

JAMES T. CUSHING
Professor of Physics
University of Notre Dame

BORN: February 4, 1937

AT: Long Beach, California

Education

Loyola University, Chicago, Illinois; 1959; B.S. (Physics)
Northwestern University; 1960; M.S. (Physics)
University of Iowa; 1963; Ph.D. (Physics)

Professional History

Woodrow Wilson and NSF Predoctoral Fellow, 1959-63
Postdoctoral Research Associate, University of Iowa, 1963-64
NSF Postdoctoral Fellow, Imperial College, London, 1964-65
Postdoctoral Research Associate, Argonne National Laboratory, 1965-66
Assistant Professor of Physics, University of Notre Dame, 1966-69
Associate Professor of Physics, University of Notre Dame, 1969-78
Professor of Physics, University of Notre Dame, 1978-present
Professor of Philosophy, University of Notre Dame, 1990-1993

Research Areas

History and Philosophy of Twentieth Century Physics
Foundational Problems in Quantum Theory

Honors and Grants

Visiting Professor of Physics, 1969-70, Hampton Institute under auspices of Woodrow Wilson Foundation
Director of NSF Summer Institute in Physics, 1971
Visiting Scientist in AIP Visiting Scientists Program, 1971-72
Participant in Seminar on Historical Development of Science, England, 1978
Lilly Faculty Open Fellow, 1978-79
Academic Visitor, London School of Economics, Spring 1980
National Research Council Travel Grant to Conference in Salzburg, Austria, 1983
Recipient James Shilts Award, College of Science, for excellence in teaching, 1983
Recipient Summer Stipend Award, Lilly Endowment, 1984
Principal Investigator, National Science Foundation Research Grant in the History and Philosophy of Science, 1984-85
Invited participant at the International Symposium on Particle Physics in the 1950's, Fermilab, May 1-4, 1985
Invited participant at the Conference on New Techniques and Ideas in Quantum Measurement Theory, sponsored by the New York Academy of Sciences, New York City, January 21-24, 1986
Member editorial advisory board for the series Science and Philosophy (Kluwer Academic Publishers). 1986-present

Principal Investigator, National Science Foundation Research Grant in the History and Philosophy of Science, 1986-87

National Research Council Travel Grant to Conference in Moscow, USSR, 1987

Academic Visitor, London School of Economics, Fall 1987

Visiting Fellow, St. Edmund's College and the History and Philosophy of Science Department, Cambridge University, Winter and Summer Terms, 1988

Principal Investigator, National Science Foundation Research Grant (Scholar's Award) in the History and Philosophy of Science, 1987-88

Member of American Association of Physics Teachers National Committee on History and Philosophy of Physics, 1988-1991

National Endowment for the Humanities Grant to direct the Conference on Philosophical Lessons From Quantum Theory, University of Notre Dame, October, 1988

Principal Investigator, National Science Foundation Research Grant in the History and Philosophy of Science, 1989-1991

Chaired a session on Physical Sciences and gave the paper "Conceptual and Social Factors in the Nonacceptance of Causal Quantum Theory" at the XVIII International Congress of History of Science held in Hamburg and Munich, Germany, August 1-9, 1989

Member of the American Physical Society's Program Committee, 1989-91

Organized and chaired an invited session on "Philosophy in Physics" at the annual joint meeting of the American Physical Society/American Association of Physics Teachers Meeting, Atlanta, GA, January 20-25, 1990

Fellow, Reilly Center for Science, Technology and Values, University of Notre Dame, 1989-present

Organized and chaired an invited session on "Determinism and Causality in Physics" at the annual joint meeting of the American Physical Society/American Association of Physics Teachers Meeting, San Antonio, TX, January 21-24, 1991

Visiting Scientist in AIP Visiting Scientist Program, 1991-1995

National Research Council Travel Grant to Conference in Uppsala, Sweden, 1991

Member of the Nominating Committee of the History of Physics Division of the American Physical Society, 1991-1993

Principle Investigator, National Science Foundation Grant in the History and Philosophy of Science, 1992-93

Member, editorial board, *Foundations of Physics Letters*, 1992- present

Invited chair of a session for the centennial celebration of the Physics Department at the University of Chicago, Chicago, IL, December 2, 1992

History of Science Society Travel Grant to Conference in Zaragoza, Spain, August, 1993

Academic Visitor, London School of Economics, Fall 1994

Visiting Fellow, Wolfson College, Cambridge University, Winter and Summer Terms, 1995

Academic Visitor, History and Philosophy of Science Department, Cambridge University, Winter and Summer Terms, 1995

Academic Visitor, Philosophy Faculty, Cambridge University, Winter and Summer Terms, 1995

Co-organizer of the conference "Quantum Theory without Observers" at Bielefeld University, Bielefeld, Germany, July 24-28, 1995

Member, editorial board, *Studies History and Philosophy of Modern Physics* 1995-present

Member, Editorial Committee, *Science & Education*, 1996-1999

Member of the Program Committee for the 1998 Biennial Philosophy of Science Association Meeting

Loyola University (Chicago) Alumnus of the Year Award, November 1998

Elected Fellow of the American Physical Society, November 1998

Member, editorial board, *Physics in Perspective*, 1998-present

Member, editorial board, *Fundamental Theories of Physics* (Kluwer Academic Press), 1999-present

Invited Addresses/Refereed Conference Papers since 1980

- London School of Economics, London, England, March, 1980; "The Philosophical Import of Bell's Theorem"
- Chelsea College, London, England, April, 1980; "Models in High-Energy Theoretical Physics"
- Philosophy of Science Association Meeting, Philadelphia, PA, October, 1982; "Models, High-Energy Theoretical Physics and Realism"
- 7th International Congress of Logic, Methodology and Philosophy of Science, Salzburg, Austria, July, 1983; "Is There Just *One* Possible World? Contingency vs. the Bootstrap"
- Indiana State University, Terre Haute, IN, November, 1983; "The Bell Theorems, Locality and All That"
- Panelist for Discussion "Hidden Variables and the Implicate Order" at Conference *Beyond Mechanism*, University of Notre Dame, March, 1984
- Philosophy of Science Association Meeting, Chicago, IL, October, 1984; "The Convergence and Content of Scientific Opinion"
- DePauw University, Greencastle, IN, November, 1984; "Bell's Theorem: Determinism or Locality?"
- Philadelphia Philosophy Symposium on Quantum Mechanics and Scientific Realism held at Villanova University, March, 1985; "Cartwright's Pragmatism and Heelan's Hermeneutics in the Interpretation of Quantum Mechanics"
- Center for Interdisciplinary Study of Science and Technology, Northwestern University, April, 1985; "Does Science Produce Stable Knowledge? If So, How?"
- XVIIth International Congress for the History of Science, Berkeley, California, August, 1985; "The Importance of Heisenberg's S-Matrix Program for the Theoretical High-Energy Physics of the 1950's"
- Oxford University, Oxford, England, June, 1986; "Foundational Problems In and Methodological Lessons from Quantum Field Theory"
- De Pauw University, Greencastle, IN, October, 1986; "Electromagnetic Mass, Relativity and the Kaufmann Experiments"
- Miami University, Oxford, Ohio, October, 1986; "The Role of Science and Technology in a Liberal Education"
- Conference on Testing Theories of Scientific Change, VPI, Blacksburg, VA, October, 1986; "The Justification and Content of Scientific Theories"
- Philosophy of Science Association Meeting, Pittsburgh, Pennsylvania, October, 1986; "Causality as an Overarching Principle in Physics"
- Conference on the History of Field and Gauge Theory, Utah State University, Logan, UT, July, 1987; "The S Matrix and Its Relation to Quantum Field Theory"
- 8th International Congress of Logic, Methodology and Philosophy of Science, Moscow, USSR, August, 1987; "A Naturalized, Socialized, But Highly Constrained Model of Scientific Change"
- Conference on Philosophical Lessons From Quantum Theory, University of Notre Dame, Notre Dame, IN, October, 1987; "The Bell Theorems: A Pandora's Box"
- London School of Economics, London, England, November, 1987; "Can We *Understand* Our (Quantum) World?"
- American Philosophical Association Meeting, New York City, December 28, 1987; "Representations, Reduction and Realism: Reflections on Schweber's Phenomenological Quantum Field Theories"
- Cambridge University, Cambridge, England, March, 1988; "The S Matrix: A Role for Dead-End Theories?"
- King's College, London, England, May 1988; "Can the Philosophy of Science Be Ahistorical in Any Interesting Sense?"

American Physical Society Meeting, Baltimore, May 1, 1989; "On the Nonacceptance of Viable Theories: The S-Matrix Program and Bohm's Causal Quantum Theory"

Conference on The Observer and the Observed, Vivekananda Monastery and Retreat, Ganges, MI, May 27, 1989, "David Bohm's Causal Interpretation of Quantum Mechanics and Its Relation to His Implicate Order"

XVIIIth International Congress for the History of Science, Hamburg and Munich, Germany, August 1-9, 1989; "Conceptual and Social Factors in the Nonacceptance of Causal Quantum Theory"

1989 Annual Conference of the Association for General and Liberal Studies, Butler University, Indianapolis, IN, October 19-21, 1989; "Scientific Explanation vs. Scientific Worldviews"

First International Conference on the History and Philosophy of Science in Science Teaching, Florida State University, Tallahassee, FL, November 5-10, 1989; "History and Philosophy in Introductory Physics: What is *the* Problem?"

Boston University, Boston, MA, March 22, 1990; "Understanding, Copenhagen Quantum Mechanics and Historical Contingency"

Central Michigan University, Mount Pleasant, MI, April 12, 1990; "The Copenhagen vs. the Causal Interpretation of Quantum Mechanics"

Symposium on the Foundations of Modern Physics 1990, Joensuu, Finland, August 13-17, 1990; "Copenhagen Hegemony: *Need It Be So?*"

Eta Kappa Nu induction dinner speaker, South Bend, IN, December 5, 1990; "Why Do We Do Science?"

American Association of Physics Teachers Meeting, San Antonio, TX, January 23, 1991; "Physics: Its Principles, History and Philosophy – a Resource"

American Philosophical Association, Chicago, IL, April 25-27, 1991; "Underdetermination, Conventionalism and Realism: The 'Copenhagen' vs. the Bohm Interpretation of Quantum Mechanics"

Interviewee and discussion panelist for the four-part science and religion TV series, *Life Choices*, produced by Golden Dome Productions (University of Notre Dame), April 14, 1991, and aired nationally

9th International Congress of Logic, Methodology and Philosophy of Science, Uppsala, Sweden, August 7-14, 1991; "Quantum Mechanics, Historical Contingency and the Copenhagen Interpretation"

Purdue University, West Lafayette, IN, September 12, 1991; "What's the Problem With Causal Quantum Theory?"

International Conference on Bell's Theorem and the Foundations of Modern Physics, Cesena, Italy, October 7-10, 1991: "What If Bell Had Come *Before* 'Copenhagen'?"

History of Science Society Meeting, Madison, WI, October 30-November 3, 1991; "The Fate of Causal Quantum Theory"

University of Colorado, Boulder, CO, November 14, 1991; " 'Copenhagen' vs. 'Bohm': An Interesting Case of Underdetermination" and "Changing Perceptions of Determinism in Physics"

Bradley University, Peroria, IL, November 21-22, 1991; "Bell's Theorem, Quantum Mechanics and the Nature of Physical Reality", "The Fall From the Bacon-Descartes Ideal", and "The Measurement Problem and Schrödinger's Cat Paradox"

Marquette University, Milwaukee, WI, April 9-10, 1992; "Bell's Theorem, Quantum Mechanics and the Nature of Physical Reality", "The Fall From the Bacon-Descartes Ideal" and "The Measurement Problem and Schrödinger's Cat Paradox"

Second International Conference on the History and Philosophy of Science in Science Teaching, Queen's University, Kingston, Ontario, May 11-15, 1992; "Physics: Its Principles, History and Philosophy"

Third International Symposium on The History of Particle Physics, Stanford Linear Accelerator Center, June 24-27, 1992; commentator on "Toward Gauge Theories"

London School of Economics, London, England, July 10, 1992; "Einstein's (1927) Hidden Variables Theory"

Workshop in Occasion of Louis de Broglie's 100th Birthday, Trani, Italy, September 24-30, 1992; "Why Local Realism?"

Utrecht University, The Netherlands, September 29, 1992; "Historical Contingency in Theory Selection: 'Copenhagen' versus Causal Quantum Mechanics"

Philosophy of Science Association Meeting, Chicago, IL, October 29-November 1, 1992; "Historical Contingency and Theory Selection in Science"

Michigan State University, East Lansing, MI, November 5, 1992; "Bell's Theorem, Quantum Mechanics and the Nature of Physical Reality"

Butler University, Indianapolis IN, November 17-18, 1992; "Bell's Theorem, Quantum Mechanics and the Nature of Physical Reality", "The Fall From the Bacon-Descartes Ideal" and "The Measurement Problem and Schrödinger's Cat Paradox"

JuCo Conference, Pittsburgh State University, Pittsburgh, Kansas, February 27, 1993; "Bell's Theorem, Quantum Mechanics and the Nature of Physical Reality"

Conference on the Underdetermination of Scientific Theories, University of North Carolina, Greensboro, NC, March 19-21, 1993; "Is Quantum Mechanics an Interesting Case of Underdetermination?"

University of Missouri, Kansas City, MO, April 2, 1993; "Bell's Theorem, Quantum Mechanics and the Nature of Physical Reality"

Wittenberg University, Springfield, OH, April 21-22, 1993; "Causal Quantum Theory: A Case of Underdetermination?", "The Fall From the Bacon-Descartes Ideal" and "The Measurement Problem and Schrödinger's Cat Paradox"

XIXth International Congress for the History of Science, Zaragoza, Spain, August 22-29, 1993; "Einstein's 1927 Attempt at a Hidden-Variables Theory and the Fifth Solvay Congress"

University of Minnesota, Minneapolis, MN, January 26, 1994; "Why the 'Copenhagen' Hegemony?"

Symposium on the Foundations of Modern Physics 1994, Helsinki, Finland, June 13-16, 1994; "Can Tunneling Times Discriminate Between 'Bohm' and 'Copenhagen'?"

American Association of Physics Teachers Meeting, Notre Dame, IN, August 8-13, 1994; "The Implications of Quantum Mechanics for Our World View"

Third UK Conference on Foundations of Quantum Theory and Relativity, Cambridge, England, September 13-16, 1994; "Quantum Tunneling Times in Bohm's Theory"

Centre for the Philosophy of Science, London School of Economics, London, UK, October 5, 1994; "Bohm's Theory and Benign Nonlocality"

Conference on Conceptual Problems of Relativistic Quantum Mechanics, University of Western Ontario, London, Ontario, Canada, October 7-9, 1994; "What Measurement Problem?"

Philosophy of Science Association Meeting, New Orleans, LA, October 13-16, 1994; "Locality/Separability: Is This Necessarily a Useful Distinction?"

History of Science Society Meeting, New Orleans, LA, October 13-16, 1994; "Marginalizing a Competitor: Copenhagen versus Causal Quantum Theory"

London School of Economics, London, England, October 25, 1994; "It Is the Theory Which Decides What We Can Observe"

London School of Economics, London, England, November 16, 1994; "Quantum Tunneling Times and Theory Underdetermination"

Imperial College of Science and Technology, London, November 29, 1994; "Bohm's Theory and the Measurement Problem"

University of Leeds, Leeds, England, January 18, 1995; "Who Was Correct About Quantum Mechanics: Bohr or Einstein?"

Queen Mary College, London, England, January 23, 1995; "Some Recent Developments in Bohmian Mechanics"

Cambridge University, Cambridge England, January 24, 1995; "Can Tunneling Times Be Used to Distinguish Between 'Copenhagen' and 'Bohm'?"

University of Munich, Munich, Germany; January 27, 1995; "How the Causal Quantum Theory Program Was Marginalized"

University College of the University of London, February 6, 1995; "Why the 'Copenhagen' Hegemony?"

Cambridge University, Cambridge England, February 9, 1995; "Historical Contingency and Theory Selection"

Oxford University, Oxford, England, February 21, 1995; "Historical Contingency and Scientific Realism"

Oxford University, Oxford, England, February 22, 1995; "Quantum Tunneling Times: Standard Quantum Mechanics Versus Bohm's Theory"

Imperial College, London, England, February 28, 1995; "What's Wrong With Deterministic Quantum Mechanics?"

University of Surrey, Guildford, England, March 9, 1995; "'Copenhagen' Versus 'Bohm'"

University of Louvain, Louvain, Belgium, March 11, 1995; "Quantum Mechanics and Underdetermination: A Difficulty for Scientific Realism?"

Hebrew University, Jerusalem, Israel, March 23, 1995; "Quantum Mechanics: A Case of Duhem-Quine Theory Underdetermination?"

Cambridge University, Cambridge England, July 20, 1995; "Chaos and the Classical Limit in Bohmian Mechanics"

Bielefeld University, Bielefeld, Germany, July 24-28, 1995; chair of the workshop "The Quantum Mechanics of Time Measurements"

Annual Meeting of the Illinois Section of the American Association of Physics Teachers, Bradley University, Peoria, IL, October 27, 1995; "Philosophical Concepts in Physics: Determinism versus Indeterminism"

3rd International Conference on History and Philosophy of Science in Science Teaching, University of Minnesota, Minneapolis, MN, October 29-November 1, 1995; "Hermeneutics, Underdetermination and Quantum Mechanics"

American Association for the Advancement of Science Meeting, Baltimore, MN, February 9, 1996; "Science Studies and the Advancement of Science"

Indiana University, Bloomington, IN, February 12, 1997; "Need Quantum Mechanics Be Indeterministic?"

American Philosophical Association Central Division Meeting. Pittsburgh, PA, April 24-26, 1997; invited commentator on C. Liu's "Decoherence and Quantum Measurement"

Northern Arizona University, Flagstaff, AZ, September 8, 1997; "The Quantum-Mechanical World View: Deterministic or Indeterministic?"

Niels Bohr Institute, Copenhagen, Denmark, March 20, 1998; "Quantum Mechanics and Realism: A Conflict?"

World Congress of Philosophy, Boston, MA, August 10, 1998; "Quantum Mechanics and the Limits of Scientific Knowledge"

David Bohm Symposium: Foundations of Physics, University of São Paulo, São Paulo, Brazil, September 21-25, 1998; "The Quantum-Mechanical World View: Deterministic or Indeterministic?"

III International Ontology Congress on the Concept of Nature from Greek Thought to Quantum Mechanics, San Sebastian, Spain, and Saint-Jean-de-Luz, France, October 1-5, 1998; "Bohmian Mechanics and Its Ontological Commitments"

Philosophy of Science Association Meeting, Kansas City, MO, October 22-25; "Bohmian Insights into Quantum Chaos"

Loyola University, Chicago, IL, November 20, 1998; "The Fall From the Bacon-Descartes Ideal"

Rice University, Houston, TX, February 10-11, 1999; "Bohmian Mechanics: A New Conception of Physics" and "Some Unexpected Limits on Scientific Knowledge"

Hope College, Holland, MI, February 26, 1999; "The Quantum-Mechanical World View: Deterministic or Indeterministic?"

Andrews University, Berrien Springs, MI, April 16, 1999; "The Quantum-Mechanical World View: Deterministic or Indeterministic?"

University of Notre Dame, Notre Dame, IN, April 30, 1999; roundtable discussion at the workshop on Identity and Individuation in Modern Physics

Seven Pines Symposium on the Field Concept in Physics, Lewis, WI, May 5-9, 1999; "The Historical Development of Quantum Field Theory"

Pre-Conference on Science and Theology, Wye College (University of London), Wye, UK, September 24-27, 1999; "Some Comments of Bell's Theorem"

University of Toronto, Toronto, Ontario, Canada, October 14, 1999; "Which Side, If Either, Is Correct About the 'Science Wars' Conflict?"

Bar-Hillel Colloquium in the History and Philosophy of Science, University of Tel Aviv, Tel Aviv, Israel, May 15, 2000, and The Hebrew University of Jerusalem, Jerusalem, Israel, May 17, 2000; "Historical Contingency and the Quantum Revolution"

Northwestern University, Evanston, IL, June 2, 2000; "Contingency and Dialogue: Their Relation in the Quantum Revolution"

Vatican Observatory Conference on Quantum Physics and Quantum Field Theory, Castel Gandolfo, Rome, Italy, June 25-July 1, 2000; "Determinism versus Indeterminism in Quantum Mechanics: A 'Free' Choice"

IV International Ontology Congress, Madrid and San Sebastian, Spain, October 2-7, 2000; "Causality, Explanation and Understanding After Bell's Theorem"

Creighton University, Omaha, NE, October 26-27, 2000; "The Fall From the Bacon-Descartes Ideal" and "The Quantum-Mechanical World View: Deterministic or Indeterministic?"

Miami University, Oxford, OH, November 8, 2000; "The Quantum-Mechanical World View: Deterministic or Indeterministic?"

University of Eastern Tennessee, Johnson City, TN, November 16, 2000; "The Quantum-Mechanical World View: Deterministic or Indeterministic?"

Centenary Meeting of the German Physical Society (DPG), Berlin, Germany, December 11-15, 2000; "The Interpretation of Quantum Mechanics Through 1935"

Memberships in Professional Organizations

American Association of Physics Teachers
 American Philosophical Society
 American Physical Society, Fellow
 Association Henri Poincaré (Paris)
 British Society for the Philosophy of Science
 History of Science Society
 Phi Beta Kappa
 Philosophy of Science Association
 Royal Society of Arts (London), Fellow
 Sigma Xi

Reviewing

Reviewer for *Mathematical Reviews* from 1965 to 1972.
 Manuscript reviewer for *Journal of Mathematical Physics* from 1972 to 1982.
 Book reviewer for *American Journal of Physics* since 1976.
 Manuscript reviewer for *American Journal of Physics* since 1976.
 Manuscript reviewer for *Philosophy of Science* since 1979.

Book reviewer for *Philosophy of Science* since 1985.
 Book reviewer for *Foundations of Physics* since 1986.
 Manuscript reviewer for *Centaurus* since 1990.
 Book reviewer for *Physics Today* since 1990.
 Book reviewer for *Centaurus* since 1991.
 Manuscript reviewer for *Physics Letters A* since 1991.
 Manuscript reviewer for *Physical Review Letters* since 1991.
 Manuscript reviewer for *Foundations of Physics* since 1992.
 Manuscript reviewer for *Synthese* since 1993.
 Manuscript reviewer for *Perspectives on Science* since 1993.
 Manuscript reviewer for *Revue d'Histoire des Sciences* since 1994.

Publications

A. Papers

1. "A Double Dispersion Relation for a Class of Nonlocal Potentials," J. T. Cushing, *Nuovo Cimento* **28**, 818-833 (1963).
2. "A Simple Nonlocal Model for High-Energy Scattering," J. T. Cushing, *Nuovo Cimento* **31**, 688-690 (1964).
3. "Analyticity of Compound-Particle Scattering Amplitudes," J. T. Cushing, *Nuovo Cimento* **33**, 988-989 (1964).
4. "Analyticity of Bound-State Scattering Amplitudes," J. T. Cushing, *Nuovo Cimento* **36**, 586-603 (1965).
5. "Inelastic Bound-State Scattering in Separable Approximation," J. T. Cushing, *Nuovo Cimento* **36**, 905-915 (1965).
6. "A Model for the Connected Part of the Three-Body Amplitude," J. T. Cushing, *Nuovo Cimento* **38**, 463-482 (1965).
7. "Internal Symmetries in a Coupled-Channel Soluble Model with Inelasticity," James T. Cushing, *Physical Review* **148**, 1558-1573 (1966).
8. "SU(3) in a Byers-Yang Model," James T. Cushing, *Physical Review* **160**, 1506-1510 (1967).
9. "Vector Lorentz Transformations," James T. Cushing, *American Journal of Physics* **35**, 858-862 (1967).
10. "Asymptotic $\bar{p} \rightarrow n$ and $\bar{p} \rightarrow n$ Cross Sections from Separability Unitarity," James T. Cushing, *Physics Letters* **25B**, 339-340 (1967).
11. "Exact Static-Model Bootstrap Solutions for Arbitrary 2×2 Crossing Matrices," James T. Cushing, *Journal of Mathematical Physics* **10**, 1319-1326 (1969).
12. "Broken-Symmetry Mass Formula for the $J^P = 1/2^+$ Baryon Octet from S-Matrix Theory," James T. Cushing and Udo W. Pooch, *Physical Review* **D1**, 2955-2961 (1970).

13. "Relativistic Bohr Model with Finite-Mass Nucleus," James T. Cushing, *American Journal of Physics* **38**, 1145-1150 (1970).
14. "Internal Symmetry Propagation in the Strong-Interaction S Matrix," James T. Cushing, *Physical Review* **D4**, 1177-1184 (1971).
15. "Coulomb Corrections to Scattering," Cheng-jean Chen and James T. Cushing, *Physical Review* **D8**, 542-555 (1973).
16. "Radiative Corrections for the Processes $\bar{p} \pm n$," Brian Cheng-jean Chen and James T. Cushing, *Physical Review* **D10**, 113-135 (1974).
17. "Inverse Scattering Problem in Nonrelativistic S-matrix Theory," James T. Cushing, *Physical Review* **D15**, 1790-1795 (1977).
18. Review of Frank Chorlton's, *Vector and Tensor Methods*, *American Journal of Physics* **45**, 110 (1977).
19. Review of Peter J. Brancazio's, *The Nature of Physics*, *American Journal of Physics* **45**, 227-229 (1977).
20. Review of Leon N. Cooper's, *An Introduction to the Meaning and Structure of Physics*, *American Journal of Physics* **46**, 114-116 (1978).
21. Review of Ernest S. Abers and Charles F. Kennel's *Matter in Motion: The Spirit and Evolution of Physics*, *American Journal of Physics* **46**, 313 (1978).
22. "S-matrix Inverse Scattering Problem via A Fixed-Point Theorem," James T. Cushing, *Physical Review* **D18**, 1268-1271 (1978).
23. Review of James S. Trefil's, *Physics as a Liberal Art*, *American Journal of Physics* **47**, 122-123 (1979).
24. Review of Gilbert Shapiro's, *Physics Without Math*, *American Journal of Physics* **48**, 324 (1980).
25. "Electromagnetic Mass, Relativity, and the Kaufmann Experiments," James T. Cushing, *American Journal of Physics* **49**, 1133-1149 (1981).
26. "Models and Methodologies in Current Theoretical High-Energy Physics," James T. Cushing, *Synthese* **50**, 5-101 (1982).
27. "A Response," James T. Cushing, *Synthese* **50**, 109-123 (1982).
28. "Kepler's Laws and Universal Gravitation in Newton's *Principia*," James T. Cushing, *American Journal of Physics* **50**, 617-628 (1982).
29. "Models and Methodologies in Current Theoretical High-Energy Physics," James T. Cushing, in Hans S. Plendl (ed.), *Philosophical Problems of Modern Physics* (D. Reidel, Dordrecht, 1982), pp. 5-101.

30. "Models, High-Energy Theoretical Physics and Realism," James T. Cushing, in P. D. Asquith and T. Nickles (eds.) *Proceedings of the 1982 Biennial Meeting of the Philosophy of Science Association, Vol. II*, Philosophy of Science Association, pp. 31-56 (1983).
31. "A Response to Paul Teller," James T. Cushing, in Asquith and Nickles, *Proceedings of the 1982 Biennial Meeting of the Philosophy of Science Association, Vol. II*, Philosophy of Science Association, pp. 112-113 (1983).
32. Review of Bruce A. Sherwood's *Notes on Classical Mechanics*, *American Journal of Physics* **51**, 958-959 (1983).
33. Essay review of Edward M. MacKinnon's *Scientific Explanation and Atomic Physics*, *Erkenntnis* **21**, 89-100 (1984).
34. Review of Laurie M. Brown and Lillian Hoddeson's *The Birth of Particle Physics*, *American Journal of Physics* **52**, 667-668(1984).
35. "The Spring-Mass System Revisited," James T. Cushing, *American Journal of Physics* **52**, 925-933 (1984).
36. "The Method of Characteristics Applied to the Massive Spring Problem," James T. Cushing, *American Journal of Physics* **52**, 933-937 (1984).
37. "The Convergence and Content of Scientific Opinion," James T. Cushing, in P. D. Asquith and P. Kitcher (eds.), *Proceedings of the 1984 Biennial Meeting of the Philosophy of Science Association, Vol. I*, Philosophy of Science Association, pp. 211-223 (1984).
38. Review of Husain Sarkar's *A Theory of Method*, *American Journal of Physics* **52**, 1054 (1984).
39. "But, Who Will Publish a Sane Introductory Physics Text?", James T. Cushing, *American Journal of Physics* **52**, 1069-1071 (1984).
40. Review of Ian Hacking's *Representing and Intervening*, *Journal of Social and Biological Structures* **7**, 396-398 (1984).
41. "Is There Just *One* Possible World? Contingency vs. the Bootstrap," James T. Cushing, *Studies in History and Philosophy of Science* **16**, 31-48 (1985).
42. "Comment on Angelidis' Universality Claim," James T. Cushing, *Physical Review Letters* **54**, 2059(1985).
43. Review of Larry Laudan's *Science and Values*, *American Journal of Physics* **53**, 1119-1120 (1985).
44. Review of Andy Pickering's *Constructing Quarks*, *Philosophy of Science* **52**, 640-641 (1985).
45. Review of Andy Pickering's *Constructing Quarks*, *American Journal of Physics* **54**, 381-383 (1986).
46. "The Importance of Heisenberg's S-Matrix Program for the Theoretical High-Energy Physics of the 1950's," James T. Cushing, *Centaurus* **29**, 110-149 (1986).

47. "Causality as an Overarching Principle in Physics," James T. Cushing, in A. Fine and P. Machamer (eds.), *Proceedings of the 1986 Biennial Meeting of the Philosophy of Science Association, Vol. I*, Philosophy of Science Association, pp. 3-11 (1986).
48. "The Justification and Selection of Scientific Theories," J. T. Cushing, *Synthese* **78**, 1-24 (1989).
49. Review of Nancy J. Nersessian's *Faraday to Einstein: Constructing Meaning in Scientific Theories*, *Foundations of Physics* **17**, 101-106 (1987).
50. "Foundational Problems in and Methodological Lessons from Quantum Field Theory," James T. Cushing, in H. Brown and R. Harré (eds.), *Philosophical Foundations of Quantum Field Theory*, Oxford, Oxford University Press, pp. 25-39 (1988).
51. Review of John C. Polkinghorne's *One World*, *American Journal of Physics* **55**, 188-190 (1987).
52. Review of Allan Franklin's *The Neglect of Experiment*, *Foundations of Physics* **19**, 115-118 (1989).
53. Review of J. C. Pitt's (ed.) *Change and Progress in Modern Science*, *Philosophy of Science* **57**, 173-176 (1990).
54. "A Background Essay," James T. Cushing, in J. T. Cushing and E. McMullin (eds.) *Philosophical Consequences of Quantum Theory*, University of Notre Dame Press, pp. 1-24 (1989).
55. "A Tough Act: History, Philosophy and Introductory Physics (An American Perspective)," James T. Cushing, *Interchange* **20**, 54-59 (1989).
56. Review of Dugald Murdoch's *Niels Bohr's Philosophy of Physics*, *American Journal of Physics* **56**, 956-957 (1988).
57. Review of Peter Galison's *How Experiments End*, *Foundations of Physics* **19**, 625-627 (1989).
58. "Quantum Theory and Explanatory Discourse: Endgame for Understanding?," James T. Cushing, *Philosophy of Science* **58**, 337-358 (1991).
59. "Is Scientific Methodology Interestingly Atemporal?," James T. Cushing, *British Journal for the Philosophy of Science* **41**, 177-194 (1990).
60. "Conceptual and Social Factors in the Nonacceptance of Causal Quantum Theory," James T. Cushing, *Abstracts of the XVIII International Congress of History of Science ICHS*, Hamburg-München, 1989).
61. Review of David Park's *The How and the Why*, *American Journal of Physics* **57**, 567-568 (1989).
62. "Causal Quantum Theory: Why a Nonstarter?," James T. Cushing, in Franco Selleri (ed.), *The Wave-Particle Duality*, Plenum Publishing Co., pp. 37-68 (1992).

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