

Publications
Richard A. Matzner

Publications and Papers in Preparation:

*Items marked with an asterisk appear in refereed journals.

- *1. “Gravitational Field Equations for Sources with Axial Symmetry and Angular Momentum” (Richard A. Matzner and Charles W. Misner), *Physical Review* **154**, 1229 (February 1967).
- *2. “Scattering of Massless Scalar Waves by a Schwarzschild ‘Singularity’ ” (Richard A. Matzner), *Journal of Mathematical Physics* **9**, 163 (January 1968).
- *3. “3-Sphere ‘Backgrounds’ for the Space Sections of the Taub Cosmological Solution” (Richard A. Matzner), *Journal of Mathematical Physics* **9**, 1063 (July 1968).
- *4. “Almost Symmetric Spaces and Gravitational Radiation” (Richard A. Matzner), *Journal of Mathematical Physics* **9**, 1657 (October 1968).
- *5. “On the Present Temperature of Primordial Black-Body Gravitational Radiation” (Richard A. Matzner), *The Astrophysical Journal* **154**, 1123 (October 1968).
- *6. “The Evolution of Anisotropy in Non-Rotating Bianchi Type V Cosmologies” (Richard A. Matzner), *The Astrophysical Journal* **157**, 1085 (September 1969).
- *7. “Effect of Various Cross Section Energy Dependences in Calculations of Cosmological Viscosity” (Richard A. Matzner), *Astrophysics and Space Sciences* **4**, 459 (February 1969).
- *8. “Dynamics of $SO(3, R)$ -Homogeneous Cosmologies” (Richard A. Matzner, L. C. Shepley and James B. Warren), *Ann. Phys.* **57**, 401 (April 1970).
- *9. “Rotation in Closed Perfect-Fluid Cosmologies” (Richard A. Matzner), *Journal of Mathematical Physics* **11**, 2432 (August 1970).
- *10. “Collisionless Radiation in Closed Cosmologies” (Richard A. Matzner), *Comm. Math. Phys.* **20**, 1 (January 1971).
- *11. “Closed Rotating Cosmologies Containing Matter Described by the Kinetic Theory. A: Formalism ” (Richard A. Matzner), *Ann. Phys. (NY)* **65**, 438 (June 1971).
- *12. “Closed Rotating Cosmologies Containing Matter Described by the Kinetic Theory. B: Small Anisotropy Calculations; Application to Observation” (Richard A. Matzner), *Ann. Phys. (NY)* **65**, 482 (June 1971).
- *13. “On Stationary Axisymmetric Solutions of the Einstein Field Equations” (Richard A. Matzner and Yavuz Nutku), *The Astrophysical Journal* **167**, 149 (July 1971).
- *14. “Rotation Does Not Enhance Mixing in the Mixmaster Universe” (Richard A. Matzner and D. M. Chitre), *Comm. Math. Phys.* **22**, 173 (July 1971).
- *15. “Perturbations in Anisotropic Euclidean-Homogeneous Cosmologies” (T. E. Perko, Richard A. Matzner, and L. C. Shepley), *Phys. Lett.* **A35**, 467 (July 1971).

- *16. “Dissipative Effects in the Expansion of the Universe I” (Richard A. Matzner and Charles W. Misner), *The Astrophysical Journal* **171**, 415 (February 1972).
- *17. “Dissipative Effects in the Expansion of the Universe II. A Multicomponents Model for Neutrino Dissipation of Anisotropy in the Early Universe” (Richard A. Matzner), *The Astrophysical Journal* **171**, 433 (February 1972).
- *18. “Closed Rotating Cosmologies Containing Matter Described by the Kinetic Theory. Entropy Production in the Collision Time Approximation” (Richard A. Matzner), *Journal of Mathematical Physics* **13**, 7 (July 1972).
- *19. “Galaxy Formation in Anisotropic Cosmologies” (T. E. Perko, R. A. Matzner and L. C. Shepley), *Physical Review D, Third Series* **6**, 969 (August 1972).
- *20. “A Model for Peaking of Galactic Gravitational Radiation” (Richard A. Matzner and G. Campbell), *Journal of Mathematical Physics* **14**, 1 (January 1973).
- *21. “Ejection of Matter and Gravitational Radiation from Orbiting Bodies” (A. A. Jackson and Richard A. Matzner), *Nature* **241**, 112 (February 1973).
- *22. “The Brans-Dicke Theory and Anisotropic Cosmologies” (R. A. Matzner, M. P. Ryan, Jr., and E. T. Toton), *Il Nuovo Cimento* **14B**, 161 (April 1973).
- *23. “Numerical Solutions for Symmetric Bianchi Type IX Universes” (Allan R. Moser, Richard A. Matzner and Michael P. Ryan, Jr.), *Ann. Phys.* **79**, 558 (August 1973).
- *24. “On the Method of Virtual Quanta and Gravitational Radiation” (R. A. Matzner and Y. Nutku), *Proc. Roy. Soc.* **A336**, 285 (January 1974).
- *25. “Photographic Experiments in Preparation for a Test of General Relativity During the Eclipse of 30 June 1973” (Richard A. Matzner and M. P. Ryan, Jr.), American Astronomical Society *Photobulletin* **1**, 10 (1975).
- 26. “Modern Theoretical and Observational Cosmology” (Thomas B. Chriss, Richard A. Matzner, Michael P. Ryan, Jr. and L. C. Shepley), *General Relativity and Gravitation*, Proceedings of the Seventh International Conference on Gravitation and General Relativity (1975).
- *27. “Gravitational Deflection of Light. Solar Eclipse of 30 June 1973, I. Description of Procedures and Final Results” (Texas Mauritanian Eclipse Team.¹ Seventeen authors, including Richard Matzner), *Astronomical Journal* **81**, 452 (June 1976).
- *28. “Zero-Mass Plane Waves in Non-Zero Gravitational Backgrounds” (Paul L. Chrzanowski, Richard A. Matzner, Vernon D. Sandberg, Michael P. Ryan, Jr.), *Physical Review D* **14**, 317 (July 15, 1976).
- *29. “Low Frequency Limit Conversion Cross Sections for Charged Black Holes” (Richard A. Matzner), *Physical Review D* **14**, 3274 (December 15, 1976).
- *30. “Pair Production by Gravitational Waves in the Field of a Black Hole” (Richard A. Matzner and Y. Nutku), *Phys. Lett.* **A60**, 1 (January 1977).

¹The author’s name for this paper appeared precisely as “Texas Mauritanian Eclipse Team.”

- *31. “Low Frequency Limit of Gravitational Scattering” (Richard A. Matzner and Michael P. Ryan, Jr.), *Physical Review D* **16**, 1636 (September 1977).
- *32. “Gravitationally Induced Electromagnetic Bremsstrahlung” (Richard A. Matzner and Vernon D. Sandberg), *Physical Review D* **16**, 2939 (November 15, 1977).
- *33. “The Homogeneity and Isotropy of the Universe” (J. D. Barrow and Richard A. Matzner), *Monthly Notices of the Royal Astronomical Society* **181**, 719 (December 1977).
- *34. “Scattering of Gravitational Radiation from Vacuum Black Holes” (Richard A. Matzner and Michael P. Ryan, Jr.), *The Astrophysical Journal Suppl.* **36**, 451 (March 1978).
- *35. “The Method of Virtual Quanta as a Probe of the Equivalence Principle” (Richard A. Matzner), *GRG Journal* **9**, 71 (1978).
- *36. “Photographic Astrometry Against a Bright Sky: Theory and Application” (F. A. Handler and Richard A. Matzner), *The Astrophysical Journal* **83**, 1227 (October 1978).
- *37. “Plane-Symmetric Cosmologies” (Joan Centrella and Richard A. Matzner), *The Astrophysical Journal* **230**, 311 (June 1979).
- *38. “Instability of the Cauchy Horizon of Reissner-Nordström Black Holes” (Richard A. Matzner, Nelson Zamorano and Vernon D. Sandberg), *Physical Review D* **19**, 2821 (1979).
- *39. “Imaginary-Frequency Interior Modes of Black Holes” (Richard A. Matzner and Nelson Zamorano), *Proc. Roy. Soc.* **A273**, 223 (1980).
- *40. “On Observations of the Cosmic Radiation Background” (Richard A. Matzner), *The Astrophysical Journal* **241**, 851 (1980).
- *41. “The Size of a Bouncing Mixmaster Universe” (John Barrow and Richard A. Matzner), *Physical Review D* **21**, 336 (January 15, 1980).
- 42. *Gravitational Radiation and the Equivalence Principle by the Technique of Virtual Quanta*, published by the Dublin Institute of Advanced Studies, 1980. (Notes on Lectures given at DIAS, Summer 1979).
- *43. “Gravitational/Electromagnetic Conversion Scattering on Fixed Charges in the Born Approximation” (R. A. Breuer, M. Rosenbaum, M. P. Ryan, Jr., and R. A. Matzner), *Physical Review D* **23**, 305 (1981).
- *44. “Upper Limits on Micro-Mini Black Holes” (T. Rothman and R. A. Matzner), *Astrophysics and Space Sciences* **75**, 229 (1981).
- *45. “Gravitational Wave Scattering” (F. A. Handler and R. A. Matzner), *Physical Review D* **22**, 2331 (1980).
- *46. “Gravitational Deflection of Light in the 1-1/2 PPN Approximation” (R. A. Matzner and G. Richter), *Astrophysics and Space Sciences* **79**, 119 (1981).
- 47. “General Relativity in Astrophysics” (Proceedings of a workshop chaired by R. Matzner, at the Tenth Texas Symposium on Relativistic Astrophysics, Baltimore, 1980. Proceedings of Conference, New York Academy of Sciences, 1981).

- *48. “Electromagnetic Wave Scattering by Spheroidal Objects Using a Method of Spin-Weighted Harmonics” (John A. H. Futterman and Richard A. Matzner), *Radio Science* **16**, 1303 (1981).
- *49. “Colliding Gravitational Waves in Expanding Cosmologies” (Joan A. Centrella and Richard A. Matzner), *Physical Review D* **25**, 930 (1982).
- *50. “Electromagnetic Wave Scattering by Spheroidal Conductors for Arbitrary Polarization and Angle of Incidence. I. Theory” (John A. H. Futterman and Richard A. Matzner), *Radio Science* **17**, 463 (1982).
- *51. “Scale-Covariant Gravitation and Primordial Nucleosynthesis” (Tony Rothman and R. A. Matzner), *The Astrophysical Journal* **257**, 450 (1982).
- *52. “The Effects of Anisotropy and Dissipation on the Primordial Light Isotope Abundances” (T. Rothman and R. Matzner), *Physical Review Letters* **48**, 1565 (1982).
- *53. “Second-Order Contributions to Gravitational Deflection of Light in the Parametrized Post-Newtonian Formalism” (Gary W. Richter and Richard A. Matzner), *Physical Review D* **26**, 1219 (1982).
- *54. “Grand Unified Reactions and Dissipation in Anisotropic Cosmologies” (T. Rothman and R. A. Matzner), *The Astrophysical Journal* **263**, 501 (1982).
- *55. “On a Non-Eclipse Optical Determination of the Gravitational Deflection of Light by the Sun” (F. Handler and R. Matzner), *Acta Astronautica* **9**, 57 (1982).
- *56. “Second-Order Contributions to Gravitational Deflection of Light in the Parametrized Post-Newtonian Formalism. II. Photon Orbits and Deflection in Three Dimensions” (Gary W. Richter and R. Matzner), *Physical Review D* **26**, 2549 (1982).
- *57. “Cosmological Spatial Curvature Probed by Microwave Polarization” (B. Tolman and R. Matzner), *Physical Review D* **26**, 2951, Rapid Communications (1982).
- *58. “Initial Data and Wave Propagation in One-Dimensional Inhomogeneous Cosmologies” (Richard Matzner, M. Rosenbaum and M. P. Ryan, Jr.), *Journal of Mathematical Physics* **23**, 10 (October 1982).
- 59. “A Numerical Computation of Nucleosynthesis in a One-Dimensional Inhomogeneous Cosmology” (Richard A. Matzner, J. M. Centrella, T. Rothman and J. R. Wilson), in *Numerical Astrophysics*, a Symposium in Honor of J. Wilson. J. Centrella, J. LeBlanc, and R. Bowers, eds. (Jones and Bartlett Publishers, Boston, 1985).
- *60. “Second-Order Contributions to Relativistic Time Delay in the Parametrized Post-Newtonian Formalism” (G. Richter and R. A. Matzner), *Physical Review D* **28**, 3007 (1983).
- *61. “Metaphysics of Colliding Self-Gravitating Plane Waves” (R. A. Matzner and F. Tipler), *Physical Review D* **29**, 1575 (1984).
- *62. “Non-Equilibrium Processes and Primordial Nucleosynthesis” (T. Rothman and R. A. Matzner), *Nuovo Cimento Letters* **41**, 65 (1984).

- *63. “Low Mass Collisionless Particles and Galaxy Formation,” *Publications of the Astronomical Society of the Pacific* **96**, 189 (1984).
- *64. “Nucleosynthesis in Anisotropic Cosmologies Revisited” (T. Rothman and R. A. Matzner), *Physical Review D* **30**, 1649 (1984).
- *65. “An Exact Non-Ghost Solution for a Plane-Symmetric Cosmology Containing a Classical Spinor Field” (R. A. Matzner and M. P. Ryan, Jr.), *Journal of Mathematical Physics* **25**, 2236 (1984).
- *66. “Large Scale Anisotropies and Polarization of the Microwave Background Radiation in Homogeneous Cosmologies” (B. W. Tolman and R. A. Matzner), *Proc. Roy. Soc. Lond.* **A392**, 391 (1984).
- *67. “Glory Scattering by Black Holes” (R. A. Matzner, C. DeWitt-Morette, B. Nelson and T. R. Zhang), *Physical Review D* **31**, 1869, (1985).
- 68. “Cosmic Nucleosynthesis,” lectures given at the International Center for Theoretical Physics *Workshop on High Energy Physics and Cosmology*, Trieste, Italy (July 1984).
- *69. “Cosmic Nucleosynthesis and Nonlinear Inhomogeneities” (J. M. Centrella, Richard A. Matzner, Tony Rothman and J. R. Wilson), *Nuclear Physics* **B216**, 171 (1986).
- *70. “Anisotropy and Cosmic Nucleosynthesis of Light Isotopes including Li” (H. Kurki-Suonio and Richard A. Matzner), *Physical Review D* **31**, 1811, (1985).
- 71. “Numerical Cosmology: Revealing the Universe Using Computers” (J. Centrella, Richard A. Matzner and B. Tolman), in *Supercomputers: Algorithms, Architectures and Scientific Computation*, T. Tajima and A. Matsen, eds. (University of Texas Press, Austin, 1986), Chapter 6, pp. 73-96.
- *72. “Numerical Analysis of Inflation” (A. Albrecht, R. Brandenberger, and Richard A. Matzner), *Physical Review D* **32**, 1280 (1985).
- *73. “Professor Wheeler and the Crack of Doom: Closed Cosmologies in the 5-d Kaluza-Klein Theory” (Richard A. Matzner and A. Mezzacappa), *Foundations of Physics* **16**, 227 (March 1986).
- *74. “A 3-Dimensional Closed Universe Without Collapse in 5-Dimensional Kaluza-Klein Theory” (Richard A. Matzner and A. Mezzacappa), *Physical Review D* **32**, 3114 (1985).
- *75. “Behavior of Ray Optics in the Dray-’tHooft Geometry” (Richard A. Matzner), *Nuclear Physics* **B266**, 661 (1986).
- *76. “Colliding Plane Waves in $N = 1$ Classical Supergravity” (M. Rosenbaum, M. Ryan, L. F. Urrutia, and Richard A. Matzner), *Physical Review D* **34**, 409 (1986).
- *77. “A Conjecture on Isotope Production in the Bianchi Cosmologies” (Richard A. Matzner, Tony Rothman, and G. F. R. Ellis), *Physical Review D* **34**, 292 (1986).
- 78. “The LAGEOS Gravitational Experiment” (I. Ciufolini and Richard A. Matzner), *Proceedings of the 1985 Marcel Grossman Meeting*, Rome, R. Ruffini, ed. (World Scientific, 1988).
- *79. “Inflation from Inhomogeneous Initial Data in 1-d Backreacting Cosmology,” (H. Kurki-Suonio, J. Centrella, Richard A. Matzner and J. R. Wilson), *Physical Review D* **35**, 435 (1987).

80. “Numerical Analysis of Inflation” (Richard A. Matzner), in *Dynamical Spacetimes and Numerical Relativity*, J. Centrella, ed. (Cambridge University Press, Cambridge, 1986).
- *81. “Inflation and Bubbles in General Relativity” (P. Laguna-Castillo and R. Matzner), *Physical Review D* **34**, 2913 (1986).
- *82. “Cosmic Nucleosynthesis,” *Publications of the Astronomical Society of the Pacific* **98**, 1049 (1986).
- *83. “Surfaces of Discontinuity in 5-Dimensional Kaluza-Klein Cosmologies” (P. Laguna-Castillo and R. Matzner), *Nuclear Physics* **B282**, 542 (1987).
- *84. “Inflation with Generalized Initial Conditions” (A. Albrecht, R. Brandenberger, and R. Matzner), *Physical Review D* **35**, 429 (1987).
- *85. “Discontinuity Cylinder Model of Gravitating $U(1)$ Cosmic Strings” (P. Laguna-Castillo and Richard A. Matzner), *Physical Review D* **35**, 2933 (1987).
- *86. “Singularities in Kaluza-Klein-Friedmann Cosmological Models” (M. Rosenbaum, M. Ryan, L. Urrutia and Richard A. Matzner), *Physical Review D* **36**, 1032 (1987).
- *87. “Coupled Field Solutions for $U(1)$ Gauge Cosmic Strings” (P. Laguna-Castillo and Richard A. Matzner), *Physical Review D* **36**, 3663 (1987).
- *88. “Interaction of $U(1)$ Cosmic Strings: Numerical Intercommutation” (Richard A. Matzner), *Computers in Physics* **2**, No. 5, p. 51 (Sept/Oct 1988).
89. “Primordial Nucleosynthesis in a Universe with Nonlinear Inhomogeneities” (Richard A. Matzner, J. M. Centrella, T. Rothman, and James R. Wilson), in *Origin and Distribution of the Elements*, G. Mathews, ed. (World Scientific, Singapore, 1988).
90. “Old English Conductors” (Richard A. Matzner), *New York Times Book Review*, November 1, 1987, p. 38 (letter to the editor).
- *91. “Behavior of Chaotic Inflation in Anisotropic Cosmologies with Nonminimal Coupling” (Toshifumi Futamase, Tony Rothman, and Richard A. Matzner), *Physical Review D* **39**, 405 (1989).
- *92. “Inhomogeneous Nucleosynthesis with Neutron Diffusion” (Hannu Kurki-Suonio, Joan M. Centrella, Richard A. Matzner, Tony Rothman, and James R. Wilson), *Physical Review D* **38**, 1091 (1988).
93. “Interaction of Cosmic Strings” (Richard A. Matzner), in *Proceedings of the First International Conference on Computational Physics*, D-Y Li and D-H Feng, ed. (World Scientific, Singapore, 1989).
94. “General Relativistic Radiation Hydrodynamics in Spherically Symmetric Spacetimes” (A. Mezzacappa and Richard A. Matzner), in *Frontiers in Numerical Relativity*, C. Evans, D. Hobill, and S. Finn, eds. (Cambridge University Press, Cambridge, 1989).
- *95. “Nonlinear Solutions for Initial Data in the Vacuum Einstein Equations in Plane Symmetry” (Peter Anninos, J. Centrella, and Richard A. Matzner), *Physical Review D* **39**, 2155 (1989).

96. “The Pregalactic Cosmic Gravitational Wave Background” (Richard A. Matzner), in *Relativistic Gravitational Experiments in Space (Proceedings of the Workshop)*, held in Annapolis, Maryland, June 28–30, 1988, R. Hellings, ed., NASA Technical Publication NASA CP-3046 (National Technical Information Service, Springfield, VA 22161-2171, 1989).
97. “Computational Dynamics of $U(1)$ Gauge Strings: Probability of Reconnection of Cosmic Strings” (Richard A. Matzner), in *Frontiers in Numerical Relativity*, C. Evans, D. Hobill, and S. Finn, eds. (Cambridge University Press, Cambridge, 1989).
98. “Initial Value Solutions in Planar Cosmologies” (Peter Anninos, Joan Centrella, and Richard A. Matzner), in *Frontiers in Numerical Relativity*, C. Evans, D. Hobill, and S. Finn, eds. (Cambridge University Press, Cambridge, 1989).
- *99. “Effect of Small-Scale Baryon Inhomogeneity on Cosmic Nucleosynthesis” (H. Kurki-Suonio and Richard A. Matzner), *Physical Review D* **39**, 1046 (1989).
100. “Probability of Interconnection of Cosmic Strings” (Richard A. Matzner and D. Jill McCracken), in *Cosmic Strings, the Current Status (Proceedings of Yale Conference on Cosmic Strings)*, Frank Accetta and Lawrence Krause, eds. (World Scientific, Singapore, 1988).
- *101. “Computer Simulation of Time-Dependent, Spherically Symmetric Spacetimes Containing Radiating Fluids: Formalism and Code Tests” (Anthony Mezzacappa and Richard A. Matzner), *The Astrophysical Journal* **343**, 853 (August 15, 1989).
102. “Recent Developments in Cosmology” (Richard A. Matzner and D. Jill McCracken), in *Proceedings of the VIIIth Italian Conference on General Relativity*, Cerdonio, Cianci, Francaviglia, and Toller, eds. (World Scientific, Singapore, 1989).
103. “The Interaction of Cosmic Strings: A Study of Research and Teaching Graphics” (Richard A. Matzner), in *Proceedings of Supercomputing 1988* (J.L. Martin and S.F. Landstrom, editors) (Computer Society Press, Washington, DC, 1989).
- *104. “Peeling $U(1)$ Gauge Cosmic Strings” (P. Laguna and Richard A. Matzner), *Physical Review Letters* **62**, 1948 (1989).
- *105. “Numerical Simulation of Bosonic Superconducting String Interactions” (P. Laguna and Richard A. Matzner), *Physical Review D* **41**, 1751 (1990).
- *106. “Big Bang Nucleosynthesis and the Quark-Hadron Transition” (H. Kurki-Suonio, Richard A. Matzner, K. A. Olive, and D. N. Schramm), *The Astrophysical Journal* **353**, 406 (1990).
107. “Current Status of Cosmic String Interactions” (Richard A. Matzner and P. Laguna), *Proceedings of the Third Regional Conference in Mathematical Physics*, F. Hussain and A. Qadir, eds. (World Press, Singapore, 1990).
- *108. “Overproduction of ${}^4\text{He}$ in strongly inhomogeneous $\Omega_b = 1$ models of primordial nucleosynthesis” (H. Kurki-Suonio and Richard A. Matzner), *Physical Review D* **42**, 1047 (1990).
- *109. “Numerical Methods for Solving the Planar Vacuum Einstein Equations” (Peter Anninos, Joan Centrella, and Richard A. Matzner), *Physical Review D* **43**, 1808 (1991).

- *110. “Nonlinear Wave Solutions to the Planar Vacuum Einstein Equations” (Peter Anninos, Joan Centrella, and Richard A. Matzner), *Physical Review D* **15** **43**, 1825 (1991).
- *111. “How Does Inflation Isotropize the Universe?” (Peter Anninos, Richard A. Matzner, Tony Rothman, and Michael P. Ryan, Jr.), *Physical Review D* **15** **43** 3821 (1991).
- *112. “Non-Riemannian Theories of Gravity and Lunar and Satellite Laser Ranging” (I. Ciufolini and Richard A. Matzner), *Internation. Journal Modern Physics A* **7** (1992).
- *113. “3-D Numerical Cosmology” *Annals N.Y. Academy of Science* **631** 1 (August 1991).
- 114. “Numerical Relativity” in *SILARG VII*, J. D’Olivo, E. Nachmad-Achar, M. Rosenbaum, M. Ryan, L. Urrutia, F. Zertuche eds. (World Scientific, Singapore, 1991).
- *115. “Fractal Structure in the Scalar $\lambda(\phi^2 - 1)^2$ Theory” (Peter Anninos, Samuel Oliveira, and Richard A. Matzner), *Physical Review D* **44** 1147 (Aug. 15, 1991).
- 116. “Three Dimensional Numerical Study of Inhomogeneous Chaotic Inflation” (P. Laguna, H. Kurki-Suonio, and Richard A. Matzner) *Proceedings of Sixth Marcel Grossmann Conference on General Relativity*, (T. Nakamura, ed.; Tokyo 1992).
- 117. “Designing a Two Black Hole Code” *Proceedings of Conference on Computational Quantum Physics* (A. S. Umer, V. E. Oberacker, M. R. Strayer, C. Bottcher, eds.) (AIP Conference Proceedings 260; American Institute of Physics, New York, 1992).
- 118. “3-d Rectangular Coordinate Initial Data for Two Black Holes” *Proceedings of First Black-Hole Collision Group Meeting* (Copies of Transparencies) (P. Laguna, ed., Los Alamos National Laboratory 1991).
- *119. “Inhomogeneous Inflation: The Initial Value Problem” (P. Laguna, H. Kurki-Suonio, and R. Matzner), *Physical Review D* **44** 3077 (1991).
- *120. “Anisotropies of the Cosmic Background Radiation in a ‘Hot’ Dark Matter Universe” (P. Anninos, R. A. Matzner, R. Tuluie, and J. Centrella), *The Astrophysical Journal* **382** 71 (1991).
- 121. “Theoretical Predictions of the Spin of LAGEOS” (Copies of Transparencies) (Richard A. Matzner) in *First Phillips Laboratory/Los Alamos National Laboratory meeting on the Rotation Vector of LAGEOS* (W. Miller, ed.) (Los Alamos National Labs 1992).
- 122. “Solution of Elliptic Equations in Numerical Relativity Using MultiQuadrics” (M. R. Dubal, S. R. Oliveira, and Richard A. Matzner), in *Approaches to Numerical Relativity*, R. d’Inverno ed., (Cambridge University Press, Cambridge 1992).
- *123. “Orbiting Cross Sections. Applications to Black Hole Scattering” (P. Anninos, C. DeWitt-Morette, Richard A. Matzner, P. Yiotas, T. R. Zhang), *Physical Review D* **46** 4477 (1992).
- 124. “A Line SOR Solution for the 2-Black-Hole Initial Value Problem” (S. Klasky, M. Choptuik, and Richard Matzner) in *Proceedings of the Midwest Relativity Conference*, Edward Seidel, coordinator (National Center for Supercomputing Applications, Urbana, IL, 1992).

- *125. “Three-Dimensional Initial Data for the Collision of Two Black Holes” (G. B. Cook, M. W. Choptuik, M. R. Dubal, S. Klasky, Richard A. Matzner, and S. R. Oliveira), *Physical Review D* **47** 1471 (February 1993).
- 126. “Charles W. Misner: Insight and Discovery,” (B.K. Berger, D.R. Brill, J. Isenberg, and Richard A. Matzner) in *Directions in General Relativity*, Vol. I, Misner Birthday Symposium (Hu, Ryan, Visheshawara, eds.) Cambridge University Press (1993).
- 127. “The Isotropy and Homogeneity of the Universe” (Richard A. Matzner) in *Directions in General Relativity*, Vol. I, Misner Birthday Symposium (Hu, Ryan, Vishveshwara, eds.) Cambridge University Press (1993).
- *128. “Inhomogeneous Inflation: Numerical Evolution” (H. Kurki-Suonio, P. Laguna, and Richard A. Matzner), *Physical Review D* **47** 3611 (1993).
- *129. “Universality and Scaling in Gravitational Collapse” (Richard A. Matzner), *Matters of Gravity* **2**, 9 (Fall 1993).
- 130. “Computing Gravitational Radiation from the Collision of Black Holes” in *Phenomenology of Unification from Present to Future*, G. Diambri- Palazzi, C. Cosmelli, G. Martinelli, and L. Zanello, eds., World Scientific (Singapore, 1994).
- *131. “Spin Dynamics of the LAGEOS Satellite in Support of a Measurement of the Earth’s Gravitomagnetism” (S. Habib, D. Holz, A. Kheifets, Richard Matzner, W. Miller, B. Tolman), *Physical Review D* **50** 6068 (15 November 1994).
- *132. “Anisotropies of the Cosmic Background Radiation in a Reionized Universe” (Robin Tuluie, Richard A. Matzner and Peter Anninos), *The Astrophysical Journal* **446**, 447 (1995) (including color plates #15, 16).
- *133. “Geometry of a Black Hole Collision” (Richard Matzner, H.E. Seidel, S. Shapiro, L. Smarr, W.M. Suen, Saul Teukolsky, J. Winicour), *Science* **270** 941 (Nov. 10, 1995) (cover article).
- *134. “Cauchy-Characteristic matching: a new approach to radiation boundary conditions” (N.T. Bishop, R. Gomez, P.R. Holvorcem, Richard A. Matzner, P. Papadopoulos, J. Winicour), *Physical Review Letters* **76** 4303 (3 June 1996).
- *135. “Cauchy-Characteristic Evolution and Waveforms” (N.T. Bishop, R. Gomez, P.R. Holvorcem, Richard A. Matzner, P. Papadopoulos, J. Winicour), *J. Computational Phys.* **136** 140 (1997).
- *136. “Analysis of ‘Gauge Modes’ in Linearized Relativity” (Richard A. Matzner, Mijan Huq, Alonso Botero, Dae Il Choi, Ullar Kask, Juan Lara, Steven Liebling, David Neilsen, Premana Premadi and Deirdre Shoemaker), *Classical and Quantum Gravity* **14** L21 (1997).
- *137. “Non-intercommuting Cosmic Strings” (Luis M.A. Bettencourt, Pablo Laguna, and Richard A. Matzner), *Physical Review Letters* **78** 2066 (1997).
- *138. “Morphological Evolution of Galaxies” (Hugo Martel, Premana Premadi, and Richard A. Matzner), *The Astrophysical Journal* **497** 512 (1998).

139. “Light Propagation in Inhomogeneous Universes” (Premana Premadi, Hugo Martel, Richard A. Matzner), *Proceedings of the 1997 Symposium in Cosmology*, Japan National Astronomical Observatory, Mitaka, Japan (1997).
- *140. “Light Propagation in Inhomogeneous Universes I: Methodology and Preliminary Result” (Premana Premadi, Hugo Martel, and Richard A. Matzner), *The Astrophysical Journal* **493** 10 (1998).
- *141. “Gravitational Wave Extraction and Outer Boundary Conditions by Perturbative Matching” The Binary Black Hole Grand Challenge (43 authors including Richard A. Matzner), *Physical Review Letters* **80** 1812 (1998).
- *142. “Boosted 3-dimensional Black Hole Evolutions with Singularity Excision” The Binary Black Hole Grand Challenge (44 authors including Richard A. Matzner), *Physical Review Letters* **80** 2512 (1998).
- *143. “Stable characteristic evolution of generic 3-dimensional single-black-hole spacetimes” The Binary Black Hole Grand Challenge (43 authors including Richard A. Matzner), *Physical Review Letters* **80** 3915 (1998).
144. “Light Propagation in Inhomogeneous Universes” (Premana Premadi, Hugo Martel, and Richard A. Matzner), *Proceedings of the 1998 Tokyo Conference on Numerical Astrophysics* (Kluwer Academic Publishers), (astro-ph/9807127).
145. “Light Propagation in Inhomogeneous Universes” (Premana Premadi, Hugo Martel, and Richard A. Matzner), *Publications of the Yukawa Institute of Theoretical Physics*, in press (astro-ph/9807129).
- *146. “Initial Data and Coordinates for Multiple Black Hole Systems” (Richard A. Matzner, Mijan F. Huq, and Deirdre M. Shoemaker), *Physical Review*, **D59**, 024015 (1999).
- *147. “Cauchy-perturbative Matching and Outer Boundary Conditions: Computational Studies” (Luciano Rezzolla, Andrew M. Abrahams, Richard A. Matzner, Mark E. Rupright, and Stuart L. Shapiro), *Physical Review*, **D59**, 064001 (June, 1999).
148. “Relation of Dissipative and Non-Dissipative Magnetic Torques, and Gravitational Torques, in LA-GEOS and LARES Satellites” (Richard Matzner and Warner Miller), in *LARES-Laser Relativity Satellite Phase A Study for Italian Space Agency*, I. Ciufolini, ed. (University of Rome, October 30, 1998).
149. “Computational Black Holes” (Richard A. Matzner) in *Proceedings of First SIGRAV Graduate School in Contemporary Relativity and Gravitational Physics* (P. Fre, V. Gorini, G. Mogli and U. Moschella, editors) (Institute of Physics Press London, 1999).
150. “Light Propagation in Inhomogeneous Universes: Cosmological Parameter Survey” (Premana Premadi, Hugo Martel, Toshifumi Futamase, and Richard A. Matzner), *Proceedings of the 19th Texas Symposium* Available only on CD: University of Texas Department of Astronomy (Paris, 1998).
- *151. “A Database of COBE-Normalized CDM Simulations” (Hugo Martel and Richard A. Matzner), *Astrophysical Journal* **530**, 525 (February 2000).
- *152. “Testing the Convergence of the Multiple Lens-Plane Algorithm (Hugo Martel, Premana Premadi, and Richard A. Matzner), *Astrophysical Journal* **537**, 28-36 (July 2000).

- *153. “Approximate Analytical Solutions to the Initial Data Problem of Black Hole Binary Systems” (P. Marronetti, M. Huq, P. Laguna, L. Lehner, Richard A. Matzner and D. Shoemaker), *Physical Review* **D62** 024017 (2000); gr-qc 0001077.
- *154. “Locating Boosted Kerr and Schwarzschild Apparent Horizons” (M. F. Huq, M. W. Choptuik and Richard A. Matzner), *Physical Review* **D66** 084024 (2002); gr-qc 0002076.
- *155. “Towards stable evolutions of excised black hole spacetimes via the ADM equations: A spherically symmetric test” (L. Lehner, M. Huq, M. Andersen, E. Bonning, D. Schaefer, and Richard A. Matzner), *Physical Review* **D62**, 44037 (2000).
- *156. “Generic Tracking of Multiple Apparent Horizons with Level Flow” (Deirdre M. Shoemaker, Mijan F. Huq, and Richard A. Matzner) *Physical Review* **D62** 124005 (2000); gr-qc 0004062.
- *157. “Solving the Initial Value Problem of Two Black Holes” (P. Marronetti and Richard A. Matzner), *Physical Review Letters* **85**, 5500-5503 (2000); gr-qc 0009044.
- *158. “Grazing Collisions of Black Holes via the Excision of Singularities” (Steve Brandt, Randall Correll, Roberto Gomez, Mijan Huq, Pablo Laguna, Luis Lehner, Pedro Marronetti, Richard A. Matzner, David Neilsen, Jorge Pullin, Erik Schnetter, Deirdre Shoemaker, Jeffrey Winicour) *Physical Review Letters* **85**, 5496-5499 (2000); gr-qc 0009047.
- *159. “Light Propagation in Inhomogeneous Universes II. Cosmological Parameter Survey,” (Premana Premadi, Hugo Martel, Richard A. Matzner, and Toshifumi Futamase) *Astrophysical Journal Suppl.* **135**, 7 (2001).
- 160. “Collisions of Black Holes: Cracks in a Hard Problem” (Richard A. Matzner), in *Astrophysical Sources for Ground Based Gravitational Wave Detectors*, J. Centrella, ed. (American Institute of Physics, College Park, 2001).
- *161. “Cosmological Parameter Survey using the Gravitational Lensing Method” (P. Premadi, H. Martel, Richard A. Matzner, and T. Futamase) *Publications of Astronomical Society of Australia* **18**, 201 (2001).
- 162. “Cosmological Parameter Survey using the Gravitational Lensing Method” (Premana Premadi, Hugo Martel, Richard Matzner, and Toshifumi Futamase) page 268 in *Relativistic Astrophysics: 20th Texas Symposium*, edited by J.C. Wheeler and H. Martel (American Institute of Physics, College Park, 2001).
- 163. “Simulations of Black Hole Binaries: Providing Initial Data” (Pedro Marronetti and Richard A. Matzner) page 740 in *Relativistic Astrophysics: 20th Texas Symposium*, edited by J.C. Wheeler and H. Martel (American Institute of Physics, College Park, 2001).
- *164. “Light Propagation in Inhomogeneous Universes III: Distributions of Image Separations” (H. Martel, P. Premadi, and Richard A. Matzner) *Astrophysical Journal* **570** 17 (May 1, 2002).
- *165. “Physics and Initial Data for Multiple Black Hole Spacetimes” (E. Bonning, P. Marronetti, D. Neilsen, and Richard A. Matzner), *Physical Review* **D68** 044019 (2003).

- *166. “Adaptive Event Horizon Tracking and Critical Phenomena in Binary Black Hole Coalescence” (Scott A. Caveny and Richard A. Matzner) *Physical Review* **D68** 104003 (2003)[arXiv: gr-gc/03003109].
- *167. “Tracking Black Holes in Numerical Relativity” (Scott A. Caveny, Matthew Anderson, and Richard A. Matzner) *Physical Review* **D68**, 104009 (2003) [arXiv: gr-gc/0303099].
- *168. “Tips for implementing multigrid methods on domains containing holes” (Scott Hawley and Richard A. Matzner) *Classical and Quantum Gravity* **21** 805 (2004) [arXiv: gr-gc/0306122].
- *169. “Extended lifetime in computational evolution of black holes” (Matthew Anderson and Richard A. Matzner) *Foundations of Physics* **35** (9) 1477 (2005) [arXiv: gr-gc/0307055].
- *170. “Hyperbolicity and Constrained Evolution in Linearized Gravity” *Physical Review* **D71** 024011 (2005) [arXiv: gr-gc/0408003].
- *171. “Spin Dependence in Computational Black-Hole Data” (Scott H. Hawley, Michael J. Vitalo, and Richard A. Matzner) *Phys. Rev.* (submitted, 2006) [arXiv:gr-qc/0604100].
- *172. “Intercommutation of Semi-Local Strings and Skyrmions” (Pablo Laguna, Vishnu Natchu, Richard A. Matzner, and Tanmay Vachaspati) *Phys. Rev. Lett.* **98** 041602 (2007) [arXiv:hep-th/0604177], (Cover article, 26 January 2007).
- *173. “Probing Gravity in NEO with High-Accuracy Laser-Ranged Test Masses” (A. Bosco, C. Cantone, S. Dell’Agnello, G. O. delle Monache, W. A. Franceschi, M. Garattini, T. Napolitano, I. Ciufolini, S. Negri, A. Agneni, F. Graziani, P. Ialongo, A. Lucantoni, A. Paolozzi, I. Peroni, G. Sindoni, G. Bellettini, R. Tauraso, E. C. Pavlis, D.G. Currie D.P. Rubincam D. A. Arnold R. A. Matzner and V. J. Slabinski) *International Journal of Modern Physics D* (in press 2006). Presented by S. Dell’Agnello at the Quantum to Cosmos NASA International Workshop, Warrenton, VA (USA), May 2006.
- *174. “Gravitational Radiational Recoil from Spinning Binary Black Hole Mergers” (Frank Herrmann, Ian Hinder, Deirdre Shoemaker, Pablo Laguna Richard A. Matzner) *AstroPhys. Jour.* **661**, 430-436(20 May 2007) [arXiv:gr-qc/0701143].
- *175. “High order convergent multigrid methods on domains containing holes for black hole initial data” (Vishnu Natchu and Richard A. Matzner), *Classical and Quantum Gravity* (submitted, 2007) [arXiv:0705.14 [gr-qc]].
- *176. “Binary Black Holes: Spin Dynamics and Gravitational Recoil” (Frank Herrmann, Ian Hinder, Deirdre Shoemaker, Pablo Laguna Richard A. Matzner) *Phys. Rev.* **D76** 084032 (2007)[<http://arxiv.org/a/gr-qc>].
- *177. “High-Order Pulsar Timing For Navigation” S. Sheikh, R. Hellings, Richard A. Matzner Institute of Navigation Publications (in press 2007).
- *178. “Second-Order in Pulsar Timing: Theory and Code Implementation”, S. Sheikh, R. Hellings, Richard A. Matzner in preparation (2007).
- *179. “Area Invariance of Apparent Horizons under Arbitrary Boosts” Sarp Akcay, Richard A. Matzner; arXiv:0708.0276 (gr-qc), (2007).

- *180. “The Design of LARES: a Satellite for Testing General Relativity”, Ignazio Ciufolini, Antonio Paolozzi, Simone Dell’Agnello, Isidoro Peroni, Filippo Graziani, Giampiero Sindoni, Claudio Paris, Cristian Vendittozzi, Paolo Ialongo, Chiara Cerruti, Alessandro Lucantoni, Alessandro Boni, Claudio Cantone, Giovanni Delle Monache, Alberto Franceschi, Tommaso Napolitano, Nicola Intaglietta, Manuele Martini, Marco Garattini, Giovanni Bellettini, Roberto Tauraso, Laura Caputo, Francesco Passeggio, Francesco Longobardo, Erricos Pavlis, Richard Matzner, David P. Rubincam, Douglas Currie, Victor J. Slabinski, David. A. Arnold; paper IAC-07-B4.2.07 in proceedings of *58th International Astronautical Congress , Hyderabad, India, 24 - 28 September 2007*.
- *181. “The Volume Inside a Black Hole” Brandon S. DiNunno, Richard A. Matzner, *Am. Jour. Phys.* (submitted, 2008); arXiv:0801.1734

Web-Published Meeting Proceedings:

1. “Astrophysical Black Holes” (report of Los Alamos meeting, February 3-4, 1997):
<http://www.npac.syr.edu/projects/bh/TALKS/LOS-ALAMOS>
2. “Binary Black Hole Meeting” (report on Los Alamos meeting, October 13-15, 1997):
<http://www.npac.syr.edu/projects/bh/TALKS/LOS-ALAMOS-2/menu.html>
3. “Numerical Relativity Workshop 2005”
(report on a meeting at the Goddard Space Flight Center, November 2-4 2005)
(Scott H. Hawley and Richard A. Matzner), in *Matters of Gravity* Number 27 Spring 2006

Video/Film:

1. “Interaction of Antialigned Cosmic Strings,” (Richard A. Matzner), Motion Picture Video, National Center for Supercomputing Applications, University of Illinois, Urbana-Champaign (1987).
2. “Interaction of Cosmic Strings,” (Richard A. Matzner), Motion Picture Video, National Center for Supercomputing Applications, University of Illinois, Urbana-Champaign (1988).
3. *Segment of* “Interaction of Cosmic Strings,” (Richard A. Matzner), Motion Picture Video, appeared with credit in *Final Approach*, a film by Eric Steven Stahl, Filmquest Pictures (1991). (This film starred James B. Sikking, Hector Elizondo, and Kevin McCarthy; the film won the *Golden Scroll* award.)
4. “Interaction of 3-D Cosmic Strings,” (Richard A. Matzner), video segment in *Computer Dreams*, a one-hour feature presentation broadcast by Public Broadcasting Service (May 1989) (feature produced by Digital Vision Entertainment, Los Angeles, California).²
5. “Bosonic Superconducting String Interactions,” (P. Laguna and Richard A. Matzner), Motion Picture Video, Center for Relativity, The University of Texas at Austin (1989).
6. “Charge and Current on Superconducting Cosmic Strings,” (P. Laguna and Richard A. Matzner), Motion Picture Video, Center for Relativity, The University of Texas at Austin (1990).

²Video on display at Museum of Science and Industry, Los Angeles, CA (Feb.–July 1990).

Cover Graphics:

1. Cover design (Richard A. Matzner) for *Cosmic Strings, the Current Status (Proceedings of Yale Conference on Cosmic Strings)*, Frank Accetta and Lawrence Krause, eds. (World Scientific, Singapore, 1988).
2. Cover design for *1997 Cray Directory of Cray Sponsored University Research and Development Grants*, based on artwork from Matzner et al, *Science*, **220**, p. 941 (1995).
3. “Skyrmion Cosmic Strings after Collision” (Pablo Laguna, Vishnu Natchu, Richard A., Matzner and Tanmay Vachaspati), Cover Illustration, *Physical Review Letters* **98**, Number 4 (26 January 2007).

Books:

1. *Spacetime and Geometry*, Alfred Schild Lectures, eds., R. Matzner and L. Shepley (U.T. Press, 1982).
2. *Scattering From Black Holes*, J. A. H. Futterman, F. A. Handler and R. Matzner (Cambridge University Press, Cambridge, 1988).
3. *Classical Mechanics*, R. A. Matzner and L. C. Shepley (Prentice Hall, Englewood Cliffs, New Jersey, 1991).
4. *Dictionary of Geophysics Astrophysics, and Astronomy*, Richard A. Matzner, editor (CRC Press, Boca Raton, 2001) (also available at <http://www.CRCnetBASE.com/ENGnetBASE>).³

Locally published meeting proceedings:

1. *Texas Symposium on 3-Dimensional Numerical Relativity*, ed. R. Matzner (Relativity Center, The University of Texas, Austin, 1990).
2. *Second Texas Symposium on 3-Dimensional Numerical Relativity*, ed. R. Matzner (Relativity Center, The University of Texas, Austin, 1991).
3. *Third Texas Workshop on 3-dimensional Numerical Relativity: The Binary Black Hole Grand Challenge*, ed. R. Matzner (Relativity Center, The University of Texas, Austin, 1996).

Chapters in Books:

Chapter 2: “Demythologizing the Black Hole” (Richard Matzner, Tsvi Piran, and Tony Rothman), in *Frontiers of Modern Physics*, Tony Rothman, ed. (Dover Publications, New York, 1985), pp. 21–47 [Reprint of popular article #5 below].

Chapter 3: “Grand Illusions: Further Conversations on the Edge of Spacetime” (Richard Matzner, Tony Rothman, and Bill Unruh), in *Frontiers of Modern Physics* (Dover Publications, New York, 1985), pp. 49–81.

³This book won the 2002 Award “Outstanding Academic Title” by *Choice* magazine, a publication of the American Library Association. Selections are made based on “their excellence in scholarship and presentation, the significance of their contribution to the field, and their value as an important — often the first — treatment of their subject.”

Chapter 4: “The New Neutrinos” (Richard Matzner and Tony Rothman), in *Frontiers of Modern Physics* (Dover Publications, New York, 1985), pp. 87–105.

“Professor Wheeler and the Crack of Doom,” (A. Mezzacappa and Richard A. Matzner) in *Between Quantum and Cosmos*, W. Miller and W. Zurek, eds., (Princeton University Press, Princeton, 1988).

Chapter 6: “Demythologizing the Black Hole” (Richard Matzner, Tsvi Piran, and Tony Rothman), in *Analog Essays in Science*, Stanley Schmidt, ed., (Wiley Science Publications, New York, 1990) [Reprint of popular article #5 below], pp. 61–83.

Chapter 7: “Alternate Cosmologies” (T. Rothman, G. F. R. Ellis, and Richard Matzner), in *A Physicist on Madison Avenue*, by T. Rothman, (Princeton University Press, Princeton, 1991).

Macmillan Encyclopedia of Physics, *Black Hole; Black Hole, Schwarzschild; Black Hole, Kerr; Time; Spinor; Isothermal Process* (Richard A. Matzner) Macmillan Publishing USA (New York, NY, 1997), pp. 101-117.

Popular Articles:

1. “A Relativity Experiment Refurbished,” (Bryce S. DeWitt, Richard A. Matzner and A. H. Mikesell), *Sky and Telescope* **47**, 301 (May 1974).
2. “Testing Relativity in the Desert,” (Richard Matzner), *The Physics Teacher* (April 1975).
3. “Closing the Back Door Ahead of Yourself: Instabilities of Black Holes,” (Richard Matzner), *McDonald Observatory News*, Vol. VII, No. 5 (May 1979).
4. “The Cosmic Ether, 1865 to 1979,” *McDonald Observatory News*, Vol. VIII, No. 4 (April 1980).
5. “Demythologizing the Black Hole,” (Richard Matzner, Tsvi Piran and Tony Rothman), *Analog Science Fiction–Science Fact*, Vol. C, No. 9, p. 33 (September 1980). Reprinted in *Frontiers of Modern Physics*, (Dover Publications, New York, 1985).
6. “The Vanishing Black Hole,” (Richard Matzner and Tony Rothman), *McDonald Observatory News*, Vol. VIII, No. 10 (October 1980).
7. “The New Neutrinos,” (Richard Matzner and Tony Rothman), *Analog Science Fiction–Science Fact*, Vol. CI, No. 6, p. 43 (May 25, 1981). Reprinted in *Frontiers of Modern Physics*, (Dover Publications, New York, 1985).
8. “Naked Singularities Raise Questions Over General Relativity,” (Richard A. Matzner), *Physics World* **4**, No. 6 (June 1991).

Book Reviews:

1. *Gravity, Black Holes and the Universe*, by Iain Nicolson, *American Scientist* **70**, 312 (May-June 1982).
2. *Origin and Evolution of Galaxies*, *International Journal of General Relativity and Gravitation* **16**, 603 (1984).

3. *Dynamics*, by S. Niel Rasband, (Wiley-Interscience, New York, 1983), *Foundations of Physics* **15**, 821 (1985).
4. *Introduction to Special Relativity, 2nd edition* by Wolfgang Rindler, (Clarendon Press, Oxford 1991), *Foundations of Physics* **23**, 1617 (1993).
5. *The Vindication of the Big Bang* by Barry Parker, (Plenum Press, New York 1993), *American Scientist* (January–February 1995, p. 82).
6. *From Electrostatics to Optics: A Concise Electrodynamics Course* by Gúnter Scharf (Springer-Verlog, New York 1994) *American Journal of Physics* **63** (10), 959 (October 1995).
7. *Gravitation and Inertia* by Ignazio Ciufolini and John Archibald Wheeler (Princeton University Press, Princeton, 1995) *American Journal of Physics* **84**, 600 (November-December 1996).
8. *Renaissance of General Relativity and Cosmology*, G. Ellis, A. Lanza, J. Miller, eds. (Cambridge University Press, 1993) *Foundations of Physics* **26** (9) 1263 (September, 1996).
9. “Black Holes–Gravitational Interactions,” review of monograph by P.D. d’Eath, *Bulletin of the American Mathematical Society*, **35** #2, 189 (April 1998).
10. *Black Hole Horizons*, review of *Black Holes and Relativistic Stars*, R.M. Wald, ed. (University of Chicago Press), *Science* **282** 1651 (November 27, 1998).