

VITA  
Dr. Mark H. Shapiro

Dr. Mark H. Shapiro  
Professor and Chair  
Department of Physics  
California State University, Fullerton

Visiting Associate  
Basic and Applied Physics Group  
Division of Physics, Mathematics, and Astronomy  
California Institute of Technology

Education:

A.B. (honors) University of California, Berkeley 1962  
M.S. University of Pennsylvania 1963  
Ph.D. University of Pennsylvania 1966  
(N.S.F. Cooperative Fellow 1963-1966)

Employment:

1958-1962 U.S. Naval Radiological Defense Laboratory  
San Francisco, California

1966-1968 Research Fellow, Kellogg Radiation Laboratory  
California Institute of Technology

1968-1970 Research Associate, Nuclear Structure Research  
Laboratory, University of Rochester

1970-1973 Assistant Professor of Physics  
California State University, Fullerton

1973-1978 Associate Professor of Physics  
California State University, Fullerton

1978- Professor of Physics  
California State University, Fullerton

1976-1983 Visiting Associate, Kellogg Radiation Laboratory  
California Institute of Technology

1983-1992 Visiting Associate, Div. of Physics, Mathematics,  
and Astronomy, California Institute of Technology

1992-1993 Consultant, Div. of Physics, Mathematics, and  
Astronomy, California Institute of Technology

1993- Visiting Associate, Div. of Physics, Mathematics,  
and Astronomy, California Institute of Technology

1985-1986 Acting Associate Dean, School of Mathematics, Science  
and Engineering, California State University, Fullerton

1986-1987 Acting Director, Office of Faculty Research and  
Development, California State University, Fullerton

1987-1988 "Rotator", National Science Foundation (served as

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a program officer for the Teacher Enhancement Program and the Instrumentation and Laboratory Improvement Program, and as a special assistant to the Assistant Director for Science and Engineering Education)

- 1987-1995 Visiting Scientist, Surface Physics Group, National Institute of Standards and Technology (Gaithersburg, MD)
- 1989-1996 Chair, Department of Physics, California State University, Fullerton
- 1996- Graduate Advisor, Department of Physics, California State University, Fullerton
- 1998 - Chair, Department of Physics, California State University, Fullerton

Honors, Memberships:

Exceptional Merit Service Award - 1983-84  
California State University, Fullerton

Faculty Marshall and Distinguished Professor  
School of Mathematics, Science and Engineering  
California State University, Fullerton 1985

Member, Board of Directors, California State University,  
Fullerton, Foundation 1982-85 (Ex-officio 1986-87)

Listed in *Who's Who in America*,  
*Who's Who in the West*,  
*Who's Who in the World*,  
*Who's Who in the Frontiers of Science and Technology*,  
*Who's Who in Science and Engineering*  
*American Men and Women of Science*,  
*Who's Who in Technology Today* and  
*Industry's Directory of Technical Consultants*

Member- American Physical Society ( Materials Research  
Group, Division of Condensed Matter Physics)  
American Association of Physics Teachers  
American Geophysical Union  
American Association for the Advancement of Science  
New York Academy of Sciences  
Materials Research Society  
Council on Undergraduate Research

Scientific and Technical Interests:

Nuclear Structure Physics  
Laboratory Nuclear Astrophysics  
Applications of Nuclear Physics in Instrumentation, Geophysics,  
Environmental Radioactivity, and Nuclear Safety  
Computer Algorithm Development for Scientific and Technical  
Data Analysis

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Computational Physics  
Surface Physics

Pedagogical and Administrative Interests:

Classical Physics  
Electronics  
Measurement Systems  
Computational Physics  
Use of Computers in Physics Instruction  
Surface Physics  
Resource Allocation  
Proposal Development  
Research Administration

Research and Other External Funding:

Research Corporation  
California State University, Fullerton Foundation  
U.S. Department of H.E.W.  
Caltech President's Venture Fund  
U.S. Geological Survey  
National Science Foundation (Research, Research in Undergraduate  
Institutions, Instrumentation and Laboratory Improvement, and  
Undergraduate Faculty Enhancement Programs)  
Digital Equipment Corporation - DECOR Program  
CSU Chancellor's Office Research Fund Program  
Wolfram Research, Inc. (Educational Grant Program)  
IBM Grant Program (Caltech)

Other Professional Activities:

Referee/Reviewer - *A.A.A.S. Science Books and Films,*  
*Science,*  
*Nuclear Instruments and Methods-B,*  
*Earth and Planetary Science Letters,*  
*Journal of Geophysical Research,*  
*Geophysical Research Letters,*  
*Physical Review Letters,*  
*The Physical Review*  
*Tectonophysics,*  
*Surface Science,*  
*Journal of Chemical Physics*  
*Computers in Physics*  
*Journal of Vacuum Science and Technology A*  
U.S. Geological Survey,  
National Science Foundation,  
Alaska Council on Science and Technology,  
Materials Research Society,  
Fund for the Improvement of Post-Secondary Education  
Research Corporation  
Educational Testing Service (Graduate Record Exami-  
nation in Physics)  
International Science Foundation  
Petroleum Research Fund  
Idaho State Board of Education

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External Examiner - University of Melbourne (Australia),  
Yale University  
Ph.D. dissertations in physics

External Tenure/Promotion Evaluator - Vanderbilt University,  
Kalamazoo College, Loughborough University of Technology,  
Louisiana State University System

Invited Guest of the State Seismological Bureau of the  
Peoples Republic of China (8/81) - Cooperative Earthquake  
Prediction Research Program

Member - Governor's Emergency Task Force on Earthquake  
Preparedness, Committee on Public Information, Warning,  
and Education (1981-5).

Invited Guest of the Consiglio Nazionale Richerche,  
Istituto di Geochimica dei Fluidi (Italy 5/83) - Presentation  
of research results.

Frequent Talks and Lectures on Scientific Work

Radio and Television Appearances Including Programs  
on Voice of America and National Public Radio

American Chemical Society tour speaker 1983-85

Member, Dean Search Committee, School of Mathematics, Science  
and Engingeering, CSUF (1977)

Member, Dean Search Committee, School of Human Development and  
Community Service, CSUF (1987)

Member, Program Review Committee for the CSULA physics program  
(1989).

Member, Committee on Professional Concerns, American  
Association of Physics Teachers (1990-93).  
Chair (1991-93).

Member, CSUF Library (Building) Addition Committee, 1990-1995

Member, Search Committee, School Based Development Director,  
CSUF School of Natural Science and Mathematics (1993).

Elected member, CSUF Faculty Leaves Committee (3-yr term)  
(1993).

Elected physics councilor, Council on Undergraduate Research  
(3-year term) (1993), re-elected (1996).

School of NSM representative, CSUF Academic Standards  
Committee (2-yr term, elected by the CSUF Academic Senate,  
1993)

Member, Program Review Committee for Cal Poly, Pomona physics  
program (1993-94).

Elected to the CSUF Faculty Senate 1996, representing the School

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of Natural Science and Mathematics (two-year term). Re-elected for 1998 (two-year term). Re-elected for 2000 (two-year term).

Elected to the CSUF Long Range Planning and Priorities Committee 1996 (two year term).

Elected to the CSUF Budget and Resources Committee 1997 (one year term). Re-elected to a two-year term 1998.

Outside reviewer, physics program California State University, San Bernardino (1999-2000).

Elected to the CSUF University Advancement Committee (2000).

Elected to the search committee for Vice President of University Advancement (2002)

References:

Dr. Thomas A. Tombrello  
Professor of Physics and Division Chair  
Division of Physics, Mathematics, and Astronomy  
Caltech Mail Code 200-36  
Pasadena, CA 91125  
(626) 395-4581

Dr. Roger Nanes  
Professor,  
Department of Physics  
California State Univ., Fullerton  
Fullerton, CA 92634  
(714) 278-3366

Dr. James M. Feagin  
Professor,  
Department of Physics  
California State Univ., Fullerton  
Fullerton, CA 92634  
(714) 278-3366

Dr. Kolf A. Jayaweera  
Dean,  
School of Natural Science and Mathematics  
California State Univ., Fullerton  
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Additional references available on request.

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Publications, Invited, and Contributed Papers:

- Evidence for the Existence of Three Doublets in  $^{56}\text{Fe}$   
*Physics Letters*, 19, 573 (1965)
- Present Status of the Search for Double Beta Decay  
*Bull. Am. Phys. Soc.*, 10, 609 (1965)
- Use of Spark Chambers to Reduce Background in a Search for Double  
Beta Decay in  $^{48}\text{Ca}$   
*Bull. Am. Phys. Soc.*, 10, 424 (1965)
- $\text{Fe}^{56}(\text{p},\text{p}'\gamma)$  Coincidence Measurements at 6.0 and 7.0 MeV  
*Bull. Am. Phys. Soc.*, 10, 427 (1965)
- Spark-Chamber Search for Double Beta Decay in  $^{48}\text{Ca}$   
*Physical Review*, 154, 1050 (1967)
- Nuclear Energy Levels of  $^{56}\text{Fe}$  from Studies of the  $^{56}\text{Fe}(\text{p},\text{p}'\gamma)$   
Reaction  
*Nuclear Physics*, A101, 81 (1967)
- High Resolution Studies of  $^{70}\text{Ge}$  Levels  
*Bull. Am. Phys. Soc.*, 12, 129 (1967)
- $^{16}\text{O}({}^3\text{He},\text{n}\gamma)\text{Ne}^{18}$  Coincidence Measurements at 9.0 MeV  
*Bull. Am. Phys. Soc.*, 12, 535 (1967)
- $^{40}\text{Ca}({}^3\text{He},\text{n})^{42}\text{Ti}$  Reaction  
*Bull. Am. Phys. Soc.*, 12, 1123 (1967)
- Energy Levels of  $^{42}\text{Ti}$  from the  $^{40}\text{Ca}({}^3\text{He},\text{n})$  Reaction  
*Nuclear Physics*, A114, 401 (1968)
- The  $(\alpha,\gamma)$  Reaction on  $^{12}\text{C}$  and  $^{18}\text{O}$   
*Bull. Am. Phys. Soc.*, 13, 698 (1968)
- $({}^3\text{He},\text{n}\gamma)$  Coincidence Measurements on  $A = 4n$  Targets  
*Bull. Am. Phys. Soc.*, 13, 698 (1968)
- Level Structure of  $^{70}\text{Ge}$   
*Bull. Am. Phys. Soc.*, 13, 1427 (1968)
- High Resolution Study of  $^{70}\text{Ge}$   
*Nuclear Physics*, A123, 250 (1969)
- A Study of the  $^{36}\text{Ar}({}^3\text{He},\text{n})^{38}\text{Ca}$  Reaction  
*Nuclear Physics*, A128, 73 (1969)
- Evidence for an Energy Level Triplet in  $^{56}\text{Fe}$   
*Nuclear Physics*, A130, 62 (1969)
- The  $^{18}\text{O}(\alpha,\gamma)^{22}\text{Ne}$  Reaction  
*Nuclear Physics*, A131, 430 (1969)

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- $^{16}\text{O}(^3\text{He},n\gamma)^{18}\text{Ne}$  Angular Correlation Measurements  
*Bull. Am. Phys. Soc.*, 14, 530 (1969)
- Study of the  $^{40}\text{Ar}(^3\text{He},p)^{42}\text{K}$  Reaction at 24.0 MeV  
*Bull. Am. Phys. Soc.*, 14, 1228 (1969)
- Decay Schemes of  $^{18}\text{Ne}$ ,  $^{22}\text{Mg}$ , and  $^{38}\text{Ca}$  from  $(^3\text{He},n\gamma)$  Measurements  
*Nuclear Physics*, A144, 17 (1970)
- Reduced Isoscalar and Isovector E2 Matrix Elements in the A = 26, T = 1 Triad  
*Nuclear Physics*, A148, 632 (1970)
- Study of the  $^{28}\text{Si}(^3\text{He},n)^{30}\text{S}$  Reaction  
*Bull. Am. Phys. Soc.*, 15, 529 (1970)
- Study of the  $^{36}\text{Ar}(d,\alpha)^{34}\text{Cl}$  Reaction  
*Bull. Am. Phys. Soc.*, 15, 530 (1970)
- Interpretation of Recent Double Beta Decay Results  
*Recent Developments in Mass Spectroscopy* (University of Tokyo Press, 1970) p. 1307
- The  $^{36}\text{Ar}(d,\alpha)^{34}\text{Cl}$  Reaction at 19 MeV  
*Nuclear Physics*, A180, 37 (1972)
- A System for the Measurement of n- $\gamma$  Capture Cross-sections from  $E_n = 0.3$  to 3.0 MeV  
*Bull. Am. Phys. Soc.*, 17, 894 (1972)
- $^{27}\text{Al}(n,\gamma)$  Capture Cross-section Measurements Above  $E_n = 0.3$  MeV  
*Bull. Am. Phys. Soc.*, 17, 1180 (1972)
- Illustrative Material from Biology and Medicine in the Elementary Physics Sequence  
*American Journal of Physics*, 41, 919 (1973)
- A Simple Nuclear Lifetime Measurement for the Undergraduate Laboratory  
*A.A.P.T. Announcer*, IV, 61 (1974)
- $^{214}\text{Bi}/^{214}\text{Pb}$  Ratios in the Boundary Layer Atmosphere  
*Bull. Am. Phys. Soc.*, 20, 26 (1975)
- Hydrogen Burning of  $^{20}\text{Ne}$  and  $^{22}\text{Ne}$  in Stars  
*Nuclear Physics*, A241, 460 (1975)
- $^{214}\text{Bi}/^{214}\text{Pb}$  Ratios in Air at a Height of 20 m  
*Journal of Geophysical Research*, 80, 1605 (1975)
- Review of the Film "The Doppler Effect"  
*A.A.A.S. Science Books and Films*, XI, 103 (1975)
- Review of the Film Sequence "Energy"  
*A.A.A.S. Science Books and Films*, XI, 165 (1975)
- The  $^{40}\text{Ca}(\alpha,\gamma)$  Reaction Between 3.5 and 3.8 MeV  
*Bull. Am. Phys. Soc.*, 20, 1496 (1975)

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- An Electronic Nuclear Lifetime Experiment for the Senior Laboratory  
*American Journal of Physics*, 44, 380 (1976)
- Mean Residence Time of  $^7\text{Be}$  Bearing Aerosols in the Troposphere  
*Journal of Geophysical Research*, 81, 2647 (1976)
- Review of the Film "Above the Horizon"  
*A.A.A.S. Science Books and Films*, XII, 112 (1976)
- An Automated Radon-Thoron Monitor for Earthquake Prediction Research  
*Bull. Am. Phys. Soc.*, 21, 1313 (1976)
- Comment on "Physics Education. Does it Hinder Intellectual Development?"  
*American Journal of Physics*, 45, 89 (1977)
- Helium Burning of  $^{40}\text{Ca}$   
*Nuclear Physics*, A284, 163 (1977)
- Wigner Cusp in  $^{51}\text{V}(p,\gamma)^{52}\text{Cr}$  and Isospin Mixing  
*Bull. Am. Phys. Soc.*, 22, 542 (1977)
- Preliminary Data from the Caltech Automated Radon-Thoron Monitor  
*Eos*, 58, 434 (1977)
- Wigner Cusps and Explosive Nucleosynthesis  
*Proceedings of the International Conference on Nuclear Structure*  
(Organizing Committee, Tokyo, 1977) p. 846
- Stratospheric Contributions to Tropospheric Ozone in the Los Angeles Basin  
*Proceedings of the Joint Symposium on Atmospheric Ozone*  
(Dresden, 9-17 August 1976), (K.H. Grasnick, ed., Berlin, 1977)  
Vol. III, p.201
- Excitation Function of the  $^{54}\text{Cr}(p,\gamma)^{55}\text{Mn}$  Reaction near the (p,n) Threshold  
*Bull. Am. Phys. Soc.*, 22, 1246 (1977)
- Wigner Cusps in ( $\alpha,\gamma$ ) Reactions  
*Bull. Am. Phys. Soc.*, 22, 1246 (1977)
- Wigner Cusps in  $^{68}\text{Zn}(p,\gamma)^{69}\text{Ga}$  and  $^{68}\text{Zn}(p,\alpha)^{65}\text{Cu}$   
*Bull. Am. Phys. Soc.*, 22, 1246 (1977)
- Absence of Predicted Wigner Cusp in  $^{48}\text{Ca}(p,\gamma)^{49}\text{Sc}$   
*Bull. Am. Phys. Soc.*, 23, 13 (1978)
- Radon Series Disequilibrium in Southern California Coastal Air  
*Journal of Geophysical Research*, 81, 929 (1978)
- An Automated Radon-Thoron Monitor for Earthquake Prediction Research  
*Nuclear Instruments and Methods*, 153, 239 (1978)
- A Cusp in the  $^{54}\text{Cr}(p,\gamma)^{55}\text{Mn}$  Reaction  
*Nuclear Physics*, A301, 179 (1978)
- Data from the Caltech Automated Radon-Thoron Monitors  
*Eos*, 59, 1196 (1978)



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Absolute Cross Sections and Thermonuclear Reaction Rates for the  
 $^{63,65}\text{Cu}(\alpha, n)^{66,68}\text{Ga}$  Reactions

*Bull. Am. Phys. Soc.*, 24, 33 (1979)

Cross Section Measurements and Thermonuclear Reactions Rates for  
 $^{48}\text{Ca}(p, \gamma)^{49}\text{Sc}$  and  $^{48}\text{Ca}(p, n)^{48}\text{Sc}$

*Nuclear Physics*, A315, 430 (1979)

Review of the film "Energy: What About Tomorrow?"

*A.A.A.S. Science Books and Films*, XV, 53 (1979)

Reply to Comments of R.E. Larson

*J. Geophys. Res.*, 84, 752 (1979)

Competition Cusps in  $(\alpha, \gamma)$  Reactions

*Nucl. Phys.*, A331, 180 (1979)

Computer Controlled Collection of Radon Data for Earthquake Prediction

*Bull. Am. Phys. Soc.*, 24, 599 (1979)

Southern California Radon Anomaly

*Eos*, 60, 883 (1979)

Experimental Tests of Turbulent Diffusion Models by High Resolution  
 $\gamma$ -Ray Spectroscopy of Radon Daughters

*Proceedings of the Natural Radiation Environment III Symposium*  
(Houston, TX, April 23-28, 1978), D.O.E. CONF-780422 (1980)

Automated Radon-Thoron Monitoring for Earthquake Prediction Research

*Proceedings of the Natural Radiation Environment III Symposium*  
(Houston, TX, April 23-28, 1978), D.O.E. CONF-780422 (1980)

Competition Effects in Proton-Induced Reactions on  $^{51}\text{V}$

*Nuclear Physics*, A343, 295 (1980)

Automated Radon Monitoring at a Hard-Rock Site in the Transverse Ranges  
of Southern California

*J. Geophys. Res.*, 85, 3058 (1980)

Rainfall Induced Changes in Subsurface Radon Levels

*Eos*, 61, 573 (1980)

Tests of Global Hauser-Feshbach Calculations for Proton-Induced Reactions on  $^{68}\text{Zn}$

*Physical Review*, C23, 1822 (1981)

Relationship of the 1979 Southern California Radon Anomaly to a Possible Regional  
Strain Event

*J. Geophys. Res.*, 86, 1725 (1981)

Recent Data from the Caltech Automated Radon-Thoron Monitoring Network

*Eos*, 61, 1033 (1980)

Preliminary Spectral Analysis of Near Real-Time Subsurface Radon Data

*Eos*, 61, 1033 (1980)

Review of the film "Fire in the Water"

*A.A.A.S. Science Books and Films*, 16, 282 (1981)

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Dr. Mark H. Shapiro

- Preliminary Spectral Analysis of Near Real-Time Subsurface Radon Data  
*Geophys. Res. Lett.*, 8, 449 (1981)
- Review of NATURAL RADIATION ENVIRONMENT III, vols. 1 & 2, T.F. Gesell and W.M. Lowder eds., (U.S. Dept. of Energy CONF-780422, 1980)  
*American Scientist*, 69, 454 (1981)
- Radon and Earthquake Prediction  
1982-83 MCGRAW-HILL YEARBOOK OF SCIENCE AND TECHNOLOGY,  
Sybil Parker, ed. (1982, McGraw-Hill, New York)
- Review of the film "Sun, Wind, and Wood"  
*A.A.A.S. Science Books and Films*, 17, 109 (1981)
- Changes in Southern California Subsurface Radon Concentrations  
*Eos*, 62, 962 (1981)
- Seismo-geochemical Characteristics of the Caltech Radon-Thoron Monitoring Network  
*Eos*, 62, 963 (1981)
- Experimental Studies on the Mechanisms of Seismo-geochemical Precursors  
*Eos*, 62, 963 (1981)
- Correlated Radon and CO<sub>2</sub> Variations Near the San Andreas Fault  
*Geophys. Res. Lett.*, 9, 503 (1982)
- Seismo-geochemical Characteristics of the Caltech Radon-Thoron Monitoring Network  
Technical Report LiAP-47, W.K. Kellogg Radiation Laboratory, Caltech (1982)
- Remote Monitoring of Seismo-geochemical Variables in Southern California  
Preprint LiAP-48, W.K. Kellogg Radiation Laboratory, Caltech (1982)  
(International conference on continental tectonics and earthquake prediction, Beijing, China, Sept. 1982.)  
Published in *A Collection of Papers of International Symposium on Continental Seismicity and Earthquake Prediction (ISCSEP)*, Seismological Press, Beijing, China 1984 p.541
- Recent Changes in Southern California Radon and Geochemical Data  
*Eos*, 63, 1043 (1982)
- Review of the film "Speaking of Weather",  
*A.A.A.S. Science Books and Films*, 18, 286 (1983)
- Automated Geochemical Monitoring for Earthquake Prediction in Southern California  
(Invited paper, Joint Italian-Soviet symposium on the use of geochemical techniques of monitoring volcanic and seismic hazards. Palermo, Italy, May, 1983)
- Comparison of Two Radon Anomalies  
(Invited paper, American Chemical Society Annual Meeting, Washington, D.C., Aug. 28 - Sept. 2, 1983)
- Review of the film "Electromagnetic Waves"  
*A.A.A.S. Science Books and Films*, 19, 305 (1984)
- Computer-Simulated Energy and Angular Distributions of Sputtered Cu Atoms  
Preprint BB-12, Div. of Physics, Mathematics, and Astronomy,

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Dr. Mark H. Shapiro

- Caltech (1983)  
*Radiation Effects*, 89, 234 (1985)
- Recognition of Environmentally Caused Variations in Radon Time-Series  
*Eos*, 64, 758 (1983) and Preprint BB-15, Div. of Physics,  
Mathematics, and Astronomy, Caltech (1984)  
*PAGEOPH*, 122, 309 (1984/85)
- Experimental Studies on Responsible Mechanisms for Radon and Some  
Geochemical Precursors (in Chinese)  
*Seismology and Geology*, 6, 41 (1984)
- Preliminary Investigation of Seismo-hydrogeochemical Characteristics of the Radon-  
Thoron Monitoring Network of California Institute of Technology (in Chinese)  
*Earthquake*, 1, 11 (1984)
- Simulation of Isotopic Mass Effects in Sputtering  
Preprint BB-26, Div. of Physics, Mathematics, and Astronomy,  
Caltech (1984)  
*Nucl. Inst. and Methods in Phys. Research B12*, 137 (1985)
- Simulation of Sputtering from Liquid Cu Targets (Preliminary Results)  
Fifth International Workshop on Inelastic Ion-Surface  
Collisions, Gold Canyon Ranch, Arizona, January 1985
- Review of the NOVA television program "The pleasure of finding things out."  
*A.A.A.S. Science Books and Films*, 20 (1985).
- Simulation of Sputtering from Liquid Cu Targets  
11'th International Conference on Atomic Collisions in Solids,  
Georgetown University, Washington, D.C., August 1985  
*Nucl. Inst. and Methods in Phys. Research B13*, 348 (1986)
- Liquid Target Generation Techniques in Molecular Dynamics Studies of Sputtering  
*Nucl. Inst. and Methods in Phys. Research B17*, 207 (1986)  
Invited paper American Physical Society Meeting, Denton TX,  
Nov. 1986
- Computer Simulation of Sputtering from Two Component Liquid Metal Targets  
Symposium R, Materials Research Society 1985 Fall Meeting,  
Boston, Mass., published in Vol. 63, Materials Research Society  
Symposia Proceedings, J. Broughton, W. Krakow, and S.T. Pantelides,  
eds. (Pittsburg, PA, 1986) p. 31
- Review of the BBC television program "Threads"  
*A.A.A.S. Science Books and Films*, 21, 176 (1986)
- Review of the NOVA television program "Tornado!"  
*A.A.A.S. Science Books and Films*, 22, 67 (1986)
- Computer Simulation of Sticking and Penetration of Copper Atoms on Copper Substrates  
Symposium on Sputtering (SOS '86), Spitz a.d. Donau, Austria,  
June, 1986.  
*Nucl. Inst. and Methods in Phys. Research, B18*, 355 (1987)
- Energy Cost to Sputter an Atom from a Surface in keV Ion Bombardment Processes  
*Surface Science*, 180, L129 (1987) (letter)
- Simulation Studies of Collision Cascades in Liquid In Targets  
Symposium A, Materials Research Society 1986 Fall Meeting,

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Dr. Mark H. Shapiro

Boston, Mass., published in Vol. 74, *Materials Research Society Proceedings*, p449, 1987

- Physics Computer Animation with GKS  
*Bull. Am. Phys. Soc.* 32, 77 (1987)
- Many Body Interactions for Theoretical Studies of keV Ion Bombardment  
SIMS VI Meeting (France, Sept. 1987)  
*Secondary Ion Mass Spectrometry (SIMS VI)*  
(John Wiley & Sons, N.Y., 1988) p37.
- Many-body Embedded Atom Potential for Describing the Energy and Angular Distributions of Rh Atoms Desorbed From Ion-bombarded Rh{111}  
*Phys. Rev. B*, 37, 7197 (1988)
- Theoretical Studies of Ion Bombardment: Many-Body Interactions  
AVS Meeting (Anaheim, CA, Nov. 1987)  
*J. Vac. Sci. Technol. A*6, 708 (1988)
- Molecular Dynamics Simulation of Sputtering with Many-Body Interactions  
MRS 1987 Fall Meeting, Boston, Mass., published in Vol. 100,  
*Materials Res. Soc. Symp. Proc.*, p. 145 (1988)
- Simulation of Isotopic Sputtering II  
*Nuclear Inst. and Meth. B*30, 152 (1988)
- Review of 3 segments of the Mechanical Universe and Beyond.  
(Atoms to Quarks; Energy, Momentum, Mass; The Quantum Mechanical Universe)  
*A.A.A.S. Science Books and Films*, 23, 116 (1987)
- Review of the film "Chasing the Tornado"  
*A.A.A.S. Science Books and Films*, 23, 325 (1988)
- Round Robin Computer Simulation of Ejection Probability in Sputtering  
*Nucl. Instr. and Meth.*, B36, 110 (1989)
- Molecular Dynamics Simulation of Preferential Sputtering from Isotopic Mixtures  
*Nucl. Instr. and Meth.*, B40/41, 270 (1989)
- Kinetic Energy Loss in Sputtering  
*Nucl. Instr. and Meth.*, B42, 290 (1989)
- A Molecular Dynamics Simulation of Collisional Excitation in Sputtering From Al  
Paper selected for oral presentation at the Low Energy Ion Beams-5 Conference (University of Surrey, Guildford, U.K., April 1989).  
*Nucl. Instr. and Meth.*, B44, 43 (1989)
- Molecular Dynamics Simulation of Nonlinear Effects in Sputtering  
Paper presented at the 13th International Conference on Atomic Collisions in Solids, (University of Aarhus, Denmark, August 1989).
- Molecular Dynamics Simulation of Nonlinear Effects in Sputtering - Cu(100) Targets  
*Nucl. Instr. and Meth.*, B48, 557 (1990).
- Review of the videotape "The Research Process"

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A.A.A.S. *Science Books and Films*, 1990.

Simulation of Cluster Impacts on Metallic Surfaces  
Caltech preprint BB-94 (January, 1990)  
*Phys. Rev. Letters*, 65, 92 (1990).

Molecular Dynamics Simulations of Cluster Impacts on Metallic Targets  
Paper presented at the Materials Research Society Meeting,  
San Francisco, CA, April 17, 1990  
*MRS Symposium Proceedings*, Vol. 193, 319 (1990).

Molecular Dynamics Simulations of Energetic Cluster Impacts on Metallic Surfaces  
Invited paper - Eleventh International Conference on the Application of Accelerators in Research and Industry, Denton, TX, November 7, 1990  
*Bull. Am. Phys. Soc.*, 35, 1750 (1990).

Molecular Dynamics Simulations of Energetic Cluster Impacts on Al, Cu, and Au Targets  
*Nucl. Inst. and Meth. in Physics Res. B58*, 161 (1991).

Simulation of Energetic Cluster Impacts on Metallic Targets  
(Invited brief review article.)  
*Mod. Phys. Lett. B*, 5, 341 (1991).

Molecular Dynamics Simulation of Nonlinear Effects in Sputtering - Au(100) and Au(111) Targets  
*Nucl. Inst. and Meth. in Physics Res. B62*, 35 (1991).

The Computational Physics Workshop at California State University, Fullerton, June 17-22, 1990  
(Invited paper, AAPT Summer Meeting, Vancouver, B.C. June, 1991)  
*AAPT Announcer* 21, 50 (1991).

Molecular Dynamics Simulations of Low Energy Cluster Deposition on Metallic Targets  
(Oral presentation, 14th International Conference on Atomic Collisions in Solids, Salford, UK, July 28-August 2, 1991)  
Caltech Preprint BB-104  
*Nucl. Inst. and Meth. in Physics Res. B67*, 296 (1992).

Simulation of Core Excitation During Cluster Impacts  
*Phys. Rev. Lett.* 68, 1613 (1992).

Simulations of Core Excitation in Energetic Cluster Impacts on Metallic Surfaces  
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