

# 1 Biography

- 1963 B.Sc., University of Auckland, New Zealand
- 1964 M.Sc. (Mathematics), University of Auckland, New Zealand
- 1968 Ph.D. (Physics), Syracuse University, United States
- 1968-1970: U.S. National Academy of Sciences (N.R.C.) postdoctoral research associate, Aerospace Research Laboratories, Dayton Ohio
- 1970-78: Lecturer in Applied Mathematics, Mathematics Department, King's College London
- 1978-1996: Reader in Applied Mathematics, Mathematics Department, King's College London
- 1993-1996: Head of Mathematics Department, King's College London
- 1996-2001: Professor of Mathematics, Mathematics Department, King's College London
- 2001-present: Emeritus Professor of Mathematics, King's College, London

# 2 Publications and arXiv papers

- Conserved quantities of Newman and Penrose, *Journal of Mathematical Physics*, **10**, 1745-1753 (1969)
- An observable peculiarity of the Brans-Dicke radiation zone, (co-author: J Winicour), *Physical Review Letters*, **22**, 198-200 (1969)
- Comments on Einstein scalar solutions (co-authors: A Janis & J Winicour), *Physical Review*, **186**, 1729-1731 (1969)
- Can the energy of a weak gravitational field become negative? (co-author: J Winicour), *Physical Review D*, **3**, 840-845 (1971)
- Scaling behaviour of gravitational energy, (co-author: J Winicour), *Journal of Mathematical Physics*, **12**, 995-999 (1971)

- The possibility of negative gravitational energy, (co-author: J Winicour), *General Relativity & Gravitation*, **3**, 325-329 (1972)
- Energy of gravitational shock waves, (co-author J Winicour), *Journal of Mathematical Physics*, **13**, 1435-1441 (1972)
- Black holes in static vacuum space-times, (co-authors: H Muller zum Hagen and H J Seifert), *General Relativity & Gravitation*, **4**, 53-78 (1973).
- Classification of black holes with electromagnetic fields, *Physical Review D*, **10**, 458-460 (1974)
- Black holes in static electrovac space-times, (co-authors: H Muller zum Hagen and H J Seifert), *General Relativity & Gravitation*, **5**, 61-72 (1974)
- Uniqueness of the Kerr black hole, *Physical Review Letters*, **34**, 905-906 (1975)
- Applications of variational principles to classical perturbation theory in general relativity. *Mathematical Proceedings Cambridge Philosophical Society* **78**, 351-356 (1975)
- Imbedding the G-string, published as New embedding model of general relativity, (co-authors: F A E Pirani and S Deser), *Physical Review D*, **14**, 3301-3303 (1976)
- The soliton connection, (co-authors: M Crampin and F A E Pirani), *Letters in Mathematical Physics*, **2**, 15-19 (1977)
- A simple proof of the generalization of Israel's theorem, *General Relativity & Gravitation*, **8**, 695-698 (1977)
- Sur la definition des transformations de Bäcklund, (co-author: F A E Pirani), *Comptes rendus de l'Académie des sciences Paris, Série A* , **285**, 581-583 (1977)
- 2-manifolds of constant curvature, 3 parameter isometry groups and Bäcklund transformations, (co-authors: M Crampin, L Hodgkin & P McCarthy), *Reports in Mathematical Physics*, **17**, 3, 373-383 ((1980)

- Reprint of: Uniqueness of the Kerr black hole, *Black holes: Selected Reprints*, ed. S Detweiler, (American Association of Physics Teachers, pp110-111, 1982)
- Reprint of: Uniqueness of the Kerr black hole, *Gravitational Collapse and Black Holes: Series of Selected Papers in Physics*", eds. H Sato and K Tomita, (Physical Society of Japan, pp189-190, 1982)
- A nilpotent prolongation of the Robinson-Trautman equation, (co-author: E N Glass), *Journal of Mathematical Physics*, **25**, 3382-3386, (1984)
- Some real and complex solutions of Einsteins equations, *General Relativity & Gravitation*, **19**, 693-698 (1987)
- Half flat solutions of Einsteins equations and hyper Kahler structures; in *New Perspectives in Canonical Gravity*, ed. A Ashtekar, (Bibliopolis, Naples, pp187-, 1988).
- A first order formalism for metric curvature calculations, *Classical & Quantum Gravity*, **6**, L121-L124 (1989)
- Normal Coordinates and Adapted Frames, *General Relativity & Gravitation*, **22**, 525-538 (1990)
- Ashtekar's new variables and the vacuum constraints equations, (co-author: C Soteriou), *Classical & Quantum Gravity*, **7**, L247-L250 (1990)
- Four dimensional conformal and quaternionic structures, *Journal of Mathematical Physics*, **32**, 1259-1262 (1991)
- A canonical formalism with self dual Maxwell field on a null surface, (co-authors: J N Goldberg and C Soteriou), in *9th Italian Conference on General Relativity and Gravitational Physics*, eds. R. Cianci et al, (World Scientific, Singapore, 1991)
- Null Surface Canonical Formalism, (co-authors: J N Goldberg and C Soteriou), in *Gravitation and Modern Cosmology*, eds. A Zichichi et al, (Plenum Press, New York and London, 1991)
- Null Hypersurfaces and New Variables, (co-authors: J N Goldberg and C Soteriou), *Classical & Quantum Gravity*, **9**, 1309-1328 (1992)

- Observables in General Relativity, (co-author: J N Goldberg), *Acta Physica Polonica A*, **85**, 677-684 (1994)
- Linearized Constraints in the Connection Representation: Hamilton-Jacobi Solution, (co-author: J N Goldberg), *Physical Review D*, **50**, 6338-6343 (1994)
- A  $GL(2,C)$  formulation of Einstein-Maxwell theory, *Classical & Quantum Gravity*, **11**, L157-L161 (1994)
- Differential Forms, Spin 3/2 Fields and Einstein's Equations, *General Relativity & Gravitation*, **27**, 679-689 (1995)
- A Lagrangian Formalism for the Einstein -Yang -Mills Equations, *Journal of Mathematical Physics*, **36**, 3733-3742 (1995)
- Spinor-Valued Forms and a Variational Principle for Einstein's Vacuum Field Equations, *Classical & Quantum Gravity*, **13**, 307-315 (1996)
- The Griffiths-Bryant Algorithm and the Dirac Theory of Constraints, (co-author W F Shadwick) in *Mechanics Day, Fields Institute Communications* **7**, eds. W F Shadwick et al, (American Mathematical Society, Providence, Rhode Island, pp 189-205, 1996)
- Einstein's Equations and Associated Linear Systems, (co-author: L McCulloch), *General Relativity & Gravitation*, **29**, 1445-61 (1997)
- Null Surface Canonical Formalism, (co-author: J N Goldberg), *Acta Physica Polonica B*, **29**, 849-858, (1998)
- Chiral Actions and Einstein's Vacuum Equations, *International Journal of Theoretical Physics*, **37**,2067-2078, (1998)
- Extending half flat metrics, *Twistor Newsletter*, **44**, 10-11 (1998)
- Extensions of bundles of null directions, (co-authors: P Nurowski & L P Hughston), *Classical & Quantum Gravity*, **16**, 255-279 ( (1999)
- A  $GL(2,C)$  extension of the Tung-Jacobson chiral quadratic spinor Lagrangian, (co-author: L McCulloch), *Classical & Quantum Gravity*, **17**, 903-906 (2000)

- Intrinsic geometry of a null hypersurface, (co-author: P Nurowski), *Classical & Quantum Gravity*, **17**, 4065-4084 (2000)
- Real Lorentzian metrics from complex, half flat solutions, *Twistor Newsletter*, **45**, 32-35 (2000)
- Generalised exterior forms, geometry and space-time, (co-author: P Nurowski), *Classical & Quantum Gravity*, **18**, L81-L86 (2001)
- The real geometry of holomorphic 4-metrics, *Journal of Mathematical Physics*, **43**, 2015-2028 (2002)
- Holomorphic 4-Metrics and Lorentzian Structures, *General Relativity & Gravitation*, **34**, 1173-1191 (2002)
- Generalized forms and their applications, (co-author: P Nurowski), *Classical & Quantum Gravity*, **19**, 2425-2436 (2002)
- Lorentzian metrics from holomorphic metrics, in *Proceedings of the Ninth Marcel Grossmann Meeting on General Relativity, Vol 2*, eds. V Gurzadyan V et al (World Scientific, Singapore, pp810-812, 2002)
- Fuzzy-pp waves, (co-authors: J Madore, M Maceda), <http://arxiv.org/abs/hep-th/0207225>, (2002)
- Generalized forms and Einstein's equations, *Journal of Mathematical Physics*, **44**, 2094-2110 (2003)
- Geometry, Null Hypersurfaces and New Variables, in *Revisiting the Foundations of Relativistic Physics. Festschrift in honour of John Stachel*, eds. A Ashtekar et al (Kluwer Academic Publishers, pp349-360, 2003)
- Generalized forms, connections and gauge theories, *International Journal of Theoretical Physics*, **42**, (12), 2971-2981 (2003)
- Non-gravitating waves, *General Relativity & Gravitation*, **38**, 153-157, (2006)
- A comment on generating Einstein-scalar solutions, *Classical & Quantum Gravity*, **23**, 5455-5457 (2006)

- Generalized differential forms, *Journal of Physics A: Math. Theor.*, **40**, 8903-8922 (2007)
- Four Decades of Black Hole Uniqueness Theorems; in *Kerr Spacetime: Rotating Black Holes in General Relativity*, eds. D L Wiltshire, M Visser & S M Scott, (Cambridge University Press, pp115-143, 2009)
- Generalized forms, Chern-Simons and Einstein-Yang-Mills theory, *Classical & Quantum Gravity*, **26**, 075019 (14pp) (2009)
- Introduction to the Goldberg Festschrift (coauthor: E.N.Glass), in a special issue (eds. E.N.Glass & D.C.Robinson) of *General Relativity & Gravitation*, **43**, 12, 3239-3241 ( 2011)
- Generalized forms, vector fields and superspace, [http://arxiv.org/1309.4607 v.1](http://arxiv.org/1309.4607v.1) (2013)
- Generalized forms and gravitation, [http://arxiv.org/1312.0846 v.1](http://arxiv.org/1312.0846v.1) (2013)
- Generalized Chern-Simons action principles for gravity [http://arxiv.org/1506.09090v1\(2015\)](http://arxiv.org/1506.09090v1(2015))

### Monograph

- Local jet bundle formulation of Backlund transformations, (co-authors: F A E Pirani & W F Shadwick), *Mathematical Physics Studies 1*, (Reidel, 1979)

## 3 Other research reports

- PhD dissertation: Conserved quantities in asymptotically flat spacetime, Syracuse University, Syracuse, NY, USA; US Doctoral theses order number: Physics 69-8649 (1968)
- Must a Static Perfect Fluid be Spherically Symmetric? (1976)
- Finding Lagrangians and Hamiltonians (1993)
- Addendum to Generalized forms, Chern-Simons and Einstein-Yang-Mills theory (2010)
- A superspace approach to generalized forms and vector fields (2011).
- Gravity and General Relativity at King's (2011)