, ECT*, Trento, Italy (invited speaker), (July 2004).
143. “Targets of Opportunity for String Theory: Unexplained Dynamical Regularities of QCD” at *Hadrons and Strings*, ECT*, Trento, Italy (invited speaker), (July 2004).
142. “Exotica” at *Hadrons and Strings*, ECT*, Trento, Italy (invited speaker), (July 2004).
141. “The Interpretation of Recently Reported Exotic Baryons” at *BEACH04*, Chicago, IL (invited speaker), (June 2004).

140. “Quarks in Hadrons” at the JLab Annual Users Group Meeting, Newport News, VA (invited speaker), (June 2004).
139. “Exotica,” at *Continuous Advances in QCD 2004* University of Minnesota, Minneapolis, MN (invited speaker), (May 2004).
138. “Gluon Spin Basics,” at *Workshop on Hadron Structure and Spectroscopy*, Paris, France (invited speaker), (March 2004).
137. “Diquarks, Tetraquarks Pentaquarks, A Re-examination of Exotics in QCD” at *Multi-quark Hadrons; four, five and more?*, Kyoto, Japan (invited speaker), (February 2004).
136. “Diquarks, Tetraquarks, Pentaquarks: Exotic Hadrons in QCD,” at *Quark Matter 2004*, Berkeley, CA (invited speaker), (January 2004).
135. “Exotic Spectroscopy,” at the 4th Circum-Pan-Pacific Spin Conference, INT University of Washington, Seattle, Washington (invited speaker) August 2003.
134. “Gluon Spin Basics,” at the 4th Circum-Pan-Pacific Spin Conference, INT University of Washington, Seattle, Washington (invited speaker) August 2003.
133. “Implications of an Exotic Baryon,” at the Gordon Conference, Waterville, ME (invited speaker) July 2003.
132. “The Casimir Effect: From the Tabletop to the Standard Model,” at the Crakow School of Theoretical Physics, Zakopane, Poland (invited lecturer) June 2003.
131. “Strangeness,” at the Conference on the Intersections of Nuclear and Particle Physics, New York, NY (invited speaker) May 2003.
130. “Insight into the Scalar Mesons from a Lattice Calculation,” at the workshop: Scalar Mesons: an Interesting Puzzle for QCD, SUNY Institute of Technology, Utica, NY (invited speaker) May 2003.
129. “Unnatural Acts: Unphysical Consequences of Imposing Boundary Conditions on Quantum Fields,” at the 25th Annual Montreal-Rochester-Syracuse-Toronto Conference on High Energy Physics, ”JoeFest”, Syracuse University (invited speaker) May 2003.
128. “Unsolved Mysteries of QCD”, at the INT Workshop o QCD and String Theory, Institute for Nuclear Theory, University of Washington, Seattle, Washington (invited speaker), February 2003.
127. “What’s the Matter with Strangeness?” at the International Workshop on Parity Violation, Mainz, Germany, (opening speaker) June 2002.
126. “Casimir Effects: From Grounded Plates to the Standard Model,” at the Workshop on Continuous Advances in QCD2002/Arkadyfest, honoring the 60th Birthday of Arkady Vainshtein, Theoretical Physics Institute, University of Minneapolis, MN (opening speaker) May 2002.
125. “QCD Spin Physics: From the Allotropes of Hydrogen to the Polarized Collider at RHIC,” at the Brookhaven Spin Physics Celebration, Brookhaven National Laboratory, NY (invited speaker) April 2002.
124. “Fundamental Physics from Transversity,” at the European Workshop on The QCD Structure Of The Nucleon: QCD-N’02, Ferrara, Italy (invited speaker) April 2002.
123. “Physics of the Nucleon Spin,” at the Electron Ion Collider Workshop, Brookhaven National Laboratory, NY (opening speaker) February 2002.
122. “Open Questions in QCD Spin Physics” at The 3rd Circum-Pan-Pacific Symposium on High Energy Spin Physics, Peking University, Beijing, China (opening speaker) May 2001.

121. “The Unusual Role of the Strange Quark in QCD ” at the Herman Feshbach Memorial Symposium, MIT, Cambridge, MA (invited speaker) May 2001.
120. “Quantum Energies of Interfaces” at Quantum Field Theory under the Influence of External Conditions, Leipzig, Germany (invited speaker), September 2001.
119. “Open questions in spin physics” at the International workshop on the spin structure of the proton and polarized collider physics, ECT*, Trento, Italy (invited speaker), July 2001.
118. “High Energy Spin Physics” at the “Vernon Hughes Celebraton”, Yale, New Haven, CT (invited speaker), May 2001.
117. “White Paper on RHIC Spin” at the Brookhaven Town Meeting, BNL, Brookhaven, Upton, NY (invited speaker), January 2001.
116. “Open Questions in QCD Spin Physics” at the 3rd Circum-Pan-Pacific Symposium “High Energy Spin Physics”, Beijing, China (opening speaker), October 2000.
115. “Spin: Progress and Prospects” at the 14th International Spin Physics Symposium, SPIN 2000, Osaka, Japan (opening speaker), October 2000.
114. “The Spin Structure of the Nucleon: Theoretical Overview” at the Workshop on Pysics with an Electron Polarized Light-Ion Collider, Cambridge, MA (invited speaker), June 2000.
113. “Transversity” at the Frascati National Laboratory Spring School, Frascati, Italy (invited speaker), May–June 2000.
112. “Theory of the Nucleon Spin” at the Royal Society Discussion Meeting, “The Quark Structure of Matter”, London, UK (invited speaker), May 2000.
111. “T ransversity” at the RIKEN/BNL Workshop on Transverse Spin Physics, BNL, Brookhaven, Upton, NY (invited speaker), March 2000.
110. “Color, Spin, and Flavor-Dependent forces in Quantum Chromodynamics” at the Gregory Breit Centennial Symposium, Yale, New Haven (invited speaker), October 1999.
109. “Probing the Nucleon at RHIC” at the RHIC Dedication Ceremony, BNL, Brookhaven, Upton, NY (invited speaker), October 1999.
108. “Angular Momentum in QCD” at the International Workshop Challenges in QCD, Kfar Giliadi, Israel (invited speaker), June 1999.
107. “Open questions in Spin Theory and the RHIC Spin program” at the Conference on Polarized Protons at High Energies - Accelerator Challenges and Physics Opportunities, DESY, Hamburg, Germany (opening theory speaker), May 1999.
106. “Parton Angular Momentum” at the 7th International Workshop on Deep-Inelastic Scattering and QCD (DIS 99), DESY-Zeuthen, Germany (invited speaker), April 1999.
105. “Theoretical Overview of Transversity and Transverse Observables” at the Transverse Physics Workshop at DESY-Zeuthen, Germany (opening speaker), April 1999.
104. RIKEN Winter School, Shimoda, Ito, Japan (principal lecturer), December 1998.
103. Annual Meeting of the Division of Nuclear Physics of the Physical Society, Santa Fe, NM (invited speaker), October 1998.
102. Sid Drell Conference, SLAC, Stanford (invited speaker), July 1998.
101. Santa Fe Workshop “Perturbative and non-Perturbative Aspects of the Standard Model”, Santa Fe, NM (invited lecturer) August 1998.
100. Workshop on “Deep Inelastic Nonforward and Forward Lepton-Nucleon Scattering”, and Graduiertenkolleg, Regensburg, Germany (invited lecturer) July 1998.

99. Third Workshop on Continuous Advances in QCD, University of Minnesota, Minneapolis, MN (invited speaker), May 1998.
98. Hadron Physics in the 21st Century, Washington, DC (invited speaker), March 1998.
97. DESY Zeuthen Workshop “Deep Inelastic Scattering off Polarized Targets: Theory Meets Experiment”, DESY, Zeuthen, Berlin, Germany (invited speaker), September 1997.
96. CTEQ Summer School, Lake Como, WI (invited lecturer), May 1997.
95. CERN Workshop on the Strange Structure of the Nucleon (opening theory speaker), March 1997.
94. TJNAF Workshop on “Deep-Inelastic Structure of Nuclei” (summary speaker), December 1996.
93. Workshop on Collider Physics, GSI, Darmstadt, Germany (keynote speaker), June 1996.
92. DIS96 Workshop: Deep Inelastic Scattering and Related Phenomena, University of Rome (invited speaker), April 1996.
91. Institute for Theoretical Physics, Minneapolis, symposium on Continuous Advances in QCD, Minneapolis, Minnesota (invited speaker), March 1996.
90. RIKEN Symposium on the Spin Structure of the Nucleon, Tokyo, Japan, (keynote speaker) December 1995.
89. ICTP Trieste Workshop: Trends in Collider Spin Physics, Trieste, Italy, (keynote speaker), December 1995
88. 1995 Erice School on the Spin Structure of the Nucleon, Erice, Sicily, Italy (principal lecturer), August 1995.
87. APS/AAPT Joint Meeting, University of Connecticut, Storrs (principal speaker), April 1995.
86. Internal Spin Structure of the Nucleon, Yale, New Haven (principal speaker), January 1994.
85. Workshop on Physics at HERA with Internal Targets, DESY, Hamburg (principal speaker), September 1993.
84. Workshop on Perspectives of High Energy Strong Interaction Physics at Hadron Facilities, Fermilab (invited speaker), August 1993.
83. QCD in Nuclear Physics, Gordon Conference, Tilton, New Hampshire (principal speaker), July 1993.
82. Annual United Kingdom Particle Theory Meeting, Rutherford Laboratory (invited speaker), December 1992.
81. Explorations in Theoretical Physics, Lectures in Honor of Francis Low on the Occasion of his 70th Birthday, MIT, Cambridge (principal speaker), December 1992.
80. 10th International Symposium on High Energy Spin Physics, Nagoya, Japan (principal speaker), November 1992.
79. Institute for Advanced Study of the University of Indiana (fellow), October–

November 1992.

78. QCD and Hadron Structure – Graduiertenkolleg, Kloster Banz, Staffelstein, Germany (principal lecturer), June 1992.
77. Baryon '92 – International Conference on the Structure of Baryons and Related Mesons, Yale, New Haven (principal speaker) June 1992.
76. SLAC Workshop on High Energy Electroproduction and Spin Physics, SLAC, Stanford (principal speaker), February 1992.
75. International Symposium on Hypernuclear and Strange Particle Physics, Shimoda, Japan (principal speaker), December 1991.
74. Spin Muon Collaboration Annual Meeting, Paris, France (principal speaker), December 1991.
73. Symposium in Honor of Professor Kenneth Johnson, MIT, Cambridge, MA (principal speaker), November 1991.
72. Sante Fe QCD Study Group, Sante Fe, NM (founder, organizer and participant), July/August 1991.
71. Gordon Research Conference QCD IN NUCLEAR PHYSICS, Tilton, NH (principal speaker), July 1991.
70. Strange Quark Matter in Physics and Astrophysics, Aarhus, Denmark (principal speaker), May 1991.
69. American Physical Society Washington Meeting, Joint Symposium of the Division of Nuclear Physics and Particles and Fields (invited speaker), April 1991.
68. Workshop on High Energy Probes of QCD and Nuclei, Pennsylvania State University, State College (invited speaker), March 1992.
67. International Conference on Spin and Isospin in Nuclear Interactions, Telluride, Colorado (invited speaker), March 1991.
66. Hadronic Physics with Electrons Beyond 10 GeV, Dourdan, France (invited speaker), October 1990.
65. Sante Fe QCD Study Group, Sante Fe, NM (founder, organizer and participant), July/August 1990.
64. Paris '90: VII International Conference on Polarization Phenomena in Nuclear Physics (principal speaker), July 1990).
63. QCD '90, Montpellier, France (invited speaker), July 1990).
62. Nuclear Physics in the 1990's: A Symposium in Honor of Akito Arima (invited speaker), May 1990.
61. Workshop on Hadron Structure Functions and Parton Distributions, Fermilab (invited speaker), April 1990.
60. School on Fundamental Physics and Cosmology, Islamabad, Pakistan (principal lecturer), March 1990.
59. PASCOS-90 The First International Symposium on Particles, Strings and Cosmology, Boston (invited speaker), March 1990.
58. DPF 90: Annual Meeting of the Division of Particles and Fields of the Physical Society, Rice University, Houston, TX (invited speaker), January 1990.

57. Workshop on High Energy Electro-Nuclear Physics, Asilomar, CA (invited speaker), October 1989.
56. Sante Fe QCD Study Group, Sante Fe, NM (founder, organizer and participant), August 1989.
55. Baltimore Meeting of the American Physical Society (invited speaker), May 1989.
54. Topical Conference on Electronuclear Physics with Internal Targets, SLAC (invited speaker), January 1989.
53. Los Alamos Workshop on Nuclear and Particle Physics on the Light Cone, Los Alamos (invited speaker), August 1988.
52. First European Workshop on Hadron Physics in the 1990's with Multi-GeV Electrons, Seillac, France (opening speaker), June 1988.
51. Third Conference on the Intersections of Particle and Nuclear Physics (conference summary speaker), May 1988.
50. International Conference on Physics and Astrophysics of Quark-Gluon Plasma (ICPA-QGP), Bombay (principal speaker), February 1988.
49. Topical Seminar, *Hadrons and Structure of Matter*, Moscow (invited speaker), November 1987.
48. IX PANIC Meeting on the Intersections of Particle and Nuclear Physics, Kyoto, Japan (opening speaker), April 1987.
47. Workshop on Nuclear Physics with Internal Targets at SLAC (invited participant and lecturer), January 1987.
46. Quantum Chromodynamics: Successes in Particle, Perspectives for Nuclear Physics, Trieste (principal lecturer), September 1986.
45. SLAC Summer Institute Topical Conference Special Session in Honor of the Sixtieth Birthday of Sidney Drell (principal speaker), August 1986.
44. Institute of Theoretical and Experimental Physics, Moscow (invited visitor and lecturer), June 1986.
43. IX Warsaw Symposium on Elementary Particle Physics, Kazimierz, Poland (lecturer), May 1986.
42. First Workshop on Antimatter Physics at Low Energies, Fermilab (opening speaker), April 1986.
41. XII European Conference on the Physics and Chemistry of Complex Nuclear Reactions, Neve Ilan, Israel (invited speaker), October 1985.
40. Institute for Theoretical Physics (UCSB) Workshop on Nuclear Chromodynamics (invited participant), August 1985.
39. Los Alamos Workshop on Relativistic Dynamics and Quark-Nuclear Physics (principal lecturer), June 1985.
38. New Particles '85, Madison, Wisconsin (invited speaker), May 1985.
37. XX Rencontre de Moriond, *QCD and Beyond* (conference summary speaker), March 1985.
36. Bevelac Physical Sciences User Meeting (invited speaker), February 1985.
35. VII High Energy Heavy Ion Study, GSI Darmstadt (invited speaker), October 1984.
34. VII European Symposium on Antiproton Interactions (opening speaker), July 1984.

33. Workshop on Weak Interaction Symmetry Breaking at SSC Energies, Berkeley (invited participant), June 1984.
32. Nuclear Structure Gordon Conference (lecturer), August 1983.
31. Virginia Polytechnic Institute and State University Summer Workshop in Particle theory (principle lecturer), August 1983.
30. Fourth United Kingdom Summer Institute in Theoretical Particle Physics (principal lecturer), July–August 1983.
29. Washington Meeting of the American Physical Society – General Interest Session of the Division of Nuclear Physics (invited speaker), April 1983.
28. University of Washington Summer Institute (invited participant and lecturer), July 1982.
27. Tonji University, Shanghai, China (visiting scientist and lecturer), December 1981.
26. Peking University, Beijing, China (visiting scientist and lecturer), October–November 1981.
25. Summer School in Quantum Field Theory, Les Houches (lecturer), August 1981.
24. Lepton-Photon Symposium, Bonn, FRG (rapporteur), August 1981.
23. Aspen Center for Physics (visiting scientist), July–August 1981.
22. XX International Conference on High Energy Physics, Madison, Wisconsin (parallel session speaker and organizer), July 1980.
21. Washington Meeting of the American Physical Society – General Interest Session of the division of Nuclear Physics (invited speaker), April 1980.
20. April 1980 XIX Schladming Winter School, Schladming, Austria (principal lecturer), March 1980.
19. Interactional School of Subnuclear Physics “Ettore Majorana,” Erice (principal lecturer), July–August 1979.
18. Rutherford Laboratory Workshop on Quantum Chromodynamics (invited speaker), May 1979.
17. Symposium on Multiquark Spectroscopy – Nijmegen (principal speaker), January 1979.
16. PHYSICS AT HIGH ENERGIES, A Symposium in Celebration of the 100th Anniversary of the University of Stockholm (principal speaker), September 1978.
15. XIII Rencontre de Moriond, *Phenomenology of Quantum Chromodynamics* (invited speaker), March 1978.
14. Annual Meeting of the American Physical Society in San Francisco (invited speaker), January 1978.
13. Rutherford Laboratory Workshop on Baryonium Physics (invited speaker), January 1978.
12. S LAC Summer Institute Topical Conference on Quark and Lepton Spectroscopy (lecturer), July 1977.
11. Aspen Center for Physics (visiting scientist), June–July 1977.
10. Particles and Fields 1976, APS Division of Particles and Fields Annual Meeting, Brookhaven (invited speaker), October 1976.
9. Topical Conference on Baryon Resonances, Oxford (invited speaker), July 1976.
8. XI Rencontre de Moriond, New Fields in Hadronic Physics, (invited speaker), March 1976.

7. Aspen Center for Physics (visiting scientist), Summer 1975.
6. Aspen Center for Physics (visiting scientist), Summer 1974.
5. Moscow Seminar on Quark and Parton Problems (invited speaker), Summer 1974.
4. University of California (Santa Cruz) Summer School in High Energy Physics (principal lecturer), Summer 1973.
3. New York Academy of Sciences Conference, Recent Advances in Particle Physics, (invited speaker), March 1973.
2. International School of Subnuclear Physics, “Ettore Majorana,” (participant, lecturer, Racah Prize Scholarship), July–August 1972.
1. Scottish Universities Summer School in High Energy Physics (participant), Summer 1970.