Curriculum Vitae

Edward W. (Rocky) Kolb

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Personal Data:

Birth: October 2, 1951, New Orleans, LA
Citizenship: United States
Family: Married, three children
Home phone: (630) 393-7058

Education:

Ph.D. in Physics, 1978

- The University of Texas, Austin, Texas
- Thesis Topic: Astrophysical Limits to Weak Interaction Phenomenology
- Thesis Advisor: Professor Duane A. Dicus

B.S. in Physics, 1973

- University of New Orleans, New Orleans, Louisiana

Research Interests:

The major area of research is the application of particle physics to cosmology and astrophysics. Most of the work has involved the study of the very early Universe—inflation, dark matter, dark energy, cosmological/astrophysical limits on particle properties, baryogenesis, phase transitions, axions, etc.

An additional area of my activity is science education, particularly with regard to education for the general public. This activity includes writing and lecturing on cosmology.

Present Positions:

Arthur Holly Compton Distinguished Service Professor of Astronomy & Astrophysics (since 2007)
(Faculty member since 1984)
Member, Enrico Fermi Institute
Member, Kavli Institute for Cosmological Physics
Professor in the College
Dean of the Physical Sciences (since 1 July 2013)
The University of Chicago

Previous Positions:

2006–2012:	Chair, Department of Astronomy & Astrophysics The University of Chicago
2001–2006:	Director, Particle Astrophysics Center Fermi National Accelerator Laboratory Batavia, Illinois
1998–2001:	Scientist III, Head of Theoretical Astrophysics Group Fermi National Accelerator Laboratory
1994–1998:	Scientist III, Member of Theoretical Astrophysics Group Fermi National Accelerator Laboratory
1991–1993:	Scientist III (highest level), Head of Theoretical Astrophysics Group Fermi National Accelerator Laboratory
1984–1990:	Scientist II, Head of Theoretical Astrophysics Group Fermi National Accelerator Laboratory
1983–1993:	Scientist I, Head of Theoretical Astrophysics Group Fermi National Accelerator Laboratory
1981–1983:	Deputy Group Leader, Theoretical Astrophysics Group Theoretical Division, Los Alamos National Laboratory Los Alamos, New Mexico
1980–1981:	J. Robert Oppenheimer Research Fellow Supervisor: Stirling A. Colgate Los Alamos National Laboratory Los Alamos, New Mexico
1978–1980:	Postdoctoral Research Fellow Supervisor: William A. Fowler California Institute of Technology Pasadena, California
1975–1978:	Research Assistant, Center for Particle Theory Supervisor: Duane A. Dicus University of Texas, Austin Texas

Visiting Positions:

October 2012-December 2012	J. Hans D. Jensen Professor Institute for Theoretical Physics The University of Heidelberg
October 2001-September 2002	Visiting Professor CERN Theory Group

February-March 2003	Biedenharn Visiting Professor University of Texas, Austin
October 2001-October 2002	Guest Professor Theory Division, CERN
January-June 1992	Program Coordinator Institute for Theoretical Physics University of California, Santa Barbara
March-April 1990	Visiting Professor University of Sussex
February-March 1990	Visiting Professor Osservatorio Astronomico di Roma
July-August 1988	Visiting Professor University of Rome and Osservatorio Astronomico di Roma
March 1987	Visiting Professor of Physics University of Michigan
May-June 1987	Visiting Professor University of Rome and Osservatorio Astronomico di Roma
Spring 1981	Visiting Associate Research Physicist Institute for Theoretical Physics University of California, Santa Barbara

Awards and Honors:

- J. Hans D. Jensen Prize, Institute for Theoretical Physics, University of Heidelberg, 2012
- Docteur Honoris Causa, University of Lyon, Lyon, France, November 2010
- Dannie Heineman Prize for Astrophysics, 2010, The American Astronomical Society and the American Institute for Physics (shared with Michael S. Turner)
- Excellence in Teaching Award, Master of Liberal Arts Program, Graham School, The University of Chicago, 2009
- Distinguished Alumnus of the Year, The Graduate School, The University of Texas, Austin, May 2005
- Homer L. Hitt Distinguished Alumnus of the Year, University of New Orleans, May 2004
- Oersted Medal Award (Highest Recognition of the American Association of Physics Teachers), 2003
- Fellow, American Academy of Arts and Sciences, 2002
- George Marx Medal, Hungarian Academy of Science, Budapest, Hungary 2002
- Forum Fellow of the World Economic Forum, Davos, Switzerland, January 1998

Awards and Honors (continued):

- Eugene M. Emme Astronautical Literature Award, 1996
- Llewellyn John and Harriet Manchester Quantrell Award for Excellence in Undergraduate Teaching, The University of Chicago, 1993
- Fellow, American Physical Society 1984

Notable Lectures:

- Cowper Lecture, The University of Buffalo, Buffalo, October 2013.
- Coloquios Paco Ynduráin, Universidad Autónoma de Madrid, Madrid, Spain, March 2013
- Bethe Colloquium, University of Bonn, Bonn, Germany, December 2012
- Tschira Public Lecture, Heidelberg, Germany, November 2012
- Siemens Stiftung Lecture, Munich, Germany, February 2012
- Friday Evening Public Lecture, Fermilab, January 2012
- Convocation Address, University of Chicago, Chicago, Illinois, August 2010
- Commencement Address, Shimer College, Chicago, Illinois, May 2010
- Neils Bohr Lecture, Neils Bohr Institute, Copenhagen, December 2009
- Centennial Lecture, University of California, Davis, May 2009
- International Year of Astronomy Lecture, Torino, Italy, April 2009
- Buhl Lecture, Carnegie Mellon University, Pittsburgh, April 2009
- Phillips Distinguished Lecturer, Haverford College, March 2009
- Royal Society of Canada Lecture, McGill University, February 2009
- Public Lecture associated with the Texas Symposium on Relativistic Astrophysics, Vancouver, Canada, December 2008
- Halliday Lecture, University of California, Santa Cruz, November 2008
- Baird Lecture, The Ohio State University, Columbus, Ohio, November 2008
- Evolution Lecture, University of Pennsylvania, October 2008
- Celsius Lecture, Uppsala University, Uppsala Sweden, February 2008
- CERN Academic Lectures, February 2008
- Plücker Lecture, University of Bonn, Bonn, Germany, January 2008
- Dark Energy Debate with Simon White, American Astronomical Society Annual Meeting, Austin, Texas, January 2008
- Public Lecture associated with SUSY 07, Karlsruhe, Germany, July 2007
- Public Lecture associated with the International Dark Energy meeting, McMaster University, Hamilton, Canada, May 2007

Notable Lectures (continued):

- Coyne Lecture, Marquette University, Milwaukee, Wisconsin, February 2007
- Loeb Lecturer, Harvard University, December 2006
- National Science Writers Meeting, Baltimore, Maryland, October 2006
- Commencement Address, Illinois Mathematics and Science Academy, May 2005
- Commencement Address, University of New Orleans, May 2004
- Century Lecture, American Astronomical Society, Kansas City, May 2004
- Cosmic Questions Lecture, National Geographic Society, Washington, October 2003
- Morgan Lecture, Texas Christian University, Ft. Worth, Texas, October 2003
- Meliora Lecture, University of Rochester, NY, October 2003
- Rustgi Lecture, University at Buffalo, NY, October 2003
- Century Lecture, American Astronomical Society, Ann Arbor, MI September 2003
- James Lecture, Purdue University, IN, April 2003
- Public Lecture, The Royal Society (London, England), January 2003
- Lansdowne Lecture, University of Victoria, Victoria BC, Canada, October 2002
- Induction Remarks, American Academy of Arts and Sciences, Cambridge, MA, October 2002
- Korean Academy of Sciences Lecture, November 2001
- Il Quanto ed il Cosmo, Public lecture associated with the Lepton-Photon Meeting, Rome, July 2001
- Glicksman Lecturer, Brown Commencement Forum, Brown University, May 2000
- James Arthur Lecturer, New York University, March 1999
- NSF Distinguished Lecturer, Washington, DC, March 1999
- Public lecture associated with the 29th International Meeting on High-Energy Physics, Vancouver, Canada, July 1998
- Resnick Lecturer, Rensselaer Polytechnic Institute, March 1998
- Grasseli-Brown Lecturer, Ohio University, October 1997
- Special Public Lecture, Thessaloniki, Greece, August 1997
- Address to the President of Pakistan, Islamabad, Pakistan, July 1997
- Oppenheimer Lecturer, Los Alamos, New Mexico, July 1997
- Buhl Lecturer, Carnegie Mellon University, April 1997
- Shell Key Lecturer, The University of Edinburgh, February 1994
- Public lecture associated with the 26th International Meeting on High-Energy Physics, Dallas, Texas, August 1992

Notable Lectures (continued):

- Public lecture associated with the annual meeting of the Division of Particles and Fields, Vancouver, Canada, August 1991
- Third Annual Distinguished Lecturer, University of Rochester, February 1991

Professional Activities:

- Chair, Division of Astrophysics, American Physical Society, 2011-2012
- Chair, Dark Energy Science Plan Community Report, 2012
- Member, CERN Theory Group External Advisory Committee, 2010-present (Chair, 2011 – present)
- Board Member, Giant Magellan Telescope, 2010 – present
- Board Member, Adler Planetarium, 2010 – present
- Member, Interim Science Working Group, Joint Dark Energy Mission (NASA/DOE), 2009 – 2010
- Member, Advisory Committee, CERN Theory Group, 2009 – present
- Chair, Figure of Merit Science Working Group (NASA/DOE), 2009
- Member, Science and Security Board, Bulletin of the Atomic Scientists, 2009 – present
- Chair Line (Vice Chair, Chair Elect, Chair), Division of Astrophysics, American Physical Society, 2009 – 2011
- Vice Chair, Astronomy and Astrophysics Advisory Committee (NSF/NASA/DOE/OSTP/OMB), 2008 – 2010
- Board Member, Combined Array for Millimeter Wave Astronomy, 2008 – present
- Chair, Joint Dark Energy Mission Figure of Merit Science Working Group (NASA, DOE, and NSF), 2008
- Vice-Chair, Astronomy & Astrophysics Advisory Committee, 2008 – 2011
- Chair, Dark Energy Task Force (DOE/NASA/NSF), 2005 – 2006
- Chair, Structure and Evolution of the Universe Subcommittee (SEUS), NASA, 2001 – 2005
- Member, NASA Space Science Advisory Committee (SScAC), 1999 – 2005
- Elected: American Physical Society Executive Council, Division Councilor, Representing Division of Astrophysics 2002 – 2005
- External Advisory HEPAP Quantum Universe Subpanel, Member, October 2003
- External Advisory Committee, Center for Space Research, MIT, 2003 – 2008
- External Advisory Board, CDMS, 2003 – present

Professional Activities (continued):

- Member, Board of Trustees, Adler Planetarium, 1998 – 2006
- Adler Planetarium Council, 1993 – present
- Scientific Policy Committee, Stanford Linear Accelerator Center, 2000 – 2005
- Scientific Council, Laboratorie de l'Accelerateur Lineaire, Universite de Paris-Sud, 2000-2005
- External Advisory Committee, IceCube Project, 2000- present
- HEPAP Subpanel on Long-Range Planning (Bagger-Barish Panel), DOE and NSF, 2001
- Advisory Council, Sloan Digital Sky Survey, 1998 – 2006
- Elected: Executive Committee of the Division of Astrophysics, American Physical Society, 1993-1995
- NSERC (Canada) Special Project Grant Committee, 1994
- Consultant, NSF review of HiRes proposal, 1991
- Physics Panel, Texas Advanced Research/Technology Program, 1991
- Scientific Advisory Committee, Theoretical Physics Institute, University of Minnesota
- Member of Particles Panel, National Academy of Sciences 1990 Astronomy and Astrophysics Survey
- External Advisory Committee, Center of Particle Astrophysics NSF Science and Technology Center
- Panel Chair, NASA Long-Term Space Astrophysics Program 1990
- Referee: *Physical Review, Physical Review Letters, Physics Letters, Nuclear Physics, Nature, Science, Astrophysical Journal, NASA, NSF, DOE, NATO, Classical and Quantum Gravity, Astronomy and Astrophysics, Annals of Physics*
- Editorial Board: *Nuovo Cimento*
- Editorial Board: *Reports on Astrophysics and Cosmology*
- Editor-in-charge for high energy physics – cosmology interface: *International Journal of Modern Physics A, Modern Physics Letters A*
- Divisional Associate Editor: *Physical Review Letters*
- Editor: *Gravitation, Astrophysics, and Cosmology*
- Editorial Advisory Board: *Astronomy* magazine
- Series Editor: *High Energy Physics, Cosmology and Gravitation* Book Series, Institute of Physics Publishing Ltd., UK
- Faculty Associate: *Council for International Exchange of Scholars for the Fulbright Program*

Professional Activities (continued):

- Member: *American Physical Society, American Astronomical Society, International Astronomical Union*

Education and Public Outreach Activities:

Teaching activities at The University of Chicago have included cosmology and astrophysics at all levels: special topics courses for graduate students, as part of the astrophysics sequence for graduate students, as an advanced course for undergraduate physics and science majors, and in a "Cosmology for Poets" course for non-science majors as part of the College evolution sequence. Teaching activities in the Cosmology for Poets course were recognized by The University of Chicago with the

Education and Public Outreach Activities (continued):

1993 Quantrell Award for Excellence in Undergraduate Teaching. Educational activities outside the University include lectures to high school teachers and students, public lectures, and writing articles for a number of non-technical publications. Some of the regular educational activities are:

Harlow Shapley Visiting Lectureship Program, American Astronomical Society

Lecturer:
- Saturday Morning Physics Program, Fermilab
- Adler Planetarium, Chicago
- Saturday Scholars, Corridor Partnership for Excellence in Education
- Chautauqua Courses for College Teachers
- Summer Institute for Science Teachers, Fermilab
- High School Physics Program, Department of Energy
- Centennial Lecturer, American Astronomical Society
- University of Chicago Alumni and Parents Programs

Presentation to the Community Unit School District 200 School Board, Wheaton, IL recommending the name of Edwin Hubble for the Edwin Hubble Middle School, December 1990.

Courses Taught at The University of Chicago:

Cosmology for non-science majors (recognized with the 1993 Quantrell Award for Excellence in Undergraduate Teaching); junior-level astrophysics courses for physics majors; first-year graduate courses as part of the required courses for graduate students in the Department of Astronomy and Astrophysics; cosmology for graduate students; relativistic astrophysics for graduate students; special topics courses for graduate students, science and public policy course in the Harris School of Public Policy.

Research Grants:

- Department of Energy High Energy Physics, Task C, the University of Chicago, Co-investigator, 1987-present

Research Grants (continued):

- National Science Foundation, Physics Frontier Center, Kavli Institute for Cosmological Physics, the University of Chicago, Co-Director of Dark Matter Major Activity, 2011-present
- NASA Astrophysics Theory Program, principal investigator, 2001–2003, Fermi National Accelerator Laboratory
- NASA Astrophysics Theory Program, principal investigator, 1992–1995, Fermi National Accelerator Laboratory
- NASA Astrophysics Theory Program, principal investigator, 1990–1992, Fermi National Accelerator Laboratory
- NASA Astrophysics Division Educational Supplement Grant, 1994
- NASA Astrophysics Division Educational Supplement Grant, 1992
- NSF US/Japan Cooperative Research Program, US principal investigator, 1989–1990, Fermi National Accelerator Laboratory
- NASA Astrophysics Theory Program, principal investigator (with Leon Lederman), 1988–1990, Fermi National Accelerator Laboratory
- NASA Innovative Research Program, principal investigator (with Leon Lederman), 1983–1988, Fermi National Accelerator Laboratory
- Co-investigator on numerous other proposals for support of conferences, foreign exchange programs, etc.
- DOE High Energy and Nuclear Physics, principal investigator, 1982–1983, Los Alamos National Laboratory

Graduate Students Supervised:

- Terrance P. Walker, Ph.D. 1986, Department of Astronomy, Indiana University (cosupervisor: Stuart Mufson) Assistant Professor, The Ohio State University
- Frank S. Accetta, Ph.D. 1987, Department of Astronomy and Astrophysics, The University of Chicago, Postdoctoral Fellow, The University of Pennsylvania
- Lawrence Kawano, Ph.D. 1990, Department of Physics, The University of Chicago, Postdoctoral Fellow, Caltech
- Alessandro Massarotti, Ph.D. 1992, Department of Physics, The University of Chicago, Postdoctoral Fellow, Harvard University
- Sharon L. Vadas, Ph.D. 1993, Department of Physics, The University of Chicago, Presidential Fellow, University of California, Berkeley.

- Lloyd Knox, Ph.D. 1995, Associate Professor, Department of Physics, University of California, Davis.
- Mark Abney, Ph.D. 1996, Department of Physics, Research Fellow in Biological Sciences, The University of Chicago.
- Daniel J. Chung, Ph.D. 1998, Associate Professor, Department of Physics, University of Wisconsin, Madison.
- Patrick R. Crotty, Ph.D. 2002, Department of Physics, postdoctoral fellow, Annecy, France.
- James R. Chisholm, Ph.D. 2005, Department of Physics, The University of Utah
- Alberto Valinotto, Ph. D. 2006, Department of Physics, The University of Chicago
- Valentin Kostov, Ph. D. 2009, Department of Physics, The University of Chicago
- Zosia Krusberg, Ph. D. 2010 (expected), of Physics, The University of Chicago

Conference Organizer (partial list):

- Science Underground – Los Alamos National Laboratory 27-30 September 1982
- Inner Space/Outer Space – Fermi National Accelerator Laboratory 2-5 May 1984
- XIII Texas Symposium – Chicago 14-19 December 1986
- Cosmic String Workshop – Fermi National Accelerator Laboratory 11-13 December 1986
- American Association for the Advancement of Science Annual Meeting Chicago, 14-19 February, 1987
- Convenor, American Physical Society Division of Particles and Fields Salt Lake City, Utah 14-17 January, 1987
- International Advisory Committee – Neutrino Masses and Neutrino Astrophysics Telemark, Wisconsin March, 1986
- Quantum Gravity Workshop – Fermi National Accelerator Laboratory 1-3 May 1987
- QCD in Astrophysics – Fermi National Accelertor Laboratory 29 April - 1 May 1988
- Astrophysics Working Group (co-leader) – Snowmass Summer Study on High Energy Physics June - July 1988
- Wormhole Workshop – Fermi National Accelerator Laboratory May 1989
- Cosmological Phase Transitions – Aspen Center for Physics August 1990
- Scientific Organizing Committee – Primordial Nucleosynthesis and the Evolution of the Early Universe, Tokyo, September 1990
- Organizer, Cosmology and Astrophysics parallel session, Joint International Lepton-Photon Symposium and Europhysics Conference on High Energy Physics, Geneva, 1991
- **Conference Organizer (continued):**

Conference Organizer (continued):

- Convener, Astrophysics, Cosmology, and Dark Matter Sessions, 1991 APS/DPF Meeting, Vancouver, 1991
- Coordinator, Cosmological Phase TransitionWorkshop, Institute for Theoretical Physics, Santa Barbara, January–June, 1992
- Organizer, Topical Conference on Cosmological Phase Transitions, Santa Barbara, April 1992
- International Advisory Committee, IVth Rencontres de Blois, Blois, France, June 1992
- Convener, Mini-workshop on Particle Cosmology, 16th Texas Symposium on Relativistic Astrophysics and 3rd Symposium on Particles, Strings, and Cosmology, Berkeley, December 1992
- Member, International Advisory Committee, Unified Symmetry in the Small and the Large, Coral Gables, January 1993
- Member, International Advisory Committee, Evolution of the Universe and Its Observational Quest, Tokyo, Japan, June 1993
- Member, International Advisory Committee, Unified Symmetry in the Small and the Large, Coral Gables, January 1994
- Organizer, Giant Array Workshop, Fermilab, March 1994
- Member, International Organizing Committee, Birth of the Universe and Fundamental Physics, Rome, Italy, May, 1994
- Organizing Committee and Cosmology Convener, Particle and Nuclear Astrophysics and Cosmology in the Next Millennium, Snowmass, Co, July 1994
- Committee of the Americas, 7th Marcel Grossman Meeting on General Relativity, Stanford, CA, July 1994
- International Advisory Committee, DPF94, Albuquerque, New Mexico, August 1994
- International Advisory Committee, Trends in Astroparticle Physics, Stockholm, September 1994
- Session Organizer, 1995 Washington APS Meeting, April 1995
- International Advisory Committee, DPF96, Minneapolis, Minnesota, November 1996
- Organizing Committee, The Early Universe Meeting, Gaeta, Italy, August 1995
- International Advisory Committee, Neutrinos, Dark Matter and the Universe, Blois, France, June 1996
- Organizer of Early Universe Session, 18th Texas Symposium on Relativistic Astrophysics and Cosmology, Chicago, December 1996.

Conference Organizer (continued):

- Scientific Committee, Birth of the Universe and Fundamental Physics II, Rome, Italy, May 1997.
- Convenor of Early Universe Session, HEP97, Jerusalem, Israel, August 1997.
- International Advisory Committee, International Workshop on Particle Physics and the Early Universe, COSMO-97, Ambleside, England, September 1997.
- Advisory Committee, Primordial Black Holes, Los Angeles, Februray 1998.
- Advisory Committee, Moriond '98, France, January 1998.
- Organizer, Workshop on Relic Neutrinos, Trieste, Italy, September 1998.
- Organizing Committee, Summer School on Particle Physics and Cosmology, Trieste, Italy, Summer 1998.
- Co-organizer, Pritzker Symposium and Workshop on the Status of Inflationary Cosmology,Chicago, January-February 1999.
- Advisory Committee, 10th International Baksan School "Particles and Cosmology," Baksan Valley, Kabardino-Balkaria, Russia, April 1999.
- Co-chair of Local Organizing Committee, Inner Space/Outer Space II, the David N. Schramm Memorial Symposium, Fermilab, May 1999.
- International Advisory Committee, Frontiers in High Energy and Astroparticle Physics, Valencia, Spain, May, 1999.
- Organizing Committee, Particle Physics and the Universe, Trieste, Italy, September–October, 1999.
- International Advisory Committee, Cosmology, Relativistic Astrophysics, CosmoParticle Physics (Cosmion-99) in Honor of 80th Birthday of Isaak M. Khalatnikov, Moscow, October, 1999.
- International Advisory Committee, Strong Magnetic Fields in Neutrino Astrophysics, Yaroslavl State University, Yaroslavl, Russia, October 1999.
- Organizing Committee, International Committee for Future Accelerators Seminar, Fermilab, October 1999.
- Advisory Committee, The 4th RESCEU International Symposium on "The Birth and Evolution of the Universe," Tokyo, Japan, November, 1999.
- Organizer, Inner Space/Outer Space, Fermilab, Batavia, IL, May 1999.
- Organizer, SUSY '99, Fermilab, Batavia, IL, June 1999.
- Organizer, Fundamental Physics from Space, Sonoma CA, October 1999.
- Organizer, Aspen Winter School on Astrophysics, January 2000.

- International Advisory Board, Nuclei in the Cosmos 2000, Aarhus, Denmark, June 2000.

Conference Organizer (continued):

- International Advisory Committee, Summer School on Particle Astrophysics, International
- Center for Theoretical Physics, Trieste, Italy, June 2000
- International Advisory Committee, COSMO 2000, Seoul, Korea, October, 2000.
- International Advisory Committee, Frontiers in Particle Astrophysics and Cosmology, Valencia, Spain, October 2000.
- Organizing Committee, VII International Workshop on Advanced Computing and Analysis Techniques in Physics Research, Fermilab, October 2000.
- Advisory Committee, Frontiers in Contemporary Physics II, Nashville, TN, March 2001.
- International Advisory Committee, XXth International Symposium on Lepton and Photon Interactions at High Energy, Rome, Italy, July 2001.
- International Advisory Committee, COSMO'01, Rovaniemi, Finland, September 2001.
- Advisory Committee, 11th International Baksan School "Particles and Cosmology", Baksan Valley, Kabardino-Balkaria, Russia, April 2001.
- International Committee, Xth Brazilian School of Cosmology and Gravitation, Rio de Janiero, Brasil, July 2002.
- Advisory Committee, XIVth Rencontres de Blois, Blois, France, June 2002.
- International Organizing Committee, International Workshop on Neutrinos and Subterranean Science, Washington, DC, September 2002,
- Advisory Committee, Yamada Conference, Tokyo Japan, November 2003.
- Chair, Scientific Organizing Committee, Beyond Einstein, SLAC, Palo Alto, CA, May 2004
- International Science Organizing Committee, 22nd Texas Symposium on Relativistic Astrophysics, Palo Alto, CA, December 2004.

Invited Presentations at Conferences (partial list):

- 1980 Neutrino Mass Conference, Telemark, Wisconsin, October 1980
- Orbis Scientiae 1981, Coral Gables, Florida, January 1981
- Early Universe Workshop, Santa Barbara, California, May 1981
- V Johns Hopkins Workshop, Baltimore, Maryland, June 1981
- VIII International Conference on Neutrino Physics and Astrophysics, Maui, Hawaii, July 1981
- Third Marcel Grossman Conference on Recent Developments in Gravitation, Shanghai, China, August 1982

- 1982 Neutrino Mass Conference, Telemark, Wisconsin, October 1982

Invited Presentations at Conferences (partial list):

- XI Texas Symposium on Relativistic Astrophysics, Austin, Texas, December 1982
- Orbis Scientiae 1983, Coral Gables, Florida, January 1983
- Monopole ’83, Ann Arbor, Michigan, October 1983
- Early Universe Workshop (est Conference) San Francisco, California, January 1984
- First Equatorial School on Relativistic Astrophysics, Bogota, Colombia, February 1984
- VIII Johns Hopkins Workshop, Baltimore, Maryland, June 1984
- NATO Conference on Phase Transitions in the Very Early Universe, Bielefeld, West Germany, June 1984
- XI International Conference on Neutrino Physics and Astrophysics, Dortmund, West Germany, June 1984
- IV Brazilian School on Cosmology and Gravitation, Rio de Janeiro, Brazil, July 1984
- American Physical Society (DPF) Santa Fe, New Mexico, November 1984
- Early Universe Workshop, Rutherford Laboratory, England, March 1985
- Superconducting Super Collider Users Meeting, Berkeley, California, May 1985
- IX Johns Hopkins Workshop, Florence, Italy, June 1985
- Fourth Marcel Grossmann Meeting on Recent Developments in General Relativity, Rome, Italy June 1985
- Particles and the Universe, Thessaloniki, Greece, June 1985
- Summer Workshop on High Energy Physics and Cosmology, Trieste, Italy, June-July 1985
- Physics in Collision, Autun, France, July 1985
- Aspen Winter Conference, Aspen, Colorado, January 1986
- International School of Particle Astrophysics, Erice, Sicily, May 1986
- XVII International Seminar on Theoretical Physics, Peniscola, Spain, June 1986
- International Symposium on Weak and Electromagnetic Interactions in Nuclei, Heidelberg, West Germany, July 1986
- Theoretical Advanced Studies Institute, Santa Cruz, California, July 1986
- Cargese NATO Advanced Studies Institute on Gravitation in Astrophysics, Cargese, Corsica, July 1986
- Astroparticle Physics Meeting, Rome, Italy, November 1986
- Second Mexican School on Particles and Fields, Cuernavaca, Mexico, December 1986
- APS/DPF Meeting, Salt Lake City, Utah, January 1987
- APS/AAPT Meeting, San Francisco, California, January 1987

- Early Universe Workshop, Baltimore, Maryland, March 1987

Invited Presentations at Conferences (continued):

- Heavenly Accelerators Workshop, Baltimore, Maryland, March 1987
- Neutrino masses and Astrophysics, Ashland, Wisconsin, March 1987
- Vth Brazilian School on Cosmology, Rio de Janeiro, Brazil, July 1987
- American Chemical Society "Symposium on the Origin and Distribution of the Elements," New Orleans, Louisiana, August 1987
- First Italian/Korean Joint Symposium on Relativistic Astrophysics, Seoul, South Korea, September 1987
- MASUA Theoretical Physics Conference, Lawrence, Kansas, October 1987
- XVth Yamada Conference, Tokyo, Japan, March 1988
- Japan Physical Society Spring Meeting, Koriyama, Japan, April 1988
- Fifth Marcel Grossmann Meeting on Recent Developments in General Relativity, Perth, Australia, August 1988
- CP Violation in Particle Physics and Astrophysics, Château de Blois, France, May 1989.
- Inflation and Exotic Structure Formation, Vancouver, Canada, May 1990.
- The Birth and Early Evolution of Our Universe—Nobel Symposium 79, Graftavallen, Ostersund, Sweden, June 1990.
- Primordial Nucleosynthesis and the Origin and Evolution of the Early Universe, Tokyo, Japan, August 1990.
- International School of Particle Astrophysics, Houston, Texas, January, 1991.
- Les Rencontres de Physique, La Thuile, Italy, March 1991.
- International School Particles and Cosmology, Baksan, USSR, May 1991.
- Lepton Photon — High Energy Physics Meeting, Geneva, Switzerland, July, 1991.
- Nuclear Astrophysics Symposium, Pasadena, California, August, 1991.
- DPF91, Vancouver, Canada, August, 1991.
- UCLA High-Energy Neutrino and Gamma-Ray Astrophysics Meeting, Los Angeles, California, February, 1992.
- Third International Symposium on Neutrino Telescopes, Venice, Italy, March, 1992
- Workshop on Dynamics of First Order Phase Transitions, Jülich, Germany, June, 1992.
- IVth Recontres de Blois Particle Astrophysics, Blois, France, June, 1992.
- Lecturer, International School of Astrophysics "D. Chalonge," Erice, Italy, September, 1992.
- Le Rencontres de Physique, La Thuile, Italy, March 1993.

- 11th Capri Symposium on Certainties and Doubts in Elementary Particles, Capri, Italy, May 1993.

Invited Presentations at Conferences (continued):

- Evolution of the Universe and Its Observational Quest, Tokyo, Japan, June 1993
- Lecturer, Summer Course on Astrophysics and Particle Physics, Eötvös University, Budapest, Hungary, July 1993.
- 3rd Portugese Meeting in Astronomy and Astrophysics, Lisbon, Portugal, July 1993.
- 42nd Scottish Universities Summer School in Physics, St. Andrews, Scotland, August 1993.
- Coral Gables Conference, Coral Gables, Florida, January 1994
- Birth of the Universe and Its Observational Quest, Rome, May 1994
- Frontier Objects in Astroparticle Physics, Vulcano, Italy, May 1994
- Rapporteur, XXVIIth International Conference on High Energy Physics (Rochester Meeting), Glasgow, Scotland, August 1994
- Rapporteur, VIIth Marcel Grossmann Meeting on General Relativity, Palo Alto, CA., August 1994
- XVIIth Johns Hopkins Workshop on Current Problems in Elementary Particle Theory, Florence, Italy, August 1994
- Trends in Astroparticle Physics, Nobel Symposium, Stockholm, September 1994
- Coral Gables Conference, Coral Gables, Florida, February, 1995
- Les Rencontres de Physique, La Thuile, Italy, March 1995.
- Frontiers of Particle Physics, Valencia, Spain, June 1995.
- Non-Accelerator Particle Astrophysics School, International Centre for Theoretical Physics, Trieste, Italy, July 1995.
- International School of Physics “Enrico Fermi” Dark Matter in the Universe, Varenna, Italy, July 1995
- The Very Early Universe Conference, Gaeta, Italy, August 1995
- TAN Summer School and Workshop in Astroparticle Physics, Vigso, Denmark, August 1995
- 16th UK Institute for Theoretical High Energy Physics, Swansea, Wales, U.K., August 1995
- The Cosmological Constant and the Evolution of the Universe, Tokyo, Japan, November 1995
- Orbis Scientiae 1996, Miami, Florida, January, 1996.
- Sources and Detection of Dark Matter, Santa Monica, California, February, 1996.
- Neutrino Telescopes, Venice, Italy, February, 1996.
- Le Rencontres de Physique, La Thuile, Italy, March 1996.

- International Seminar Quarks ’96, Yaroslavl, Russia, May 1996.

Invited Presentations at Conferences (continued):

- Second German-American Frontiers of Science Symposium, National Academy of Science Study Center, Woods Hole, Massachusetts, June 1996.
- Neutrinos, Dark Matter, and the Universe, Blois, France, June 1996.
- Astrofundamental Physics, Erice, Italy, September 1996.
- Orbis Scientiae 1996, Miami, Florida, January 1997.
- Frontiers in Contemporary Physics, Nashville, May 1997.
- Birth of the Universe and Fundamental Physics, Rome, Italy, May 1997.
- Beyond the Desert, Tegernesee, Germany, June 1997.
- Nathagali Summer College on Physics and Contemporary Needs, Islamabad, Pakistan, July 1997
- British Universities Summer School in Theoretical Elementary Particle Physics, Sussex, England, September 1997. International Workshop on Particle Physics and the Early Universe, COSMO-97, Ambleside, England, September 1997.
- 26th Coral Gables Meeting, Miami, Florida, December 1997.
- XXXIIIrd Rencontres de Moriond, Les Arcs, France, January 1998.
- World Economic Forum, Davos, Switzerland, January 1998.
- 3rd Santa Monica Meeting on Sources and Detection of Dark Matter, Santa Monica, CA, February, 1998.
- Particles, Strings, and Cosmology, Boston, MA, March 1998
- Cosmology and Particle Physics, CERN, Geneva, Switzerland, June 1998
- St. Croix Summer School in Experimental Elementary Particle Physics, St. Croix, US Virgin Islands, June 1998
- The Birth of Galaxies, Xth Rencontres de Blois, Blois, France, June–July 1998
- DARK’98, Dark Matter in Astro and particle Physics, Heidelberg, Germany, July 1998
- XXIXth International Conference on High Energy Physics, plenary lecture, Vancouver, Canada, July 1998
- Particle Physics and the Universe—Nobel Symposium, Haga Slott, Sweden, August 1998
- GAAC Young Scholars Institute, Aspen, Colorado, September 1998
- COSMO’98, Asilomar, CA, October 1998
- Pritzker Symposium on the Status of Inflationary Cosmology, Chicago, IL, January 1999
- AAAS Cosmic Questions, Smithsonian, Washington DC, April 1999

- Centennial Meeting of the American Astronomical Society, Chicago, IL, June 1999.

Invited Presentations at Conferences (continued):

- 23rd Johns Hopkins Workshop on Current Problems in Particle Theory, Baltimore, MD, June 1999
- Universe ’99, Toronto, Canada, July 1999
- Newton Institute Program, Cambridge, England, August 1999
- Modern Cosmology & Inflation, Erice, Sicily, August 1999
- TAUP Conference, Paris, France, August 1999
- COSMO-99, Trieste, Italy, September 1999
- DESY-theory-workshop, Hamburg, Germany, October 1999
- Fundamental Physics from Space, Sonoma, CA, October 1999
- RESCEU Symposium, Tokyo, Japan, November 1999
- Chalonge School, Erice, Sicily, December 1999
- Aspen Astrophysics Winter Meeting, Aspen, CO, January 2000.
- Pacific Northwest Association of Physics Teachers, Portland, OR, April 2000.
- ICTP Summer School on Particle Astrophysics, Trieste, Italy, June 2000.
- CITA K2K, Toronto, Canada, August 2000.
- COSMO2K, Cheju Island, Korea, September 2000.
- Historical Development of the Big Bang, Valencia, Spain, September 2000.
- Jean Audouze & James Truran Meeting, IAP, Paris, France, November 2000.
- Frontiers in Contemporary Physics, Nashville, TN, March 2001.
- Matter in the Universe, Bern, Switzerland, March 2001.
- PASCOS, Chapel Hill NC, April 2001.
- Physics 2001, Puerto Rico, May 2001
- CMB Polarization, Chicago IL, May 2001
- Lepton-Photon Meeting, Rome, Italy, July 2001
- International Conference on High-Energy Physics, Hamburg, Germany, August 2001.
- COSMO’01, Rovaniemi, Finland, September 2001
- Advances in Cosmology, Seoul, Korea, October 2001
- Les Rencontres de Moriond, Les Arcs, France, March 2002
- International School "Bruno Touschek" in Nuclear, Subnuclear and Astroparticle Physics. Frascati, Italy, May 2002
- Colloque Chalonge, Paris, France, June 2002

- XIVth Rencontres de Blois, Blois, France, June 2002
- Brazilian Summer School on Cosmology, Mangaratiba, Brazil, August 2002

Invited Presentations at Conferences (continued):

- Summer School on Cosmology, Frascati, Italy, September 2002
- International School of Cosmology "Chalonge," Palermo, Italy, September 2002
- Mexican School of Cosmology, Cancun, Mexico, November 2002
- Texas Symposium on Relativistic Astrophysics, Florence, Italy, December 2002
- Cosmology and Particle Physics, CERN, Geneva, Switzerland, June 2003
- Itzykson Meeting, Saclay, France, June 2003
- Which Model of the Universe, Marseille, France 2003
- SLAC Summer Institute, SLAC, Palo Alto, CA, August 2003
- COSMO '04, Ambleside, England, UK, August 2003
- International School of Subnuclear Physics, Erice, Italy, September 2003
- IEEE Meeting on Detectors, Portland, OR, October 2003
- RESCEU Meeting on Cosmology, Tokyo, Japan, November 2003
- New York Area Meeting, Columbia University, NY, December 2004

Scientific Publications – Journals:

1. "Neutrino Pair Bremsstrahlung Including Neutral Current Effects," (with D.A. Dicus, D.N. Schramm, D.L. Tubbs) *Astrophys. J.* **210**, 481 (1976).
2. "Stellar Energy Loss Rates Due to S, P, or T Neutral Currents," (with D.A. Dicus) *Phys. Rev. D* **15**, 977 (1977).
3. "Reaction Rate, Weak Corrections, and Background in $e^+ e^- \rightarrow \pi^\circ\gamma, \eta\gamma$," (with D.A. Dicus, V.L. Teplitz) *Phys. Rev. D* **15**, 1286 (1977).
4. "Cosmological Upper Bounds on Heavy Neutrino Lifetimes," (with D.A. Dicus, V.L. Teplitz) *Phys. Rev. Lett.* **39**, 168 (1977).
5. "Limits from Primordial Nucleosynthesis on the Properties of Massive Neutral Leptons," (with D.A. Dicus, V.L. Teplitz, R.V. Wagoner) *Phys. Rev. D* **17**, 1529 (1978).
6. "Cosmological Implications of Massive, Unstable Neutrinos," (with D.A. Dicus, V.L. Teplitz) *Astrophys. J.* **221**, 327 (1978).
7. "Astrophysical Bounds on the Masses of Axions and Higgs Particles," (with D.A. Dicus, V.L. Teplitz, R.V. Wagoner) *Phys. Rev. D* **18**, 1829 (1978).
8. "Production and Detection of New Neutrinos," (with D.A. Dicus, H.J. Lubatti, V.L. Teplitz) *Phys. Rev. D* **19**, 1522 (1979).
9. "The Mass and Mixing Angles of the Tau Neutrino," (with T. Goldman) *Phys. Rev. Lett.* **43**, 897 (1979).
10. "Production and Inelastic Scatterings of Neutrinos by Nuclei at Extreme Temperatures," (with T.J. Mazurek) *Astrophys. J.* **234**, 1085 (1979).
11. "The Development of Baryon Asymmetry in the Early Universe," (with S. Wolfram) *Phys. Lett.* **91B**, 217 (1980).
12. "Spontaneous Symmetry Breaking and the Expansion Rate of the Early Universe," (with S. Wolfram), *Astrophys. J.* **239**, 428 (1980).
13. "Astrophysical Bounds on Very Low Mass Axions," (with D.A. Dicus, V.L. Teplitz, R.V. Wagoner) *Phys. Rev. D* **22**, 839 (1980).
14. "Baryon Number Generation in the Early Universe," (with S. Wolfram) *Nucl. Phys.* **B172**, 224 (1980).
15. "Cosmological Constraints on Heavy Weakly Interacting Fermions," (with J.A. Harvey, D.B. Reiss, S. Wolfram) *Nucl. Phys.* **B177**, 456 (1981).
16. "Gravitational Clumping and the Annihilation of Monopoles," (with T.J. Goldman and D. Toussiant) *Phys. Rev. D* **23**, 867 (1981).
17. "Cosmological Baryon Number Generation in Grand Unified Models," (with J.A. Harvey, D.B. Reiss, and S. Wolfram) *Phys. Rev. Lett.* **47**, 391 (1981).

18. "Grand Unified Theories and the Lepton Number of the Universe," (with J.A. Harvey) *Phys. Rev. D* **24**, 2090 (1981).
19. "Astrophysical Production of Fractional Charge in Broken Quantum Chromodynamics," (with G. Steigman and M.S. Turner) *Phys. Rev. Lett.* **47**, 1357 (1981).
20. "The Early Universe," (with M.S. Turner) *Nature* **294**, 521 (1981).
21. "The Generation of Isothermal Perturbations in the Very Early Universe," (with J.R. Bond and J. Silk) *Astrophys. J.* **255**, 341 (1982).
22. "Calculation of Cosmological Baryon Asymmetry in Grand Unified Gauge Models," (with J.A. Harvey, D.B. Reiss, S. Wolfram) *Nucl. Phys.* **B201**, 16 (1982).
23. "Massive Neutrinos and Primordial Nucleosynthesis," (with R. Scherrer) *Phys. Rev. D* **25**, 1481 (1982).
24. "Lepton Number Violation, Majorana Neutrinos, and Supernovae," (with D.L. Tubbs and D.A. Dicus) *Astrophys. J.* **255**, L57 (1982).
25. "The Survival of Primordial Color Fluctuations," (with M.S. Turner) *Phys. Lett.* **115B**, 99 (1982).
26. "Majorons and Muon Decay," (with T. Goldman and G.J. Stephenson) *Phys. Rev. D* **26**, 2503 (1982).
27. "Primordial Nucleosynthesis Including Radiative, Coulomb, and Finite Temperature Corrections to Weak Rates," (with D.A. Dicus, A.M. Gleeson, E.C.G. Sudarshan, V.L. Teplitz, and M.S. Turner) *Phys. Rev. D* **26**, 2694 (1982).
28. "Monopole Catalysis of Nucleon Decay in Neutron Stars," (with S.A. Colgate and J.A. Harvey) *Phys. Rev. Lett.* **49**, 1373 (1982).
29. "Cosmology with Very Large Gauge Models," (with J.A. Harvey and S.Wolfram) *Phys. Rev. D* **27**, 315 (1983).
30. "On Perturbation Theory at Finite Temperature," (with D.A. Dicus and D. Down) *Nucl. Phys.* **B223**, 525 (1983).
31. "Massive, Degenerate Neutrinos and Cosmology," (with K. Freese and M.S. Turner) *Phys. Rev. D* **27**, 1689 (1983).
32. "New Inflation in Supersymmetric Theories," (with A. Albrecht, S. Dimopoulos, W. Fischler, S. Raby, and P.J. Steinhardt) *Nucl. Phys.* **B229**, 528 (1983).
33. "Spontaneous Lepton Number Violation and De-Leptonization in Stellar Collapse," (with D.A. Dicus and D.L. Tubbs) *Nucl. Phys.* **B223**, 532 (1983).
34. "Baryon Number Generation in Supersymmetric Unified Models: The Effect of Supermassive Fermions," (with S. Raby) *Phys. Rev. D* **27**, 2990 (1983).
35. "Grand Unified Theories and the Origin of the Baryon Asymmetry," (with M.S. Turner) Ann. Rev. *Nucl. Part. Sci.* **33**, 645 (1983).

36. "Cosmological Problems for the Polonyi Potential," (with G.D. Coughlan, W. Fischler, S. Raby, and G.G. Ross) *Phys. Lett.* **131B**, 59 (1983).
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38. "Dimensional Reduction in the Early Universe: Where Have the Massive Particles Gone," (with R. Slansky) *Phys. Lett.* **135B**, 378 (1984).
39. "Phase Transitions in Supersymmetric Grand Unified Models," (with S. -Y. Pi and S. Raby) in *Cosmology of the Early Universe* (World Scientific Press, R. Ruffini and F.L. Zhi, ed.), 45 (1984).
40. "Limits from the Soft X-ray Background on the Temperature of Old Neutron Stars and on the Flux of Superheavy Magnetic Monopoles," (with M.S. Turner) *Astrophys. J.* **286**, 702 (1984).
41. "More Dimensions-Less Entropy," (with D. Lindley and D. Seckel) *Phys. Rev. D* **30**, 1205 (1984).
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43. "Cosmological Production of Kaluza-Klein Monopoles," (with J.A. Harvey and M.J. Perry), *Phys. Lett.* **149B**, 465 (1984).
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54. "Yet Another Possible Explanation of the Solar Neutrino Puzzle," (with M.S. Turner and T.P. Walker), *Phys. Lett.* **175B**, 478 (1986).

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59. "Electroweak Anomaly and Lepton Asymmetry," (with M. S. Turner), *Mod. Phys. Lett. A* **2**, 285 (1987).
60. "How Reliable Are the Neutrino Mass Limits Derived from SN 1987A?," (with A. Stebbins and M. S. Turner), *Phys. Rev. D* **35**, 3590 (1987).
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64. "Resource Letter on Particle Physics and Cosmology," (with D. Lindley and D. N. Schramm) *Am. J. Phys.* **56**, 492 (1988).
65. "Primordial Origin of Nontopological Solitons," (with J. A. Frieman, G. Gelmini, and M. Gleiser), *Phys. Rev. Lett.* **60** 2101 (1988).
66. "Nontopological Cosmic Strings," (with E. Copeland and K. Lee), *Phys. Rev. D* **38**, 3023 (1988).
67. "Cosmology of Biased Discrete Symmetry Breaking," (with G. Gelmini and M. Gleiser), *Phys. Rev. D* **39**, 1558 (1989).
68. "Ground State of High-Density Matter," (with E. Copeland and K. Lee), *Nucl. Phys.* **B319**, 501 (1989).
69. "Solitosynthesis: Cosmological Evolution of Nontopological Solitons," (with K. Griest), *Phys. Rev. D* **40**, 3231 (1989).
70. "Limits to the Radiative Decays of Neutrinos and Axions from -ray Observations of SN 1987a," (with M. S. Turner), *Phys. Rev. Lett.* **62**, 509 (1989).
71. "The Coasting Cosmology," *Astrophys. J.* **344**, 543 (1989).
72. "Astrophysical and Cosmological Constraints on Neutrino Properties," (with D. N. Schramm and M. S. Turner), in *Neutrino Physics*, ed., K. Winter.
73. "Statistical Fluctuations as the Origin of Nontopological Solitons," (with K. Griest and A. Massarotti), *Phys. Rev. D* **40**, 3529 (1989).

74. "Eternal Annihilations: New Constraints on Long-Lived Particles from Big-Bang Nucleosynthesis," (with J. A. Frieman and M. S. Turner), accepted for publication *Phys. Rev. D* **41**, 3080 (1990).
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76. "Stability of Compactification During Inflation," (with L. Amendola, M. Litterio, and F. Occhionero), *Phys. Rev. D* **42**, 1944 (1990).
77. "Gravitational Couplings of the Inflaton in Extended Inflation," (with R. Holman and Y. Wang), *Phys. Rev. Lett.* **65**, 17 (1990).
78. "Topological Defects in Extended Inflation," (with E. J. Copeland and A. R. Liddle), *Phys. Rev. D* **42**, 2911 (1990).
79. "Origin of Density Fluctuations in Extended Inflation," (with D. S. Salopek and M. S. Turner), *Phys. Rev. D* **42**, 3925 (1990).
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82. "Baryogenesis in Extended Inflation I. Baryogenesis via Production and Decay of Supermassive Bosons," (with J. D. Barrow, E. J. Copeland, and A. R. Liddle), *Phys. Rev. D* **43**, 977 (1991).
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87. "First-Order Inflation," *Physica Scripta* **T36**, 199 (1991).
88. "Phase Transitions with Sub-Critical Bubbles," (with M. Gleiser and R. Watkins), *Nucl. Phys.* **B364**, 411 (1991).
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90. "Plausible Double Inflation," (with R. Holman, S. L. Vadas, and Y. Wang), *Phys. Lett.* **B269**, 252 (1991).

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94. "Domain Wall Formation in Late-Time Phase Transitions," (with Y. Wang), *Phys. Rev. D* **45**, 4421 (1992).
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98. "Critical Behavior in the Electroweak Phase Transition," (with M. Gleiser), *Phys. Rev. D* **48**, 1560 (1992).
99. "Plasmon Decay to $\nu\overline{\nu}$ in a Relativistic Plasma," (with D. Grasso), *Phys. Rev. D* **48**, 3522 (1993).
100. "Reconstructing the Inflaton Potential—in Principle and in Practice," (with E. Copeland, A. R. Liddle, and J. E. Lidsey), *Phys. Rev. D* **48**, 2529 (1993).
101. "Axion Miniclusters and Bose Stars," (with I. I. Tkachev), *Phys. Rev. Letters* **71**, 3051 (1993).
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