

## **JOHN F. DONOGHUE**

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**Personal Data:** Born November 30, 1950  
U.S. Citizen  
Married, 3 children

**Research Field:** Theoretical Elementary Particle Physics  
- Effective Field Theory  
- Particle Phenomenology  
- Fundamental Interactions  
- Effective Field Theory of General Relativity

### **Education:**

1968-1972 B.S. Physics, June 1972, University of Notre Dame  
1972-1976 Ph.D. Physics, September 1976, University of Massachusetts

### **Employment:**

1976-1978 Research Associate, Carnegie Mellon University  
1978-1980 Research Associate, Massachusetts Institute of Technology  
1980-1984 Visiting Assistant Professor, University of Massachusetts  
1984-1985 Visiting Associate Professor, University of Massachusetts  
1985-1988 Associate Professor, University of Massachusetts  
1988-2011 Professor, University of Massachusetts  
1989-1990 Scientific Associate, CERN, Geneva  
Fall 1999 Scientific Associate, CERN, Geneva  
1996-2003 Head, Department of Physics  
Spring 2003 Visiting Researcher, IHES, Bures sur Yvette, France  
Fall 2005 Acting Head, Department of Physics  
2011-2015 Distinguished Professor, University of Massachusetts  
2015 - present Distinguished Professor Emeritus, University of Massachusetts

### **Honors and Awards:**

1987 Samuel F. Conte Faculty Research Fellowship  
1990 Fellow—American Physical Society  
2003 Outstanding Service Award, College of Natural Science and Mathematics  
2005 Chancellor's Medal and Distinguished Faculty Lectureship  
2015 Erwin Schroedinger Visiting Professor – University of Vienna

**Memberships:**

American Physical Society, Division of Particles and Fields, Fellow

**Selected Service Activities:**

Divisional Associate Editor, Physical Review Letters 1992-1995

Divisional Associate Editor, Physical Review D 1989-1992

Scientific Advisory Council – Particle Data Group 1987-1990

Scientific Director, Theoretical Advanced Study Institute (TASI) 1994

Dannie Heinemann prize selection committee - APS – member 2006 and chair 2007

JJ and Noriko Sakurai Dissertation prize selection committee – APS – member 2012, chair 2013

# JOHN F. DONOGHUE - COMPLETE PUBLICATION LIST

## A. Conference Proceedings and other Publications:

1. Asymmetries and polarization in deep inelastic neutrino scattering, "Proceedings of the Neutrino 78 Conference", ed. by E.C. Fowler (Purdue Univ., 1978), p. c229.
2. Dynamics of light hadrons—mostly glueballs, "Experimental Meson Spectroscopy—1980", Ed. by S.U. Chung and S.J. Lindenbaum, p. 104.
3. Scattering quarks off the vacuum, "High Energy Physics—1980", ed. by L. Durand and L.G. Pondrum, p. 1042.
4. Glueballs and the pion, "High Energy Physics—1980", ed. by L. Durand and L.G. Pondrum, p. 35.
5. Glueballs in the bag, in "Gauge Theories, Massive Neutrinos and Proton Decay" (Orbis Scientia 1981), edited by A. Perlmutter, Plenum (New York, 1981), p.85.
6. Glueballs and the vacuum, in "Theoretical Aspects of Quantum Chromodynamics", edited by J.W. Dash (Marseille, 1981), p. 136.
7. Expectations for glueballs, in "Particles and Fields—1981: Testing the Standard Model", ed. by C. Heusch and W.T. Kirk (AIP, 1982), p. 97.
8. The Chew-Low theory and the quark model, in "Asymptotic Realms of Physics—Essays in Honor of Francis Low", ed. by A. Guth, K. Huang and R.L. Jaffe (MIT Press, Cambridge, 1983), p. 128.
9. Bag models of hadrons, (with C. DeTar), Annual Review of Nuclear and Particle Science, Vol. 33, p. 235 (1983).
10. Glueball candidates, "Proceedings of the XXI International Conference on High Energy Physics", Journal de Physique D3, 189 (1983).
11. The status of semileptonic hyperon decay, "Proceedings of the XXI International Conference on High Energy Physics", Journal de Physique C3, 231 (1983).
12. Gluons, "McGraw Hill Yearbook of Science and Technology", 1984, p. 200.
13. Mass and mixing of pseudoscalar mesons:  $\eta'(960)$  and  $i(1440)$ , in "Gluons and Heavy Flavors", ed. by J. Tran Thanh Van, Editions Frontieres (gif sur Yvette, 1983) p. 505.
14. Studies of the  $J^{PC} = 0^{-+}$  spectrum, in "Experimental Meson Spectroscopy—1983", ed. by S.J. Lindenbaum (AIP, NY, 1984) p. 107.

15. Low energy weak interactions and the quark model, in "Phenomenology of Unified Theories—From the Standard Model to Sypersymmetry", ed. by H. Galic, B. Guberina and D. Tadic (World Scientific, 1984) p. 1.
16. The proton as a soliton and effective chiral Lagrangians in "The Quark Structure of Matter", ed. by N. Isgur, G. Karl and P.J. O'Donnell (World Scientific, 1985) p. 83.
17. Theory summary—hadron spectroscopy 1985, in "Hadron Spectroscopy—1985", ed. by S. Oneda (AIP, 1985), p. 460.
18. CP violation in the KM and Higgs boson models in "The Sante Fe Meeting" ed. by T. Goldman and M.M. Nieto (World Scientific, 1985) p. 326.
19. Theta, phi-phi, and iota, "Proceedings of the International Europhysics Conference on High-Energy Physics", ed. by L. Nitti and G. Preparata, p. 326.
20. Weak decay and CP violation, "Proceedings of the International Europhysics Conference on High-Energy Physics", ed. by L. Nitti and G. Preparata, p. 261.
21. CP violation experiments using hyperons at a  $p\bar{p}$  machine, "Proceedings of the Workshop on Antimatter Interactions at Low Energy", ed. by B. Bonner and L.S. Pinsky (Fermilab 1986) p. 241.
22. CP-odd asymmetry at low energy, in "Intersections between Particle and Nuclear Physics" (AIP, NY, 1986) ed. by D. Geesaman, p. 495.
23. Hadron spectroscopy summary, in "Intersections between Particle and Nuclear Physics" (AIP, NY, 1986) ed. by D. Geesaman, p. 313.
24. CP violation: status and future, in "Quarks, Strings, Dark Matter and All the Rest", (World Scientific, Singapore, 1987) ed. by R. Panvini, p. 13.
25. Summary of  $\varepsilon$ ,  $\varepsilon'$  and the  $\Delta I = 1/2$  rule, "Proceedings of the XXIII International Conference on High Energy Physics", (World Scientific, Singapore, 1987), ed. by S. Loken, p. 862.
26. On the content of the nucleon, "Proceedings of the Second International Conference on  $\pi N$  Physics", ed. by W. Gibbs and B. Nefkens, (Los Alamos, 1987) p. 283.
27. New ways to find CP violation, "New and Exotic Phenomena" ed. by O. Fackler and J. Tran Thank Van, p. 85 (Editions Frontiers; Gif sur Yvette) (1987).
28. On the content of the nucleon, "Proceedings of the Second Int. Conf. on  $\pi N$  Physics", ed. by W. Gibbs and B. Nefkens, (Los Alamos, 1987) p. 283.
29. Overview of the theory of hyperon decay, "High Energy Spin Physics", ed. by K. Heller (AIP, NY) p. 418.

30. Chiral symmetry in QCD, "Proceedings of the III Int. Conf. on Intersection between Nuclear and Particle Physics", ed. by G. Bunce, (AIP, NY, 1988) p. 68.
31. CP violation in kaon, hyperon and B meson systems, "Proceedings of the III Int. Conf. on Intersections between Nuclear and Particle Physics", ed. by G. Bunce, (AIP, NY, 1988) p. 341.
32. Nonleptonic kaon decay and chiral symmetry, "Proceedings of the Ringberg Workshop on Hadronic Weak Decays and Matrix Elements", (Nucl. Phys. B7A, 1989) 59.
33. On the origin of chiral lagrangians, "Symmetry Violations in Subatomic Physics", ed. by B. Castel and P.J. O'Donnell, (World Scientific, Singapore, 1989) p. 3.
34. Light quark masses and chiral symmetry, Ann. Rev. Nucl. Part. Sci., 39, 1 (1989).
35. CP violation, (with B.R. Holstein) "1990 Yearbook: Encyclopedia of Physical Science and Technology", ed. R.A. Meyers, Academic Press, New York (1989), p. 289.
36. CP violation, (with B.R. Holstein) "Encyclopedia of Modern Physics", Ed. R.A. Meyers, Academic Press, New York (1989), p. 109.
37. Program for rare K decays, "New Directions for Neutrino Physics", (FNAL, 1989) p. 187.
38. Models of  $b \rightarrow u$  semileptonic decay, "CP Violation and Beauty Factories", ed. D.B. Cline and A. Freedman, Annals of N.Y. Acad. of Science 619, 67 (1991).
39. Chiral symmetry as an experimental science, "Medium Energy Antiprotons and the Quark-Gluon Structure of Hadrons", ed. R. Landua, J-M. Richard and L. Klapisch (Plenum, NY, 1991) p. 39.
40. Rare meson decay and low energy QCD, "Proceedings of Workshop on Rare Decays of Light Mesons", Paris (1990).
41. CP violation in kaon decays, "Proceedings of Workshop on Physics for Dafne", ed. by G. Pancheri, p. 131 (INFN, Frascati, 1991).
42. SU(3) and symmetry groups (with S.L. Glashow) "Encyclopedia of Physics", ed. by R. Lerner and G. Trigg (AIP, 1991) p. 1215.
43. B decays, report of the working group on high luminosities at LEP, J.F. Donoghue and D. Treille (convenors) et. al., CERN Yellow Report 91-02, ed. by E. Blucher et. al. (CERN, 1991).
44. Theories of Heavy Quark Decay, "Heavy Flavour Physics", ed. by M. Davies and G. Wormser, p. 73-91 (Edition Frontieres, Gif-sur-Yvette, 1992).
45. Introduction to nonlinear effective field theory "Effective Field Theories of the Standard Model", ed. by U-G. Meissner, p. 3-20 (World Scientific, Singapore, 1992).

46. Quark Masses, Kaon masses and  $\eta \rightarrow 3\pi$  "Proceedings of the XXVI Intl. Conf. on High Energy Physics", ed. J. Sanford (AIP, 1993) p 1562-1565.
47. Light Quark Masses and Mixing Angles "The Building Blocks of Creation—From Microfermis to Megoparsecs (TASI 93)", (World Scientific, Singapore 1994) ed. S. Raby and T. Walker, 27 pages.
48. On the Marriage of Chiral Perturbation Theory and Dispersion Relations, in "Chiral Dynamics in Hadron and Nuclei", ed. by Dong-Pil Min and Mannque Rho (Seoul National University Press, 1995) p. 87.
49. Calculation of a Weak Matrix Element using Weinberg Sum Rules, "Proceedings of the XXVII International Conference on High Energy Physics", ed. by P.J. Bussay and I.G. Knowles (World Scientific, 1995) p. 1067.
50. The Ideas of Gravitational Effective Field Theory, "Proceedings of the XXVII International Conference on High Energy Physics", ed. by P.J. Bussay and I.G. Knowles (World Scientific, 1995) p. 1061.
51. Introduction to the Effective Field Theory Description of Gravity, "Proceedings of the Advanced School on Effective Field Theory", Almunecar, Spain, June 1995,
52. Gravity and Effective Field Theory: A Talk for Phenomenologists. "Proceedings of the International Symposium on Particle Theory and Phenomenology, Ames, Iowa, 1995
53. Dispersion Relations and Effective Field Theory, "Proceedings of the Advanced School on Effective Field Theory", Almunecar, Spain, June 1995.
54. The Quantum Theory of General Relativity at Low-energies, "Proceedings of the Annual European Meeting on General Relativity, Cosmology, Astrophysics and Quantum Field Theory Journees Relativistes," Ascona, Switzerland, 26, (1996). *Helv. Phys. Acta* **69**, 269 (1996).
55. Quantum General Relativity is an Effective Field Theory, "Proceedings of the 10th International Conference on Problems of Quantum Field Theory," Alushta, Ukraine, 13, May 1996.
56. Final state interactions in the decays of heavy quarks, "Proceedings of the 3rd German-Russian workshop on progress in heavy quark physics," 20, (1996).
57. New Results on Final State Interactions in Heavy Quark Physics, "Proceedings of the XXXI Rencontre de Moriond: Electroweak Interactions and Unified Theories", Les Arcs, France, 16, March 1996. "Les Arcs 1996, Electroweak Interactions and Unified Theories," 341.
58. On the factorization in non-leptonic decays of heavy mesons, A.A. Petrov and J.F. Donoghue invited talk at the Division of Particles and Fields of the American Physical Society, Minneapolis, Minnesota, 11-15 Aug 1996. in "DPF '96: Proceedings" ed. by H. Heller, J.K. Nelson, D. Reeder. Singapore, World Scientific, 1998 781-784

59. Properties of soft final state interactions in B decays. J.F. Donoghue, E. Golowich, A. Petrov, and J.M. Soares invited talk at the Division of Particles and Fields of the American Physical Society, Minneapolis, Minnesota, 11-15 Aug 1996. in "DPF '96: Proceedings" ed. by H. Heller, J.K. Nelson, D. Reeder. Singapore, World Scientific, 1998 p.785-788
60. Nonperturbative Methods in Kaon Physics: Aside From the Lattice, "Workshop on K Physics," Orsay, France, (1996).
61. Perturbative Dynamics of Quantum General Relativity, "Proceedings of the 8th Marcel Grossmann Meeting on Recent Developments in Theoretical and Experimental General Relativity, Gravitation and Relativistic Field Theories (MG 8)," Jerusalem, Israel (1997).
62. An Introduction to Effective Field Theory, Lectures at the 6th Workshop on Hadron Physics, Florianopolis, Santa Catarina, Brazil, 16-21 Mar 1998. In "Hadron physics 98" ed by E. Ferreira, F. de Souza Curz and S. Avancini (World Scientific, 1999) p. 2-26.
63. Fine Tunings and Quark Masses: Phenomenology of Multiple Domain Theories, hep-ph/9912298, 3pp. Proceedings International Europhysics Conference on High-Energy Physics (EPS-HEP 99), Tampere, Finland, 15-21 Jul 1999. pp. 764-766
64. Random Values of the Physical Parameters, hep-th/0012047 3pp. Talk given at DPF 2000: The Meeting of the Division of Particles and Fields of the American Physical Society, Columbus, Ohio, 9-12 Aug 2000. Published in the proceedings, ed. by K.K. Gan, R. Kass. Singapore, World Scientific, 2001. (Int. J. Mod. Phys. A. Suppl. 1A-C (2001) 1)
65. New Insights Concerning Dimension Eight Effects in Weak Decays, hep-ph/0012072 3pp. Talk given at DPF 2000: The Meeting of the Division of Particles and Fields of the American Physical Society, Columbus, Ohio, 9-12 Aug 2000. Published in the Proceedings, ed. by K.K. Gan, R. Kass. Singapore, World Scientific, 2001. (Int. J. Mod. Phys. A. Suppl. 1A-C (2001) 1)
66. The influence of Dimension Eight Operators on Weak Matrix Elements, Invited talk at International Euroconference in Quantum Chromodynamics: 15 Years of the QCD – Montpellier Conference (QCD 00), Montpellier, France, 6-13 Jul 2000. hep-ph/0010111. Nucl.Phys.Proc.Suppl.**96**:329-335 (2001)
67. Theoretical Review of  $\varepsilon'/\varepsilon$  in the Standard Model, Invited rapporteur talk at KAON 2001, Pisa Italy, June 2001, Published in the proceedings, ed by F. Costantini, G. Isidori and M. Sozzi (Frascati Physics Series, Frascati, 2001).
68. Broken Symmetry, in "Building Blocks of Matter, a supplement to the Macmillan Encyclopedia of Physics", (Macmillan, 2003)
69. Renormalization, in "Building Blocks of Matter, a supplement to the Macmillan Encyclopedia of Physics", (Macmillan, 2003)

70. CP Violation (with B. R. Holstein), in Encyclopedia of Physical Science and Technology, Third Edition, Vol. 3 ,(Academic Press, 2001) pp. 853-856
71. Improved determination of  $B_7$  and  $B_8$ . E. Golowich, J.F. Donoghue, K. Maltman and V. Cirigliano, International Europhysics Conference on High-Energy Physics (HEP 2001), Budapest, Hungary, 12-18 Jul 2001. Published in “Budapest 2001, High energy physics” ed. By D Horvath, P. Levai and A. Patkos.
72.  $K \rightarrow \pi\pi$  electroweak penguins in the chiral limit. V. Cirigliano, J.F. Donoghue, E. Golowich, Kim Maltman,. Contributed to QCD 02: High-Energy Physics International Conference in Quantum Chromodynamics, Montpellier, France, 2-9 Jul 2002. Nucl.Phys.Proc.Suppl.**121**:199-202,2003, AIP Conf.Proc.**717**:675-679,2004 Also in \*Montpellier 2002, Quantum chromodynamics\* 199-202 Also in \*Aschaffenburg 2003, Hadron spectroscopy\* 675-679 e-Print Archive: hep-ph/0209332
73. The chiral limit matrix element  $K$  to  $\pi\pi$  of the electroweak penguin operators, K. Maltman, V. Cirigliano, J.F. Donoghue, E. Golowich, 2nd Asia Pacific Conference on Few-Body Problems in Physics (APFB 02), Shanghai, China, 27-30 Aug 2002. Published in Mod.Phys.Lett.**A18**:366-369 (2003)
74.  $\varepsilon'/\varepsilon$  and the electroweak penguin contribution.V. Cirigliano, J.F. Donoghue, E. Golowich and K. Maltman,. 31st International Conference on High Energy Physics (ICHEP 2002), Amsterdam, The Netherlands, 24-31 Jul 2002. Published in “Amsterdam 2002, ICHEP” Edited by S. Bentvelsen, P. de Jong, J. Koch, E. Laenen. Amsterdam, The Netherlands, North-Holland, 2003. 973p. (High Energy Physics Proceedings) p. 462-464
75. SU(3) and Symmetry Groups, published in the Encyclopedia of Physics, Wiley , 6 pages
76. The fine-tuning problems of particle physics and anthropic mechanisms, This is a chapter in the book 'Universe or Multiverse' ed. by Bernard Carr pp 231-246 (Cambridge Univ. Press).
77. When Effective Field Theories Fail, Opening talk at the International Workshop on Effective Field Theories, Valencia, Feb 2009, (Proceedings of Science) , PoS(EFT09)001.
78. Gauge non-invariance as tests of emergent gauge symmetry, (with M. M. Anber and U. Aydemir) arXiv:1007.5049 [hep-ph]. Proceedings of the 5th Meeting on CPT and Lorentz Symmetry (CPT'10) ed. By A Kostelecky, World Scientific Publishing 2010, p113.
79. The effective field theory treatment of quantum gravity, [arXiv:1209.3511 [gr-qc]]. AIP Conf. Proc. **1483**, 73 (2012) Proceedings of 6th International School on Field Theory and Gravitation (ISFTG 2012) : Petropolis, Rio de Janeiro, Brazil, April 23-27, 2012
80. Illuminating Light Bending, (with N. E. J. Bjerrum-Bohr, B. R. Holstein, L. Planté, and P. Vanhove), PoS CORFU2016 (2017) 077



## B. Journal Articles:

1. Charmed nonleptonic decay in asymptotically free theories, (with B.R. Holstein), Phys. Rev. **D12**, 1454 (1975).
2. Phenomenological analysis of a fixed-sphere bag model, (with E. Golowich and B.R. Holstein), Phys. Rev. **D12**, 2875 (1975).
3. Parity violating internucleon potential and strong interaction enhancement, Phys. Rev. **D13**, 2064 (1976).
4. Applications of a fixed sphere bag model, (with E. Golowich), Phys. Rev. **D14**, 1386 (1976).
5. Parity violating vector meson exchange internucleon potential in a modified factorization approach, Phys. Rev. **D15**, 184 (1977).
6. Strong interactions and the  $\Delta I = 1/2$  rule in weak nonleptonic decay, (with E. Golowich and B.R. Holstein), Phys. Rev. **D15**, 1341 (1977).
7. Cabibbo suppressed nonleptonic decays of charmed mesons, (with L. Wolfenstein), Phys. Rev. **D15**, 3341 (1977).
8. Quark sea and quantum chromodynamics, (with E. Golowich), Phys. Rev. **D15**, 3421 (1977).
9. Quark sea and the  $\Delta I = 1/2$  rule, (with E. Golowich), Phys. Lett. **69B**, 437 (1977).
10. Does the heavy charged lepton have its own neutrino?, (with L. Wolfenstein), Phys. Rev. **D17**, 224 (1978).
11. The Adler Weisberger relation and the quark model, (with D. Wyler), Phys. Rev. **D17**, 280 (1978).
12. Hadronic polarization in neutrino scattering, Phys. Rev. **D17**, 2922 (1978).
13. T violation in  $SU(2) \times U(1)$  gauge theories of leptons, Phys. Rev. **D18**, 1632 (1978).
14. Properties of charged Higgs bosons, (with Ling-Fong Li), Phys. Rev. **D19**, 945 (1979).
15. Finite renormalization, flavor mixing and weak decays, Phys. Rev. **D19**, 945 (1979).
16. Comment on polarized fragmentations functions, Phys. Rev. **D19**, 2806 (1979).
17. Tensor analysis of hadronic jets in quantum chromodynamics, (with F.E. Low and So-Young Pi), Phys. Rev. **D20**, 2759 (1979).
18. Unified treatment of the parity violating nuclear force, (with B. Desplanques and B.R. Holstein), Annals of Physics **124**, 449 (1980).

19. Analysis of  $\Delta S = 1$  nonleptonic weak decays and the  $\Delta I = 1/2$  rule, (with E. Golowich, W.A. Ponce and B.R. Holstein), Phys. Rev. **D21**, 186 (1980).
20. Dynamical effects in two body charm decay, (with B.R. Holstein), Phys. Rev. **21**, 1334 (1980).
21. The pion and an improved static bag, (with K. Johnson), Phys. Rev. **D21**, 1975 (1980).
22. Proton lifetime and branching ratios in SU(5), Phys. Lett. **92B**, 99 (1980).
23. Quark-vacuum scattering, Phys. Rev. **D22**, 1789 (1980).
24. A compendium of bag-model matrix elements of the weak nonleptonic Hamiltonian, (with E. Golowich, B.R. Holstein and W.A. Ponce), Phys. Rev. **D23**, 1213 (1981).
25. Low mass glueballs in the meson spectrum, (with K. Johnson and B.A. Li), Phys. Lett. **99B**, 416 (1981).
26. The annihilation diagram in three body D meson decay, (with B.R. Holstein), Phys. Lett. **99B**, 433 (1981).
27. Comment on the proton decay mode  $P \rightarrow e^+ \pi^0$ , (with G. Karl), Phys. Rev. **D24**, 230 (1981).
28. Implications of nuclear parity nonconservation, (with B.R. Holstein), Phys. Rev. Lett. **46**, 1603 (1981).
29. Higgs boson exchange models of CP violation and  $K \rightarrow 2 \pi$ , (with J.S. Hagelin and B.R. Holstein), Phys. Rev. **D25**, 195 (1982).
30. Quark model calculation of the weak electric coupling in semileptonic baryon decay, (with B.R. Holstein), Phys. Rev. **D25**, 206 (1982).
31. Phenomenology of an f(1270)-glueball mixture, Phys. Rev. **D25**, 1875 (1982).
32. Bogoliubov transformations and calculation of coupling constants, Phys. Rev. **D25**, 854 (1982).
33. Evidence for SU(3) breaking in Cabibbo-type fits of semileptonic hyperon decay, (with B.R. Holstein), Phys. Rev. **D25**, 2015 (1982).
34. Glueballs, Comments Nucl. Part. Phys. **10**, 277 (1982).
35. Interpreting the  $i(1440)$ , (with H. Gomm), Physics Letters **112B**, 409 (1982).
36. Strong bounds on weak couplings, (with B.R. Holstein), Physics Letters **113B**, 382 (1982).

37. Proton decay via three quark fusion, (with E. Golowich), Phys. Rev. **D26**, 3092 (1982).
38. The  $\Delta S = 2$  matrix element for  $K^0\bar{K}^0$  mixing (with E. Golowich and B.R. Holstein), Phys. Lett. **119B**, 412 (1982).
39. On the mixing of pseudoscalar mesons, (with H. Gomm), Phys. Lett. **121B**, 49 (1983).
40. QCD prediction for pseudoscalar production in radiative decays of heavy vector mesons, (with H. Gomm) Phys. Lett. **122B**, 309 (1983).
41. Wave function renormalization and nuclear parity violation, (with B.R. Holstein), Phys. Lett. **125B**, 509 (1983).
42. Renormalization and radiative corrections at finite temperature, (with B.R. Holstein), Phys. Rev. **D28**, 340 (1983).
43. Flavor changes in locally supersymmetric theories, (with H.P. Nilles and D. Wyler), Phys. Lett. **128B**, 55 (1983).
44. Calculation of the masses of  $\eta(549)$  and  $\eta'(960)$  in the bag model, (with H. Gomm), Phys. Rev. **D28**, 2800 (1983).
45. Direct quark model calculation of weak nonleptonic matrix elements, (with B.R. Holstein), Phys. Rev. **D29**, 489 (1984).
46. The gluon "mass" in the bag model, Phys. Rev. **D29**, 2559 (1984).
47. Long distance chiral contribution to the  $K_L K_S$  mass difference, (with E. Golowich and B.R. Holstein), Phys. Lett. **135B**, 481 (1984).
48. Dispersive contribution to  $K^0\bar{K}^0$  mixing and CP violation, (with B.R. Holstein), Phys. Rev. **D29**, 2088 (1984).
49. The temperature measured by a uniformly accelerated observer, (with B.R. Holstein), American Journal of Physics **52**, 730 (1984).
50. Kaon decays and a determination of the scale of chiral symmetry, (with E. Golowich and B.R. Holstein), Phys. Rev. **D30**, 587 (1984).
51. Predicting the proton mass from  $\pi\pi$  scattering data, (with E. Golowich and B.R. Holstein), Phys. Rev. Lett. **53**, 747 (1984).
52. Electromagnetic decays of glueballs, Phys. Rev. **D30**, 114 (1984).
53. Chiral symmetry and the penguin interaction, Phys. Rev. **D30**, 1499 (1984).
54. The principle of equivalence at finite temperature, (with B. Holstein and R.W. Robinett), General Relativity and Gravitation **17**, 207 (1985).

55. Renormalization of the energy momentum tensor and the validity of the equivalence principle at finite temperature, (with B.R. Holstein and R.W. Robinett), Phys. Rev. **D30**, 2561 (1984).
56. Measurement of the weak neutral current from nuclear parity violation, (with B.R. Holstein), Phys. Rev. **D31**, 70 (1985).
57. Signals of CP non-conservation in hyperon decay, (with S. Pakvasa), Phys. Rev. Lett. **55**, 162 (1985).
58. Reanalysis of Higgs-boson-exchange models of CP violation, (with B.R. Holstein), Phys. Rev. **D32**, 1152 (1985).
59. Quantum electrodynamics at finite temperature, (with B.R. Holstein and R.W. Robinett), Annals of Physics **164**, 233 (1985).
60. Nonleptonic decays of chiral solitons and a possible resolution of the S-wave/P-wave puzzle, (with E. Golowich and Y.-C. R. Lin), Phys. Rev. **D32**, 1733 (1985).
61. Semileptonic hyperon decay—a problem for chiral perturbation theory, (with B.R. Holstein), Phys. Lett. **160B**, 173 (1985).
62. Electromagnetic effects in  $\psi' \rightarrow J/\psi + \pi^0$  and quark masses, (with S.F. Tuan) Phys. Lett. **164B**, 401 (1985).
63. Chiral loops in  $\pi^0$ ,  $\eta^0 \rightarrow \gamma\gamma$  and  $\eta$ - $\eta'$  mixing (with B.R. Holstein and Y.-C.R. Lin), Phys. Rev. Lett. **55**, 2766 (1985).
64. Low energy weak interactions of quarks, (with E. Golowich and B.R. Holstein), Physics Reports **131** #'s 5 and 6 (1986) p. 319-428.
65. Dispersive effects in  $D^0$  -  $D^0$  mixing (with E. Golowich, B.R. Holstein and J. Trampetic), Phys. Rev. **D33**, 179 (1986).
66. The quark content of the proton, (with C. Nappi), Phys. Lett. **168B**, 105 (1986).
67. Is  $D^0 \rightarrow \phi K^0$  really a clear signal for the annihilation diagram?, Phys. Rev. **D33**, 1516 (1986).
68. A new four quark operator—the dipenquin (with E. Golowich and G. Valencia) Phys. Rev. **D33**, 1387 (1986).
69. Chiral symmetry, nonleptonic hyperon decay and the Feinberg-Kabir-Weinberg theorem (with B.R. Holstein), Phys. Rev. **D33**, 2717 (1986).
70. The lifetime of a deeply bound H dibaryon and the Cygnus X-3 events (with E. Golowich and B.R. Holstein) Phys. Lett. **174B**, 441 (1986).
71. Quantum mechanics in curved space (with B.R. Holstein), Am. J. Phys. **54**, 827 (1986).

72. Gravitational coupling at finite temperature (with B.R. Holstein and R.W. Robinett), Phys. Rev. **D34**, 1208 (1986).
73. Hyperon decays and CP nonconservation (with X.G. He and S. Pakvasa), Phys. Rev. **D34**, 833 (1986).
74. Chiral perturbation theory corrections to  $K_L \rightarrow \gamma\gamma$  (with B.R. Holstein and Y.-C.R. Lin), Nuc. Phys. **B277**, 651 (1986).
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## D. Impact Factors (6/23/2020):

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