

Curriculum Vitae

TA-PEI CHENG

Department of Physics and Astronomy, University of Missouri - St. Louis
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Degrees

A.B. Dartmouth College 1964 *Phi Beta Kappa, Magna cum Laude, Highest Distinction in Physics*
Ph.D. Rockefeller University 1969 *Advisor: A. Pais*

Employment

Regular positions:

1969-71 *Postdoctoral Member*, Institute for Advanced Study (Princeton)
1971-73 *Research Associate*, Rockefeller University
1973-76 *Assistant Prof*, 1976-78 *Associate Prof*, 1978-2007 *Professor*
2007- *Professor Emeritus*, University of Missouri - St. Louis

Concurrent positions:

1977-78 *Visiting Associate Professor of Physics*, Princeton University
1977-78 *Member*, Institute for Advanced Study
1978-79 *Chairman*, Department of Physics, Univ. of Missouri - St. Louis
1979-80 *Visiting Professor of Physics*, University of Minnesota
1982-83 *Visiting Scientist*, Lawrence Berkeley Lab, Univ. of California
1987-88 *Member*, Institute for Advanced Study
1991-92 *Visiting Professor of Physics*, Chinese University of Hong Kong
2002-08 *Honorary Professor of Physics*, University of Hong Kong
2009- *Adjunct Professor of Physics*, Portland State University

Awards

- *Rockefeller Institute Graduate Fellow* 1964-69
- *Fellow of the American Physical Society* 1982-
- *Principal Investigator*, National Science Foundation research grants (continuous funding 1975-1996)

Book Publications

- *Relativity, Gravitation & Cosmology: A Basic Introduction*, 2nd edition, Ta-Pei Cheng, (Oxford University Press, 2010) xiv + 435pp.
- *Relativity, Gravitation & Cosmology: A Basic Introduction*, Ta-Pei Cheng, (Oxford University Press, 2005) xii+336pp.
- *Gauge Theory of Elementary Particle Physics*, Ta-Pei Cheng and L. F. Li, (Oxford University Press, 1984) xi + 536pp; Russian translation (Mir, Moscow, 1987) 624 pp; Chinese issue (Science Press, Beijing, 2008) xiii+536pp.
- *Gauge Theory of Elementary Particle Physics: Problems & Solutions*, Ta-Pei Cheng and L. F. Li, (Oxford University Press, 2000) x+340 pp.
- *Gauge Invariance, An anthology with introduction and annotated bibliography*, T. P. Cheng and L. F. Li (eds.), American Assoc. of Physics Teachers, (College Park MD, 1990) 106 pp

Refereed Articles in Journals and Conference Proceedings

My publications have been cited well over 2,000 times as recorded by the "*Science Citation Index*". They have pioneered new directions in particle physics research:

- ¶ Presented the first evidence for a possibly significant strange quark content of the proton;
proposed new model of the nucleon's quark structure.

The Zweig Rule and the πN Sigma Term, T. P. Cheng, Physical Review D **13**, 2161 (1976).

Is $SU(2) \times SU(2)$ a Better Symmetry than $SU(3)$?, T. P. Cheng and R. F. Dashen, Physical Review Letters **26**, 594 (1971).

Chiral Symmetry and the Higgs-Boson Nucleon Couplings, T. P. Cheng, Physical Review D **38**, 2869 (1988).

Flavor and Spin Contents of the Nucleon in the Quark Model with Chiral Symmetry, T. P. Cheng and L. F. Li, Physical Review Letters **74**, 2872 (1995).

Why Naive Quark Model Can Yield a Good Account of the Baryon Magnetic Moments, T. P. Cheng and L. F. Li, Physical Review Letters **80**, 2789 (1998).

The Proton Spin and Flavor Structure in the Chiral Quark Model, L. F. Li and T. P. Cheng, in Computing Particle Properties, Lectures at the 36th International University School of Nuclear and Particle Physics, Schladming, Austria, (eds.) H. Gausterer and C. B. Lang (Lecture Notes in Physics 512, Springer-Verlag, Heidelberg, 1998), p115-160

Non-perturbative QCD Spin Studies, (Plenary talk), T. P. Cheng and L. F. Li, in SPIN 98 -- Proceedings of the 13th International Symposium on High Energy Spin Physics, 8 - 12 September 1998, Protvino, Russia (eds.) N E Tyurin et al. (World Scientific, Singapore, 1999), p.192-209

¶ Lepton-quark flavor changing processes as sensitive probes of new physics: presented the first gauge theories of muon number nonconservation, quark flavor changing Higgs couplings.

Nonconservation of Separate μ - and e - Lepton Numbers in Gauge Theories with V+A Currents, T. P. Cheng and L. F. Li, Physical Review Letters **38**, 381 (1977).

Muon Number Nonconservation Effects in a Gauge Theory with V+A Currents and Heavy Neutral Leptons, T. P. Cheng and L. F. Li, Physical Review D **16**,1425 (1977).

Muon Number Nonconservation in Gauge Theories, T. P. Cheng and L. F. Li, in Deeper Pathways in High Energy Physics, Proc. of Orbis Scientiae 1977, Coral Gables, (eds.) B. Kursunoglu et al. (Plenum Press, New York, 1977), p 659-671

Mass-Matrix Ansatz and Flavor Nonconservation in Models with Multiple Higgs Doublets, T. P. Cheng and M. Sher, Physical Review D **35**, 3484 (1987).

¶ Among the first gauge theory papers on neutrino masses and oscillations.

Hierarchy of Lepton Masses in Vector-like Theory with Majorana Particles, T. P. Cheng, Physical Review D **14**,1367 (1976).

Neutrino Masses, Mixings, and Oscillations in $SU(2)\times U(1)$ Models of Electroweak Interactions, T. P. Cheng and L. F. Li, Physical Review D **22**, 2860 (1980).

Suppression of Flavor Changing Neutral Current Effects due to Mixings with a Heavy Singlet Fermion, T. P. Cheng and L. F. Li, Physical Review D **45**, 1708 (1992).

¶ Proved low-energy theorems of radiative correction, which also facilitated the subsequent development of chiral perturbation theory.

Low-Energy Theorem for e^4 Compton Scattering Amplitudes, T. P. Cheng, Physical Review **176**, 1674 (1968).

Low Energy Theorem on Radiative Corrections, T. P. Cheng, Physical Review **184**, 1805 (1969).

¶ Systematic study of the renormalization group structure of gauge theories with scalar particles.

Higgs Phenomena in Asymptotically Free Gauge Theories, T. P. Cheng, E. J. Eichten, and L. F. Li, Physical Review D **9**, 2259 (1974).

Oral Presentations (Over 100 seminars and colloquia at physics departments and invited presentations at conferences.)

Rockefeller Univ (1967, 69, 71, 73); Niels Bohr Institute, Copenhagen (1967); New York Univ (1968); Princeton Univ (1969, 70, 77); SLAC, Stanford Univ (1969, 77); Institute for Advanced Study, Princeton (1970, 88); City College of New York (1971); Univ Pennsylvania (1971); Cornell Univ (1971); Univ Rochester (1971); Univ Rome (1972); CERN, Switzerland (1972, 77, 96); Dartmouth College (1972, 78); SUNY-Buffalo (1973); Wayne State Univ (1973); Univ Missouri - St.Louis (dept colloquia, 1973, 75, 76, 95, 00); Univ Illinois, Urbana-Champaign (1973, 80); Enrico Fermi Institute, Univ Chicago (1973); Northwestern Univ (1974); Purdue Univ (1974, 77); Univ Missouri - Rolla (1974, 76, 86, 96, 01); Saint Louis Univ (1975, 99); Univ Washington, Seattle (1975); Univ Toronto (1975); Univ Hawaii, (1975); Institute of Nuclear Study, Univ Tokyo (1975); Univ Kyoto (1975); Chinese Univ

Hong Kong (1976, 91, 92); Fermilab (1976, 79, 89); Aspen Center of Physics (1976, 90); Univ Maryland (1976); Lawrence Berkeley Lab, Univ California, (1977, 82); California Institute of Technology (1977); plenary talk at Coral Gables Conference, *Orbis Scientiae* (1977); Los Alamos Scientific Lab (1977); Brookhaven National Lab (1977); Rutherford Lab, Oxford, UK (1977); invited talk, American Physical Society Spring Washington Meeting (1978); invited talk, 1980 Guangzhou Conference on Theoretical Particle Physics, PRC (1980); Univ Minnesota (1980); Univ Missouri – Columbia (1981, 95); Southern Illinois Univ – Edwardsville (1981); Univ California – Davis (1983); Univ California - Santa Cruz (1983, 98); invited seminar, Berkeley SSC Workshop (1984); invited talk, 18th MASUA Symposium, Iowa State Univ (1985); Iowa State Univ (1987); Univ Kansas (1989); Benedictine College (1989); invited talk, APS Division of Particles and Fields Meeting at Rice Univ (1990); invited talk, APS Division of Particles and Fields Meeting at Univ British Columbia, (1991); Univ Hong Kong (1992, 94, 01, 03); invited talks, International Institute of Theoretical and Applied Physics, Iowa State Univ (1994); Washington Univ - St. Louis (1994); Institute of Physics, Academia Sinica, Taipei (1994); National Chung-Cheng Univ (1994); Madison Phenomenology Symposium, Ames, IA (1995); invited talk, Europhysics Conference on High Energy Physics, Brussels (1995); Argonne National Lab (1996); lecture series, Schladming Winter International School of Particle Physics, Austria (1997); Univ Kentucky (1998); plenary talk, 13th International Symposium on High Energy Spin Physics, Provo, Russia (1998); invited talk, mini-symposium, APS Centenary Meeting, Atlanta (1999); St. Louis Astronomy Society (2000, 2009); Univ Missouri - Kansas City (2001); Kalamazoo College (2001); Truman State Univ, MO, (2001);, Ohio Univ (2005); Denison Univ (2005); Portland State Univ (2010); invited talk, AAPT/PTRA, Portland OR (2010).