

## CURRICULUM VITAE

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**Birthdate:** May 30, 1925  
**Birthplace:** Rochester, New York

**Education:**

Ph.D. Physics	Syracuse University	1952
M.A. Physics	Syracuse University	1950
B.S. Physics	University of Rochester	1947

### MEMBERSHIP IN PROFESSIONAL AND LEARNED SOCIETIES

- \* International Society for General Relativity and Gravitation
- \* American Physical Society
- \* American Association for the Advancement of Science
- \* Federation of American Scientists
- \* Sigma Xi

### OTHER PROFESSIONAL EXPERIENCES

- \* International Committee of the International Society for General Relativity and Gravitation  
1983-1992
- \* Editorial Board, Journal of Mathematics and Physics
- \* Editorial Board of Einstein Centenary, "General Relativity and Gravitation, 100 Years After the Birth of Albert Einstein", 1977-1979

### CURRENT RESEARCH INTERESTS

**General Relativity:** Conservation Laws, Equations of Motion, Twistors, and Quantum General Relativity

**Special Relativity:** Equations of Motion, Gauge Theories

## PROFESSIONAL EMPLOYMENT

1963-present	Professor of Physics, Syracuse University
1993	Visiting Professor, King's College University of London, England
1989	Visiting Professor, King's College University of London, England (Summer 1989)
1983-1984	Visiting Professor, University of Paris VI, Institut Henri Poincaé
1975-1982	Chairman, Department of Physics, Syracuse University
1970-1971	Visiting Professor, The Technion, Haifa, Israel
1962-1963	Adjunct Professor of Physics, University of Cincinnati (taught special and general relativity)
1962-1963	Senior Scientist, Aerospace Research Laboratories, Wright-Patterson Air Force Base, Ohio
1960-1961	National Science Foundation Senior Postdoctoral Fellow, Kings College London, England (research on gravitation)
1958-1959	Lecturer, Wright-Patterson AFB Extension, Ohio State University, (graduate level classical mechanics)
1956-1962	Research Physicist, Aerospace Research Laboratories, Wright Patterson AFB, Ohio (Research on relativistic theories of gravitation and to administer a limited number of contracts in related areas of research)
1952-1956	Research Physicist, Armour Research Foundation, Chicago, Illinois (various applied research projects for industry and government)
1950-1952	Research Assistant, Syracuse University

## HONORS AND OFFICES

- \* Travel and Support Grant from the Science and Engineering Research Council of Great Britain 1992-93
- \* Grant from Centre National de la Reserche Scientifique for an extended visit to Université de Paris-sud, December, 1993.
- \* Travel and Support Grant from the Science and Engineering Research Council of Great Britain, 1989-1990
- \* Outstanding Performance Rating Award, Wright-Patterson Air Force Base, Ohio, 1959
- \* Senior Postdoctoral Fellowship, National Science Foundation, 1960-1961
- \* Congressional appointment under Public Law 313, Senior Scientist, Wright-Patterson Air Force Base, Ohio, 1962-1963
- \* President, Syracuse Chapter AAUP, 1973-1974
- \* Member International Committee of GRG, 1983-1992

## BIBLIOGRAPHY

1. Electric Resonance Transitions in a Tapered Electric Field, *Phys. Rev.* **89**, 278, (1953) with P. G. Bergmann and J. Trischka.
2. Strong Conservation Laws and Equations of Motion in Covariant Field Theories, *Phys. Rev.* **89**, 263, (1953).
3. Gravitational Radiation, *Phys. Rev.* **99**, 1873, (1955).
4. Conservation Laws in General Relativity, *Phys. Rev.* **111**, 315, (1958).
5. The Measurement of Distance in General Relativity, *Phys. Rev.* **114**, 1391, (1950) with E. T. Newman.
6. Conservation Laws and Equations of Motion, Conference on the Relativistic Theories of Gravitation, published in *Les Theories de la Gravitation* (Centre National de la Recherche Scientifique, Paris, 1962).
7. Measurement of Distance, Conference on General Relativity, Brussels, Belgium, June, 1959, published in *Colloque sur la Théorie de la Relativité* (Centre Belge de Recherche Mathématique, 1960) with E. T. Newman.
8. Some Applications of the Infinitesimal-holonomy Group, *J. J. Math. Phys.* **2**, 317, (1961) with R. P. Kerr.
9. Einstein Spaces with Four-parameter Holonomy Groups, *J. Math. Phys.* **2**, 332, (1961) with R. P. Kerr.
10. Equations of Motion, in *Gravitation*, ed. L. Witten (John Wiley and Sons, New York, 1962).
11. Dynamical Variables and Surface Integrals, in *Recent Developments in Relativity*, (PWN, Warsaw and Pergamon Press, New York, 1962).
12. A Theorem on Petrov Type, *Acta Physica Polonica*, Supp. **22**, 13 (1962), with R. K. Sachs.
13. Equations of Motion of Point Masses in the General Theory of Relativity, *Phys. Rev.* **128**, 398 (1962) with Peter Havas.
14. Asymptotic Invariants in a Gravitational Radiation Field, *Phys. Rev.* **131**, 1367 (1963).
15. Asymptotic Properties of the Electromagnetic Field, *J. Math. Phys.* **5**, 172 (1964) with R. P. Kerr.
16. Electromagnetic Radiation, in *Perspectives in Geometry and Relativity*, (Essays in Honor of Vaclav Hlavaty), ed. Banesh Hoffman (Indiana University Press, Bloomington, Indiana, 1966).
17. Gravitation, *Encyclopedia of Physics*, 297, ff, ed. P. M. Besancon (Reinhold Publishing Corporation, New York, 1966).
18. Spin-s Spherical Harmonics, *J. Math. Phys.* **8**, 2155 (1967) with A. Macfarlane, E. T. Newman, F. Rohrlich, and E. C. G. Sudarshan.
19. Invariant Transformations and Newman-Penrose Constants, *J. Math. Phys.* **8**, 2161, (1967).
20. Green's Theorem and Invariant Transformations, *J. Math. Phys.* **9**, 674 (1968).
21. A Generalization of Green's Theorem, *J. Math. Phys.* **10**, 369 (1969) with E. T. Newman.
22. Newman-Penrose Constants and their Invariant Transformations, *J. Math. Phys.* **11**, (1970) with E. N. Glass.
23. Equations of Motion in General Relativity, in *Relativity and Gravitation*, ed. C. G. Kuper and A. Peres, (Gordon and Breach, New York, 1971).
24. Conservation of the Newman-Penrose Conserved Quantities, *Phys. Rev. Lett.* **28**, 1400 (1972).
25. Gravitation, *The Encyclopedia of Physics*, (Reinhold Publishing Company, 1972).

26. The Positivity Conditions in General Relativity, *International Journal of Theor. Phys.* **7**, 31, (1973), with F. Klotz.
27. Conservation Equations and Equations of Motion in the Null Formalism, *GRG* **5**, 183 (1974).
28. Canonical Quantization, in *General Relativity and Gravitation, Proceedings of the Seventh International Conference*, GR7, ed. G. Shaviv and J. Rosen, (John Wiley and Sons, New York, 1974).
29. Comments on Gravitational Radiation Damping and Energy Loss in Binary Systems, *Astrophys. J.* **208**, L77-L81, (September, 1976) with J. Ehlers, A. Rosenblum, and P. Havas.
30. Equations of Motion in the Null Formalism, *GRG* **7**, (1976) with Pantur Silaban.
31. Interactions between 'tHooft-Polyakov Monopoles, *Phys. Rev.* **D18**, 542, (1978) with P. S. Jang, S. Y. Park, and K. C. Wali.
32. Self-Dual Gauge Fields and Space-Times, in *Group Theoretical Methods in Physics*, ed. J. Plebanski, (World Scientific, Singapore, 1979).
33. Invariant Transformations, Conservation Laws, and Energy-Momentum, in *General Relativity and Gravitation, One Hundred Years after the Birth of Albert Einstein*, ed. A. Held (Plenum Press, New York, 1980).
34. Self-Dual Fields, Cosmology and Gravitation, ed. P. G. Bergmann, and V. DeSabbata, *NATO Advanced Study Institute Series*, vol. 58 (Plenum Press, New York, 1980).
35. Constraint Dynamics of Particle World Lines, *Phys. Rev.* **D23**, 2231, (1981) with E. C. G. Sudarshan and N. Mukunda.
36. Relativistically Interacting Particles and World Lines, *Phys. Rev.* **D23**, 2231, (1981), with E. C. G. Sudarshan and N. Mukunda.
37. Limiting Behavior of Asymptotically Flat Gravitational Fields, *GRG* **13**, 79 (1981) with S. Novak.
38. Conformal Properties of Nonpeeling Vacuum Space-Times, *GRG* **14**, 655 (1982) with S. Novak.
39. Algebraic Coordinate Conditions in Classical General Relativity, ed. W. B. Bonnor, J. N. Islam, and M. A. H. MacCallum, (Cambridge University Press, Cambridge, 1984).
40. Developments and Predictions in *Journes Relativiste*, ed. P. Tourrenc, (CNRS, Paris, 1984).
41. The Hamiltonian of General Relativity on a Null Surface, *Found. of Phys.* **14**, 439 (1985).
42. Canonical Formalism on a Null Surface, *Phys. Rev.* **D31**, 1354 (1985) with R. Nagarajan.
43. Dirac Brackets for General Relativity on A Null Cone, *Found. of Phys.* **15**, 439 (1985).
44. Null Cone Canonical Formalism in, *Marcel Grossmann Meeting on General Relativity*, et. R. Ruffini, (Elsevier Publishers, B. V., 1986).
45. Surface Integrals Associated with the Canonical Formalism on a Null Surface in *Gravitational Collapse and Relativity*, et. H. Sato and T. Nakamura, (World Scientific, Singapore, 1986).
46. D-Invariance on a Null Surface in *Gravitation and Geometry*, ed. W. Rindler and A. Trautman, (Bibliopolis, Naples, 1987).
47. Particle Motion and Continua in General Relativity, in *General Relativity and Gravitation*, GR **11**, et., M. A. H. MacCallum, (Cambridge University Press, Cambridge, 1987).
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49. A Hamiltonian Approach to the Strong Gravity Limit, *GRG* **20**, 881, (1988).
50. Conserved Quantities at Spatial and Null Infinity: The Penrose Potential, *Phys. Rev.* **D41**, 410 (1990).

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54. On Hamiltonian Systems with first class constraints, J. Math. Phys. 32, 2739 (1991). with E. T. Newman and C. Rovelli.
55. Quantized self-dual Maxwell field on a null surface, Geom. and Phys., 8, 163 (1992).
56. Null hypersurfaces and new variables, Class. and Quantum Grav. with D. C. Robinson and C. Soteriou.
57. Air Force Support of General Relativity 1956-72, in Studies in the History of General Relativity, et. J. Eisenstadt and A.J. Knox (Birkhäuser, Boston, 1992).
58. Degeneracy in Loop Variables, Comm. Math. Phys. 148, 377 (1992) with J. Lewandowski and C. Stornaiolo.
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60. Self-duality and Null Surfaces in Aspects of General Relativity and Mathematical Physics - in celebration of the 65th Birthday of Professor Jerzy Plebanski, ed. N. Bretón, R. Capovilla, and T. Matos (Centro de Investigacion y de Estudios Avanzados del I.P.N., Mexico City 1994).
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