

## **Peter A. Gilman**

### **Curriculum Vitae**

Peter A. Gilman received the Ph.D. from the Massachusetts Institute of Technology and is currently a Senior Scientist Emeritus at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. His research focuses on the fluid dynamics and magneto-fluid dynamics of the sun, stars, and planets. He was Director of the NCAR High Altitude Observatory (1987–1989) and Associate Director of NCAR ((1989–1995). He has served on numerous national and international committees, and has authored or co-authored more than 160 publications in refereed journals. In 2006, he was awarded the Hale Prize, the highest honor of the Solar Physics Division of the American Astronomical Society

#### **Date of Birth**

28 May 1941

#### **Education**

1966	Ph.D., Meteorology, Massachusetts Institute of Technology (Thesis Advisor: Victor P. Starr)
1964	M.S., Meteorology, Massachusetts Institute of Technology
1962	B.A., Physics, Harvard College(Magna Cum Laude)

#### **Professional Experience**

2009 – Present	Senior Scientist Emeritus, NCAR
2000 – 2005	Head, Solar Interior and Variability Section, HAO, NCAR
1973 – 2009	Senior Scientist, NCAR
1995 – 2009	Professor Adjoint, Department of Astrophysical and Planetary Sciences, University of Colorado
1989 – 1995	Associate Director, NCAR
1987 – 1989	Director, High Altitude Observatory, NCAR
1977 – 1987	Head, Solar Interior Section, HAO, NCAR
1977 – 1991	Professor Adjoint, Department of Astrophysical Planetary and Atmospheric Sciences, University of Colorado
1971 – 1975	Chairman, Advanced Study Program, NCAR
1970 – 1977	Lecturer, Department of Astro-Geophysics, University of Colorado
1970 – 1975	Scientific Staff, Advanced Study Program, NCAR
1969 – 1970	Long-term Visitor, Advanced Study Program, NCAR
1966 – 1969	Assistant Professor, Department of Astro-Geophysics, University of Colorado

## Professional Service

2001 – 2010	Member, Association of Universities for Research in Astronomy (AURA) Board of Directors
2000 – 2007	Member, Solar Observatories Council, AURA
2000 – 2003	Chairman, Solar Observatories Council, AURA
1999 – 2000	Member, Observatories Council, AURA
2000	Member, NASA SR/T Peer Review Panel for Solar Theory
1998 – 2001	Member, Panel on Education and Public Policy, Astronomy and Astrophysics Survey Committee (Decadal Survey), National Academy of Sciences
1998 – 2000	Member, Council of Solar Physics Division, American Astronomical Society (elective office)
1997 – Present	Member, Scientific Advisory Group, SOLIS (Synoptic Optical Long Term Investigations of the Sun) Project, National Solar Observatory
1998	Member, Search Committee for new Director of the National Solar Observatory
1996 – Present	Member, Solar Magnetism Initiative Steering Committee
1988 – 1995	Member, Editorial Board, <i>Solar Physics</i>
1986 – 1988	Member, Program Advisory Committee, Division of Advanced Scientific Computing, National Science Foundation (Chairman 1988)
1984 – Present	Member, Scientific Advisory Committee, Global Oscillations Network Group, National Solar Observatory
1983	Member, NASA Working Group: Solar Interior & Heliospheric Dynamics Mission
1980 – 1983	Member, Committee on Solar and Space Physics, Space Science Board, National Academy of Sciences
1979 – 1980	Member, Working Group on Related Areas of Science, Astronomy Survey Committee, National Academy of Sciences
1978 – 1979	Member, NASA Science Working Group: Solar Cycle & Dynamics Mission
1977 – 1995	Member, Editorial Board, <i>Geophysical and Astrophysical Fluid Dynamics</i>
1977 – 1979	Consultant: “Sun, Weather, & Climate,” National Academy of Sciences
1976 – 1979	Member, NASA Solar Physics Management and Operations Working Group

## Major UCAR/NCAR Committees and Programs

2003 – 2004	Chairman, NCAR Appointments Review Group
2000 – 2003	Member, NCAR Appointments Review Group
1992 – 1995	Member, UCAR President’s Council
1987 – 1995	Member, NCAR Directors’ Committee
1971 – 1975	Member, NCAR Directors’ Committee
1986	Chairman, Strategic Planning Committee for NCAR Computing
1996 – 1997	Chair, Geophysical Turbulence Program

## **Honors**

- 2006 Winner of the George Ellery Hale Prize of the Solar Physics Division of the American Astronomical Society
- 2007 Winner of the John W. Frior Publication Award recognizing the paper “Simulating and Predicting Solar Cycles Using a Flux-Transport Dynamo,” M. Dikpati and P.A. Gilman, *Ap. J.*, **649**, 498–524, 2006.

## **Professional Affiliations**

American Association for the Advancement of Science (AAAS)

American Astronomical Society (AAS)

American Geophysical Union (AGU)

International Astronomical Union (IAU)

## Peter A. Gilman

### Bibliography

Peter A. Gilman has 160 publications, mostly in *The Astrophysical Journal*, *Solar Physics*, *Astronomy and Astrophysics*, *Geophysical & Astrophysical Fluid Dynamics*, *Physics of Fluids*, *Journal of Fluid Mechanics*, *Journal of the Atmospheric Sciences*, and *Tellus*, as well as various proceedings and books.

1. Gilman, P. A., Indirect measurement of the mean meridional circulation in the southern hemisphere, M. S. thesis, Department of Meteorology, M. I. T. Also as contract AF19 (628)-2408, Planetary Circulations Project, Department of Meteorology, M. I. T., 49 pp., 1963.
2. Gilman, P. A., On the vertical transport of angular momentum in the atmosphere, *Pure and Applied Geophysics*, **57**, 161–166, 1964.
3. Gilman, P. A., On the mean meridional circulation in the presence of a steady state, symmetric, circumpolar vortex, *Tellus*, **16**, 160–167, 1964.
4. Gilman, P. A., The mean meridional circulation of the southern hemisphere inferred from momentum and mass balance, *Tellus*, **17**, 277–284, 1965.
5. Starr, V. P., and P. A. Gilman, Energetics of the solar rotation, *Astrophysical Journal*, **141**, 1119–1125, 1965.
6. Starr, V. P., and P. A. Gilman, On the structure and energetics of large scale hydromagnetic disturbances in the solar photosphere, *Tellus*, **17**, 334–340, 1965.
7. Gilman, P. A., Hydromagnetic model for the solar general circulation, Ph.D. thesis, Department of Meteorology, M. I. T., June 1966. Also as Scientific Report #1, Contract AF19 (628)-5816, Planetary Circulations Project, Department Meteorology, M. I. T., 211 pp.
8. Starr, V. P., and P. A. Gilman, Hydromagnetic energy balance equations for the solar atmosphere, *Pure and Applied Geophys.*, **64**, 145–155, 1966.
9. Gilman, P. A., Stability of baroclinic flows in a zonal magnetic field, Part I, *Journal of the Atmospheric Sciences*, **24**, 101–118, 1967.
10. Gilman, P. A., Stability of baroclinic flows in a zonal magnetic field, Part II, *Journal of the Atmospheric Sciences*, **24**, 119–129, 1967.
11. Gilman, P. A., Stability of baroclinic flows in a zonal magnetic field, Part III, *Journal of the Atmospheric Sciences*, **24**, 130–143, 1967.
12. Gilman, P. A., Stability of a continuous baroclinic flow in a zonal magnetic field, *Journal of the Atmospheric Sciences*, **24**, 333–336, 1967.
13. Gilman, P. A., Thermally driven Rossby-mode dynamo for solar magnetic field reversals, *Science*, **160**, 760–763, 1968.
14. Gilman, P. A., and E. R. Benton, The influence of axial magnetic field on the steady linear Ekman boundary layer, *Physics of Fluids*, **11**, 2397–2401, 1968.

15. Starr, V. P., and P. A. Gilman, The circulation of the sun's atmosphere, *Scientific American*, **218**, 100–113, 1968.
16. Coffey, H. E., and P. A. Gilman, Sunspot motion statistics for 1965–1967, *Solar Physics*, **9**, 423–426, 1969.
17. Gilman, P. A., A Rossby-wave dynamo for the sun: Part I, *Solar Physics*, **8**, 316–330, 1969.
18. Gilman, P. A., A Rossby-wave dynamo for the sun: Part II, *Solar Physics*, **9**, 3–18, 1969.
19. Gilman, P. A., Baroclinic, Alfven, and Rossby waves in geostrophic flow, *Journal of the Atmospheric Sciences*, **26**, 1003–1009, 1969.
20. Davies-Jones, R., and P. A. Gilman, On large scale solar convection, *Solar Physics*, **12**, 3–22, 1970.
21. Gilman, P. A., Instability of magnetohydrostatic stellar interiors from magnetic buoyancy, I, *Astrophysical Journal*, **162**, 1019–1029, 1970.
22. Davies-Jones, R., and P. A. Gilman, Convection in a rotating annulus uniformly heated from below, *Journal of Fluid Mechanics*, **46**, 65–82, 1971.
23. Gilman, P. A., Instabilities of the Ekman-Hartmann boundary layer, *The Physics of Fluids*, **14**, (1), 7–12, 1971.
24. Gilman, P. A., A method for constructing streamlines for the Sun's large-scale flow from doppler velocities, *Solar Physics*, **19**, 4043, 1971.
25. Gilman, P. A., Boussinesq convective model for large scale solar circulations, *Solar Physics*, **27**, 3–26, 1972.
26. Gilman, P. A., Convection in a rotating annulus uniformly heated from below, II, Non-linear results, *Journal of Fluid Mechanics*, **57**, 381–400, 1973.
27. Gilman, P. A., Solar rotation, *Annual Review of Astronomy and Astrophysics*, **12**, 47–70, 1974.
28. Gilman, P. A., Comments on “Solar Polar Spindown,” by Kenneth Schatten, *Solar Physics*, **36**, 61–64, 1974.
29. Gilman, P. A., Comments on Schatten's reply to my comments on “Solar Polar Spin-down,” *Solar Physics*, **37**, 491–492, 1974.
30. Gilman, P. A., Linear simulations of Boussinesq convection in a deep rotating spherical shell, *Journal of the Atmospheric Sciences*, **32**, 1331–1352, 1975.
31. Durney, B., P. A. Gilman, and M. Stix, Conference summary, Proceedings IAU Symposium 71, “Basic Mechanisms of Solar Activity,” (V. Bumba and J. Kleczek, eds.), D. Reidel Publishing Company, Dordrecht, Holland, 479–481, 1976.
32. Eddy, J. A., P. A. Gilman, and D. E. Trotter, Solar rotation during the Maunder Minimum, *Solar Physics*, **46**, 3–14, 1976.
33. Gilman, P. A., Theory of convection in a deep rotating spherical shell, and its application to the sun, Proceedings IAU Symposium 71, “Basic Mechanisms of Solar Activity,” (V. Bumba and J. Kleczek eds.), D. Reidel Publishing Company, Dordrecht, Holland, 207–228, 1976.
34. Eddy, J. A., P. A. Gilman, and D. E. Trotter, Anomalous solar rotation in the early XVII century, *Science*, **198**, 824–829, 1977.

35. Gilman, P. A., A note on estimating the latitudinal angular momentum transport in the solar photosphere from Doppler velocities, *Astronomy and Astrophysics*, **58**, 315–318, 1977.
36. Gilman, P. A., Coronal holes and the sun's interior, in *Coronal Holes and High Speed Wind Streams*, (J. B. Zirker, ed.), Colorado Associated University Press, Boulder, Colorado, 331–370, 1977.
37. Gilman, P. A., Nonlinear dynamics of Boussinesq convection in a deep rotating spherical shell, I, *Geophysical and Astrophysical Fluid Dynamics*, **8**, 93–135, 1977.
38. Gilman, P. A., Nonlinear dynamics of Boussinesq convection in a deep rotating spherical shell, II, Effects of temperature boundary conditions, *Geophysical and Astrophysical Fluid Dynamics*, **11**, 157–180, 1978.
39. Gilman, P. A., Nonlinear dynamics of Boussinesq convection in a deep rotating spherical shell, III, Effects of velocity boundary conditions, *Geophysical and Astrophysical Fluid Dynamics*, **11**, 181–204, 1978.
40. Gilman, P. A., The theory of solar rotation, Proceedings of 25<sup>th</sup> anniversary celebration, Sacramento Peak Observatory, 1978 (available from Sacramento Peak).
41. Beckers, J. M., and P. A. Gilman, Rotation at high solar latitudes and the depth of the solar convection zone, in Proceedings of Workshop on Solar Rotation, Catania, Italy, 16–29 September 1978 (sponsored by Solar Physics section of European Physical Society), *Osservatorio Astrofisico de Catania Pubblicazione N. 162*, (G. Belvedere and L. Paterno, eds.), 238–246, 1979.
42. Gilman, P. A., Dynamics of the solar interior and the solar dynamo, in *Study of the Solar Cycle From Space*, NASA Conference Publication 2098, Government Printing Office, Washington, D. C., 3–12, 1979.
43. Gilman, P. A., Model calculations concerning rotation at high solar latitudes and the depth of the solar convection zone, *Astrophysical Journal*, **231**, 284–292, 1979.
44. Gilman, P. A., Large scale circulation of the sun, in *Reports on Astronomy*, Transactions of the International Astronomical Union XVIIA (Reports 1979), Part 2, 49–52, 1979.
45. Gilman, P. A., Book review of “Rotating Fluids in Geophysics,” (P. H. Roberts and A. M. Soward, eds.), *Geophysical and Astrophysical Fluid Dynamics*, **12**, 183–185, 1979.
46. Gilman, P. A., and P. V. Foukal, Angular velocity gradients in the solar convection zone, *Astrophysical Journal*, **229**, 1179–1185, 1979.
47. Hathaway, D. H., P. A. Gilman, and J. Toomre, Convective instability when the temperature gradient and rotation vector are oblique to gravity, I, Fluids without diffusion, *Geophysical and Astrophysical Fluid Dynamics*, **13**, 289–316, 1979.
48. Gilman, P. A., Response to comments by F. Busse on paper “Nonlinear dynamics of Boussinesq convection in a deep rotating shell III: Effects of velocity boundary conditions,” *Geophysical and Astrophysical Fluid Dynamics*, **14**, 252–253, 1980.
49. Gilman, P. A., Differential rotation in stars with convection zones, Proceedings IAU Colloquium 51, “Stellar Turbulence,” (D. F. Gray and J. L. Linsky, eds.), *Lecture Notes In Physics*, **114**, Springer Verlag Publishing Company, Berlin, Germany, 19–37, 1980.
50. Gilman, P. A., Global circulation of the sun—Where are we, and where are we going? Proceedings of Joint Discussion on “Large scale velocity fields on the sun,” (P. A.

- Wayman, ed.) XVII General Assembly, International Astronomical Union, *Highlights of Astronomy*, **5**, D. Reidel Publishing Company, Dordrecht, Holland, 91–119, 1980.
51. Gilman, P. A., and G. Glatzmaier, Effects of certain analysis procedures on solar global velocity signals, *Astrophysical Journal*, **241**, 793–803, 1980.
  52. Hathaway, D. H., J. Toomre, and P. A. Gilman, Convective instability when the temperature gradient and rotation vector are oblique to gravity, II, Real fluids with effects of diffusion, *Geophysical and Astrophysical Fluid Dynamics*, **15**, 7–38, 1980.
  53. Gilman, P. A., Global circulation and the solar dynamo, Chapter in *The Sun as a Star*, (S. Jordan, ed.), NASA–CNRS Monograph Series on Non-thermal Phenomena in Stellar Atmospheres (NASA SP 450), Washington, D. C., 231–252, 1981.
  54. Gilman, P. A., and G. Glatzmaier, Compressible convection in a rotating spherical shell, I, Anelastic equations, *Astrophysical Journal Supplements*, **45**, 335–349, 1981.
  55. Gilman, P. A., and J. Miller, Dynamically consistent non-linear dynamos driven by convection in a rotating spherical shell, *Astrophysical Journal Supplements*, **46**, 211–238, 1981.
  56. Glatzmaier, G., and P. A. Gilman, Compressible convection in a rotating spherical shell, II, A linear anelastic model, *Astrophysical Journal Supplements*, **45**, 351–380, 1981.
  57. Glatzmaier, G., and P. A. Gilman, Compressible convection in a rotating spherical shell, III, Anelastic model for compressible vorticity waves, *Astrophysical Journal Supplements*, **45**, 381–388, 1981.
  58. Glatzmaier, G., and P. A. Gilman, Compressible convection in a rotating spherical shell, IV, Effects of viscosity, conductivity, boundary conditions, and zone depth, *Astrophysical Journal Supplements*, **47**, 103–116, 1981.
  59. LaBonte, B. J., R. Howard, and P. A. Gilman, An improved search for large-scale convection cells in the solar atmosphere, *Astrophysical Journal*, **250**, 796–801, 1981.
  60. Gilman, P. A., Convective dynamos for rotating stars, in Proceedings of Second Cambridge Workshop on *Cool Stars, Stellar Systems, and the Sun*, Smithsonian Astrophysical Observatory Special Publication #392, (M. S. Giampapa and L. Golub, eds.), 165–179, 1982.
  61. Glatzmaier, G., and P. A. Gilman, Compressible convection in a rotating spherical shell, V, Induced differential rotation and meridional circulation, *Astrophysical Journal*, **256**, 316–330, 1982.
  62. Gilman, P. A., Dynamically consistent nonlinear dynamos driven by convection in a rotating spherical shell, II, Dynamos with cycles and strong feedbacks, *Astrophysical Journal Supplements*, **53**, 243–268, 1983.
  63. Gilman, P. A., Dynamos of the sun and stars, and associated convection zone dynamics, in *Solar and Magnetic Fields: Origins and Coronal Effects*, (J. O. Stenflo, ed.), D. Reidel Publishing Company, Dordrecht, Holland, 247–270, 1983.
  64. Gilman, P. A., What would a dynamo theorist like to know about the dynamics of the solar convection zone? in *Solar Seismology from Space*, Jet Propulsion Laboratory Publication 84-84, NASA Jet Propulsion Laboratory, Pasadena, California, 41–48, 1984.
  65. Gilman, P. A., and R. Howard, On the correlation of longitudinal and latitudinal motions of sunspots, *Solar Physics*, **93**, 171–175, 1984.

66. Gilman, P. A., and R. Howard, Variations in solar rotation with the sunspot cycle, *Astrophysical Journal*, **283**, 385–391, 1984.
67. Howard, R., and P. A. Gilman, The rotation of the sun from Mount Wilson sunspot measurements, *Kodaikanal Observatory Bulletins*, **4**, 1, 1984.
68. Howard, R., P. A. Gilman, and P. I. Gilman, Rotation of the sun measured from Mount Wilson white-light images, *Astrophysical Journal*, **283**, 372–384, 1984.
69. Guenther, D. B., and P. A. Gilman, Inertial oscillations in the solar convection zone, I, Spherical shell model, *Astrophysical Journal*, **295**, 195–212, 1985.
70. Gilman, P. A., and D. Guenther, Inertial oscillations in the solar convection zone, II, A cylindrical model for equatorial regions, *Astrophysical Journal*, **296**, 685–695, 1985.
71. Gilman, P. A., and R. Howard, Rotation rates of leader and follower sunspots, *Astrophysical Journal*, **295**, 233–240, 1985.
72. DeLuca, E. E., and P. A. Gilman, Dynamo theory for a thin layer between the convection zone and the radiative zone of a star: Formulation and preliminary results, in “Cool Stars, Stellar Systems, and the Sun,” (M. Zeilik and D. M. Gibson, eds.), in *Lecture Notes in Physics*, Springer Verlag Publishing Company, Berlin, Germany, 173–176, 1986.
73. DeLuca, E. E., and P. A. Gilman, Dynamo theory for the interface between the convection zone and the radiative interior of a star, Part I, Model equations and exact solutions, *Geophysical and Astrophysical Fluid Dynamics*, **37**, 85–127, 1986.
74. Gilman, P. A., The solar dynamo: Observations and theories of solar convection, global circulation, and magnetic fields, in *Physics of the Sun*, **Vol. 1**, Chapter 5, (P. A. Sturrock, ed.), D. Reidel Publishing Company, Dordrecht, Holland, 95–160, 1986.
75. Gilman, P. A., and E. E. DeLuca, Dynamo theory for the sun and stars, in *Cool Stars, Stellar Systems, and the Sun*, (M. Zeilik and D. M. Gibson, eds.), Lecture Notes in Physics, Springer Verlag Publishing Company, Berlin, Germany, 163–172, 1986.
76. Gilman, P. A., and R. Howard, Rotation and expansion within sunspot groups, *Astrophysical Journal*, **303**, 480–485, 1986.
77. Gilman, P. A., and J. Miller, Nonlinear convection of a compressible fluid in a rotating spherical shell, *Astrophysical Journal Supplements*, **61**, 585–608, 1986.
78. Hart, J. E., J. Toomre, A. E. Deane, N. E. Hurlburt, G. A. Glatzmaier, G. H. Fichtl, F. Leslie, W. W. Fowles, and P. A. Gilman, Laboratory experiments on planetary and stellar convection performed on Spacelab 3, *Science*, **234**, 61–64, 1986.
79. Howard, R., and P. A. Gilman, Meridional motions of sunspots and sunspot groups, *Astrophysical Journal*, **307**, 389–394, 1986.
80. Choudhuri, A. R., and P. A. Gilman, The influence of the coriolis force on flux tubes rising through solar convection zone, *Astrophysical Journal*, **316**, 788–800, 1987.
81. Gilman, P. A., Inertial oscillations in the solar convection zone, III, A cylindrical model for nonaxisymmetric oscillations in a superadiabatic gradient, *Astrophysical Journal*, **318**, 904–912, 1987.
82. Bogdan, T. J., P. A. Gilman, I. Lerche, and R. Howard, Distribution of sunspot umbral areas: 1917–1982, *Astrophysical Journal*, **327**, 451–456, 1988.

83. DeLuca, E. E., and P. A. Gilman, Dynamo theory for the interface between the convection zone and the radiative interior of a star, Part II, Numerical solutions of the nonlinear equations, *Geophysical and Astrophysical Fluid Dynamics*, **43**, 119–148, 1988.
84. Gilman, P. A., C. A. Morrow, and E. E. DeLuca, Angular momentum transport and dynamo action in the sun: Implications of recent oscillation measurements, *Astrophysical Journal*, **338**, 528–537, 1989.
85. DeLuca, E. E., and P. A. Gilman, "The solar dynamo," chapter in *The Solar Interior and Atmosphere*, (A. N. Cox, W. C. Livingston, and M. S. Matthews, eds.), University of Arizona Press, 275–303, 1991.
86. Gilman, P. A., What can we learn about solar cycle mechanisms from observed velocity fields, in *The Solar Cycle - Proceedings of the National Solar Observatory/Sacramento Peak 12th Summer Workshop, Vol. 27*, (Karen L. Harvey, ed.), Sunspot, New Mexico, 15–18 October, 1991, Astronomical Society of the Pacific, San Francisco, 241–255, 1992.
87. Gilman, P. A., Book review, "The dynamo problem," *Solar and Planetary Dynamos* (M. R. E. Proctor, P. C. Matthews, and A. M. Rucklidge, eds.), Cambridge University Press, 1994, *Science*, **269**, 860–861, 1995.
88. Harvey, et al., The global oscillation network group (GONG) project, *Science*, **272**, 1284–1286, 1996.
89. Hathaway, et al., GONG observations of solar surface flows, *Science*, **272**, 1306–1309, 1996.
90. Gilman, P. A., and P. A. Fox, Joint instability of latitudinal differential rotation and toroidal magnetic fields below the solar convection zone, *Astrophysical Journal*, **484**, 439–454, 1997.
91. Dikpati, M., and P. A. Gilman, Instability of concentrated toroidal fields in the latitudinal differential rotation below the solar convection zone, *1997 Pacific Rim Conference on Stellar Astrophysics*, (K. L. Chan, K. S. Cheng, and H. P. Singh eds.), **138**, 1998.
92. Gilman, P. A., and P. A. Fox, Joint instability of latitudinal differential rotation and toroidal magnetic fields below the solar convection zone, II, Instability for toroidal fields that have a node between the equator and pole, *Astrophysical Journal*, **510**, 1018–1044, 1999.
93. Dikpati, M., and P. A. Gilman, Joint instability of latitudinal differential rotation and concentrated toroidal fields below the solar convection zone, *Astrophysical Journal*, **512**, 417–441, 1999.
94. Gilman, P. A., and P. Charbonneau, Creation of twist at the core-convection zone interface, chapter in Chapman Conference Proceedings, *Magnetic Helicity in Space and Laboratory Plasmas*, (M. R. Brown, R. C., Canfield, and A. A. Pevtsov, eds.), *Geophysical Monograph Series #111*, AGU, 75–82, 1999.
95. Gilman, P. A., and P. A. Fox, Joint instability of latitudinal differential rotation and toroidal magnetic fields below the solar convection zone, III, Unstable disturbance phenomenology and the solar cycle, *Astrophysical Journal*, **522**, 1167–1189, 1999.
96. Charbonneau, P., M. Dikpati, and P. A. Gilman, Stability of the solar latitudinal differential rotation inferred from helioseismic data, *Astrophysical Journal*, **526**, 523–537, 1999.

97. Gilman, P. A., and M. Dikpati, Joint instability of latitudinal differential rotation and concentrated toroidal fields below the solar convection zone, II, Instability of narrow bands at all latitudes, *Astrophysical Journal*, **528**, 552–572, 2000.
98. Miesch, M. S., J. R. Elliott, J. Toomre, T. L. Clune, G. A. Glatzmaier, and P. A. Gilman, Three dimensional spherical simulations of solar convection: Differential rotation and pattern evolution achieved with laminar and turbulent states, *Astrophysical Journal*, **532**, 593–615, 2000.
99. Gilman, P. A., Solar and stellar convection: A perspective for geophysical fluid dynamicists, in *Geophysical and Astrophysical Convection*, (Peter A. Fox and Robert M. Kerr, eds.), Ch. 2, 37–54, Gordon and Breach Publishing Company, Singapore, 2000.
100. Gilman, P. A., Fluid dynamics and MHD of the solar convection zone and tachocline: Current understanding and unsolved problems, *Proceedings of SOHO-9 Workshop* (text of invited introductory talk), *Solar Physics*, **192**, 27–48, 2000.
101. Gilman, P. A., Magnetohydrodynamic ‘shallow water’ equations for the solar tachocline, *Astrophysical Journal Letters*, **544**, L79–L82, 2000.
102. Erratum, *Astrophysical Journal*, **534**, 1020, 2000.
103. Dikpati, M., and P. A. Gilman, Analysis of hydrodynamic stability of solar tachocline latitudinal differential rotation using a shallow-water model, *Astrophysical Journal*, **551**, 536–564, 2001.
104. Dikpati, M., and P. A. Gilman, Prolateness of the solar tachocline inferred from latitudinal force balance in an MHD shallow water model, *Astrophysical Journal*, **552**, 348–353, 2001.
105. Schecter, D. A., J. F. Boyd, and P. A. Gilman, ‘Shallow water’ MHD waves in a rotating magnetized fluid layer, *Astrophysical Journal Letters*, **551**, L185–L188, 2001.
106. Corbard, T., S. J. Jimenez-Reyes, S. Tomczyk, M. Dikpati, and P. Gilman, The solar cycle and the tachocline: Theories and observations, European Space Agency Proceedings SP-463, Tenerife, Spain, 21–26, 2001.
107. Corbard, T., S. J. Jimenez-Reyes, S. Tomczyk, M. Dikpati, and P. Gilman, The solar tachocline and its variation, European Space Agency Proceedings Sp-464, Tenerife, Spain, 265–271, 2001.
108. Dikpati, M., and P. A. Gilman, Symmetry selection in solar cycle dynamo models, *Magnetic Fields Across The Hertzsprung-Russell Diagram*, (G. Mathys, S.K. Solanki, and D.T. Wickramasinghe, eds), ASP Conf. Ser. San Francisco: ASP, **248**, 125–130, 2001.
109. Dikpati, M., and P. A. Gilman, Flux-transport dynamos with alpha-effect from global instability of tachocline differential rotation; a solution for magnetic parity selection in the sun, *Astrophysical Journal*, **559**, 428–442, 2001.
110. Dikpati, M., T. Corbard, M.J. Thompson, and P.A. Gilman, Flux transport solar dynamos with near-surface radial shear, *Astrophysical Journal*, **575**, L41–L45, 2002.
111. Gilman, P. A., and M. Dikpati, Analysis of instability of latitudinal differential rotation and toroidal field in the solar tachocline using an MHD shallow water model. I. Instability for broad toroidal field profiles, *Astrophysical Journal*, **576**, 1031–1047, 2002.

112. DeRosa, M. L., P. A. Gilman, and J. Toomre, Solar multiscale convection and rotation gradients studied in shallow spherical shells, *Astrophysical Journal*, **581**, 1356–1374, 2002.
113. Gilman, P. A., Observational constraints on the solar dynamo, Proc. *SOHO-11 Symposium—From Solar Min to Max: Half a Solar Cycle with SOHO*, Davos, Switzerland 11–15 March 2002, **ESA SP-508**, 25–32, 2002.
114. Corbard, T., M. Dikpati, P. A. Gilman, and M. J. Thompson, Effect of subsurface radial differential rotation on flux-transport solar dynamos, Proc. *SOHO-11 Symposium - From Solar Min to Max: Half a Solar Cycle with SOHO*, Davos, Switzerland 11–15 March 2002, **ESA SP-508**, 75–78, 2002.
115. Miesch, M. S., and P. A. Gilman, Angular momentum transport in the solar tachocline, Proc. *SOLMAG: Magnetic Coupling of the Solar Atmosphere Euroconference and IAU Colloquium 188*, Santorini, Greece, 11–15 June 2002, **ESA SP-505**, 509–512, 2002.
116. Gilman, P. A., and R. Howe, Meridional motion and the slope of isorotation contours, Proc. *SOHO 12/GONG+ 2002—Local and Global Helioseismology: The present and future*, Big Bear Lake, California, 27 Oct.–1 Nov. 2002, **ESA SP-517**, 283–285, 2003.
117. Cally, P. S., M. Dikpati, and P. A. Gilman, Clamshell and tipping instabilities in a two-dimensional magnetohydrodynamic tachocline, *Astrophysical Journal*, **582**, 1190–1205, 2003.
118. Dikpati, M., P. A. Gilman, and M. Rempel, Stability analysis of tachocline latitudinal differential rotation and coexisting toroidal band using a shallow-water model, *Astrophysical Journal*, **596**, 680–697, 2003.
119. Dikpati, M., G. de Toma, P.A. Gilman, C.N. Arge, and O.R. White, Diagnostics of polar field reversal in solar cycle 23 using a flux-transport dynamo model, *Astrophysical Journal*, **601**, 1136–1151, 2004.
120. Cally, P.S., M. Dikpati and P.A. Gilman, The solar tachocline: Limiting magneto-tipping instabilities, Proc. *IAU Highlights of Astronomy*, 2004.
121. Miesch, M. S., and P. A. Gilman, Thin-shell magnetohydrodynamic equations for the solar tachocline, *Solar Physics*, **220**, 287–305, 2004.
122. Norton, A.A., and P.A. Gilman, Magnetic Field – Minimum intensity correlation in sunspots: A tool for solar dynamo diagnostics, *Astrophysical Journal*, **603**, 348–354, 2004.
123. Gilman, P.A., and M.S. Miesch, Limits to penetration of meridional circulation below the solar convection zone, *Astrophysical Journal*, **611**, 568–574, 2004.
124. Dikpati, M., P.S. Cally, and P.A. Gilman, Linear analysis and nonlinear evolution of 2D global instabilities in a diffusive tachocline, *Astrophysical Journal*, **610**, 597–615, 2004.
125. Dikpati, M., P.A. Gilman, and K.B. MacGregor, Constraints on the applicability of an interface dynamo to the sun, *Astrophysical Journal*, **631**, 647–652, 2005.
126. Norton, A.A., and P.A. Gilman, Recovering solar toroidal field dynamics from sunspot location patterns, *Astrophysical Journal*, **630**, 1194–1205, 2005.
127. Gilman, P.A., and M. Rempel, concentration of toroidal magnetic field in the solar tachocline by eta-quenching, *Astrophysical Journal*, **630**, 615–622, 2005.

128. Dikpati, M., M. Rempel, P.A. Gilman, and K.B. MacGregor, Comments on “Full-sphere simulations of circulation-dominated solar dynamo: Exploring the parity issue, *Astronomy & Astrophysics*, **437**, 699–702, 2005.
129. Gilman, P.A., The tachocline and the solar dynamo, *Astronomische Nachrichten*, **326**, 208–217, 2005.
130. Dikpati, M., and P. A. Gilman, A shallow-water theory for the sun’s active longitudes, *Astrophysical Journal*, **635**, L193–L196, 2005.
131. Dikpati, M., P.A. Gilman, and K.B. MacGregor, Penetration of dynamo-generated magnetic fields into the Sun’s radiative interior, *Astrophysical Journal*, **638**, 564–575, 2006.
132. Dikpati, M., and P. A. Gilman, Simulating and predicting solar cycles using a flux-transport dynamo, *Astrophysical Journal*, **649**, 498–524, 2006.
133. Dikpati, M., G. de Toma, and P.A. Gilman, Predicting the strength of solar cycle 24 using a flux-transport dynamo-based tool, *Geophysical Research Letters*, **33**, L05102, 2006.
134. Dikpati, M., P.A. Gilman, G. de Toma, and S.S. Ghosh, Simulating solar cycles in northern and southern hemispheres by assimilating magnetic data into a calibrated flux-transport dynamo, *Solar Physics*, **245**, 1–17, 2007.
135. Dikpati, M., and P. A. Gilman, Global solar dynamo models: simulations and predictions of cyclic photospheric fields and long-term non-reversing interior fields, *New Journal of Physics*, **9**, 297, 2007.
136. Gilman, P.A., Dikpati, M., and M.S. Miesch, Global MHD instabilities in a three-dimensional thin-shell model of solar tachocline, *Astrophysical Journal Supplement Series*, **170**, 203–227, 2007.
137. Dikpati, M., and P. A. Gilman, Steps for building a calibrated flux-transport dynamo for the Sun, *Solar Physics*, **241**, 1–5, 2007.
138. Miesch, M.S., Gilman, P.A., and Dikpati, M., Nonlinear evolution of global magnetospheric instabilities in a three-dimensional thin-shell model of the solar tachocline, *Astrophysical Journal Supplement Series*, **168**, 337–361, 2007.
139. Dikpati, M., P.A. Gilman, G. de Toma, and Ghosh, S.S., Simulating solar cycles in northern and southern hemispheres by assimilating magnetic data into a calibrated flux-transport dynamo, *Solar Physics*, **245**, 1–17, 2007.
140. Dikpati, M., G. de Toma, and P.A. Gilman, The Waldmeier effect: An artifact of the definition of Wolf sunspot number?, *Astrophysical Journal Letters*, **673**, L99–L101, 2008.
141. Dikpati, M., and P.A. Gilman, Global solar dynamo models: Simulations and predictions, *Journal of Astrophysics and Astronomy*, **29**, 29–39, 2008.
142. Dikpati, M., G. de Toma, and P.A. Gilman, Polar flux, cross-equatorial flux, and dynamo-generated tachocline toroidal flux as predictors of solar cycles, *Astrophysical Journal*, **675**, 920–930, 2008.
143. Jouve, L., A.S. Brun, R. Arlt, A. Brandenburg, M. Dikpati, A. Bonanno, P.J. Kopyla, D. Moss, M. Rempel, P.A. Gilman, M.J. Korpi, and A.G. Kosovichev, A solar mean field dynamo benchmark, *Astronomy & Astrophysics*, **483**, 949–960, 2008.

144. Cally, P.S., M. Dikpati, and P.A. Gilman, Three-dimensional magneto-shear instabilities in the solar tachocline–II. Axisymmetric case, *Monthly Notices of the Royal Astronomical Society*, **391**, 891–900, 2008.
145. Dikpati, M., P.A. Gilman, and P.S. Cally, Axisymmetric MHD instabilities in solar/stellar tachoclines, *Astrophysical Journal*, **692**, 1421–1431, 2009.
146. Dikpati, M., and P. A. Gilman, Flux-transport solar dynamos. *Space Science Reviews*, **144**, 67-75, 2009.
147. Kosovichev, A. G., and Coauthors, *Solar dynamo and magnetic self-organization*. Astro2010 Science White Papers, 8 pp, 2009.
148. Dikpati, M., P. A. Gilman, P. S. Cally, and M. S. Miesch. Axisymmetric MHD instabilities in solar/stellar tachoclines. *The Astrophysical Journal*, **692**, 1421-1431, 2009.
149. Gilman, P. A., Obituary: John W. Firor (1927-2007). *Bulletin of the American Astronomical Society*, **41**, 1204-1205, 2009.
150. Dikpati, M., P. S. Cally, P. A. Gilman, and M. S. Miesch, Axisymmetric MHD instabilities in solar/stellar tachoclines. *Solar-Stellar Dynamos as Revealed by Helio- and Asteroseismology*, **416**, 525-528, 2009.
151. Dikpati, M., P. A. Gilman, and R. P. Kane, Length of a minimum as predictor of next solar cycle's strength. *Geophysical Research Letters*, **37**, L06104, 2010.
152. Dikpati, M., P. A. Gilman, G. De Toma, and R. K. Ulrich, Impact of changes in the Sun's conveyor-belt on recent solar cycles. *Geophysical Research Letters*, **37**, L14107, 2010.
153. Dikpati, M., P. A. Gilman, and R. K. Ulrich, Physical origin of differences among various measures of solar meridional circulation. *The Astrophysical Journal*, **722**, 774-778, 2010.
154. Gilman, P. A., **and** M. Dikpati, Resonance in forced flux-transport dynamos. *The Astrophysical Journal*, **738**, 9 pp, 2011.
155. Dikpati, M., **and** P. A. Gilman, Theory of solar meridional circulation at high latitudes. *The Astrophysical Journal*, **746**, 15 pp, 2012.
156. Gilman, P. A., and M. Dikpati, Baroclinic instability in the solar tachocline. *The Astrophysical Journal*, **787**, 60, 2014.
157. Gilman, P. A., Effect of toroidal fields on baroclinic instability in the solar tachocline. *The Astrophysical Journal*, **801**, 13 pp, 2015.
158. Gilman, P. A., Baroclinic instability in the solar tachocline: II The Eady Problem. *The Astrophysical Journal*, **818**, 170, 2016.
159. Gilman, P. A., Baroclinic instability in the solar tachocline for continuous vertical profiles of rotation, effective gravity, and toroidal field. *The Astrophysical Journal*, **842**, 130, 2017.
160. Gilman, P.A., Magnetic buoyancy and rotational instabilities in the tachocline. *The Astrophysical Journal*, **853**, 65, 2018.
161. Dikpati, M., S.W. McIntosh, G. Bothun, P. S. Cally, S. S. Ghosh, P. A. Gilman, and O. M. Umurhan, Role of interaction between magnetic Rossby waves and tachocline differential rotation in producing solar seasons. *The Astrophysical Journal*, **853**, 144, 2018.
162. Dikpati, M., Belucz, B., Gilman, P.A. & McIntosh, S.W., Phase speed of magnetized Rossby waves that cause solar seasons. *The Astrophysical Journal*, **862**, 159, 2018.
163. Gilman, P.A., Magnetic buoyancy and magneto-rotational instabilities in stellar tachoclines for solar and antisolar-type differential rotation. *Astrophysical Journal*, **867**, 45, 2018.

Curriculum Vitae. September 15, 2015. NAME: Peter Wilkinson Howitt. ADDRESS: 12424 Wisteria Drive Naples, FL 34120 U.S.A.  
CONTACT: Phone [5] Howitt, Peter W. "The Limits to Stability of a Full-Employment Equilibrium." Scandinavian Journal of Economics 80 (September 1978): 265-282. [6] Howitt, P.W. "The Qualitative Effects of False Trading." Gilman W. Whiting, Ph.D. African American and Diaspora Studies & Callie House Research Center. George W. Peabody College of Education Vanderbilt University. Nashville, Tennessee 37235 Phone: 615-343-6390 Fax: 615-343-1767. EDUCATION 2004 Ph.D., Curriculum & Instruction, Special Education Populations, Purdue University, College of Education, West Lafayette, Indiana 1995 Individualized M.A., Multicultural Education and Urban Affairs, Rhode Island College, Providence, Rhode Island 1985 B.A., Communication Studies, University of Rhode Island, Kingston, Rhode Island. Curriculum Vitae is a compilation album by recording artists of Nigerian record label Mo' Hits Records. It was released in 2007, by the label. Nigerian record producer Don Jazzy first revealed plans for a label collaborative album in 2006. Curriculum Vitae was supported by five singles "Why Me" (Remix), "Pere", "Ololufe", "Booty Call" and "Move Your Body". It received positive reviews from music critics, and was ranked seventh on Pulse Nigeria's list of the 15 Best Nigerian Pop albums ever released