

# James A. Isenberg

## Curriculum Vitae

### Title:

Professor, Department of Mathematics  
Director, Institute of Theoretical Science

### Address:

Department of Mathematics  
University of Oregon  
Eugene, Oregon 97403-5203  
Phone Number: (541) 346-4725  
isenberg@uoregon.edu

### Education:

- PhD: May 1979 University of Maryland (1973-1979) (Major-Physics)
- AB: June 1973 Princeton University (1969-1973) (Major-Physics, summa cum laude)
- High School, June 1969 Plymouth-Whitemarsh H. School (Plymouth Meeting, PA), (valedictorian)

### Dissertations:

Ph.D.           “Construction of Spacetimes from Initial Data”  
AB              “Mach’s Principle Made Practical”

### Academic Positions:

**1993-present** Professor, Department of Mathematics, University of Oregon, Eugene.

**1987-1993** Associate Professor, Department of Mathematics, University of Oregon, Eugene.

**1982-87** Assistant Professor, Department of Mathematics, University of Oregon, Eugene.

**1980-82** Post-Doctoral Fellow and Instructor, Department of Mathematics, University of California, Berkeley.

**1979-80** Post-Doctoral Fellow and Instructor, Department of Applied Mathematics, University of Waterloo.

**1977-79** Research Assistant, Department of Physics, University of Maryland, (Dr. Charles Misner).

**1977** Teaching Assistant, Department of Physics, University of Maryland, (Dr. J. Layman).

**1974-77** NSF Pre-Doctoral Fellow, Department of Physics, University of Maryland, (Dr. Charles Misner).

**1973-75** Centre for Theoretical Physics Fellow, Department of Physics, University of Maryland, (Dr. Charles Misner).

## **Research and Visiting Positions**

**2008** visiting Research Fellow, Mittag-Leffler Institute, Stockholm, Sweden.

**2007** Visiting Research Fellow, Albert Einstein Institute, Potsdam, Germany.

**2007** Visiting Professor, Institut des Hautes Études Scientifiques, Paris, France.

**2005** Visiting Research Fellow, Isaac Newton Institute, Cambridge, England.

**2004** Visiting Professor, Institut des Hautes Études Scientifiques, Paris, France.

**2003** Visiting Professor, Department of Physics, California Institute of Technology.

**2003** Visiting Professor, Department of Mathematics, University of California, San Diego.

**2002** Visiting Professor, Department of Mathematics, Stanford University.

**1999** Program Coordinator, Institute of Theoretical Physics, University of California, Santa Barbara.

**1998-1999** Visiting Professor, Department of Mathematics, University of Washington.

**1996** Visiting Research Fellow, Albert Einstein Institute, Potsdam, Germany.

**1996** Invited Visiting Professor, Department of Mathematics, University de Tours, France.

**1994** Visiting Research Fellow, Erwin Schroedinger Institute, Vienna, Austria.

**1993** Visiting Research Fellow, Institute of Theoretical Physics, University of California, Santa Barbara.

**1989** Visiting Associate Professor, Department of Mathematics, University of California, San Diego.

**1988** Visiting Research Fellow, Centre for Mathematics Analysis, Australian National University.

- 1986** Visiting Research Fellow, Department of Mechanics and CNRS, Paris VI, France.
- 1985** Visiting Assistant Professor, Department of Mathematics, University of Minnesota.
- 1983-84** Visiting Assistant Professor, Department of Mathematics, Rice University.
- 1976** Visiting Researcher, Mathematics Institute, Oxford University, (Dr. Roger Penrose).
- 1975** Visiting Researcher, Fermi Institute, University of Chicago, (Dr. Robert Geroch).
- 1972** Student Trainee, Holography Lab, Koninklijk Shell Laboratorium, Amsterdam, Holland, (Dr. A. Godefroy).

## **Offices Held**

- 2008-2012** Editorial Board, Classical and Quantum Gravity
- 2006-2009** Editorial Board, Physical Review D
- 2004-present** Director, Institute for Theoretical Science (University of Oregon)
- 2004-2013** Committee of the International Society of General Relativity and Gravitation
- 2004-2005** Chair of Topical Group in Gravity (American Physical Society).
- 2003-2004** Chair-Elect of Topical Group in Gravity (American Physical Society).
- 2002-2003** Vice Chair of Topical Group in Gravity (American Physical Society).
- 1996-1999** Secretary-Treasurer of Topical Group in Gravity (American Physical Society).

## **Honors and Awards**

- 2001** Fellow of the American Physical Society
- 1996** Distinguished Professor (France)
- 1992** Professor of the Month (Jan. 1992, University of Oregon)
- 1986** CNRS Fellowship
- 1981** Fifth Place, Gravity Essay Award
- 1980** Fourth Place, Gravity Essay Award
- 1979** Chaim Weizmann Fellowship
- 1974** Outstanding First Year Student (Physics, University of Maryland)
- 1974** NSF Fellowship

1973 CTP Fellowship

1973 Class of 1916 Scholar Athlete Award (Princeton)

1973 Kasuka Prize (Princeton Senior Thesis)

1973 Phi Beta Kappa

1972-1973 5 Varsity Letters at Princeton (Cross Country, Wrestling, Track)

1971 New Jersey Marathon Champion

1969 National Merit Scholar

1969 Westinghouse Science Talent Search (top 40)

### **Conferences Organized:**

“Asymptotic Behavior of Mass and Spacetime Geometry,” with F. Flaherty, D. Brill and R. Wells, supported by the NSF, held October, 1983, in Corvallis, Oregon.

“Pacific Gravity Meeting,” held annually in early spring since 1985. Kip Thorne and I originated this conference, and have helped organize it every year since its inception.

“Mathematics and General Relativity,” with R. Schoen, G. Horowitz and L. Lindholm, AMS-IMS-SIAM Joint Summer Research Conference, held June, 1986, in Santa Cruz, California.

“Heat Equations in Geometry,” (NSF-CBMS Regional Conference in the Mathematical Sciences) with Joel Weiner, (Richard Hamilton—main speaker) held July 1989, in Honolulu, Hawaii.

“Directions in General Relativity,” with Bei-Lok Hu, Ted Jacobson, et. al., held May 1993 in College Park, Maryland.

Program on “Behavior of Strong Gravitational Fields,” with Abhay Ashtekar and Gary Horowitz, held January-July 1999 at the Institute of Theoretical Physics, Santa Barbara.

“Mathematical Aspects of Gravitation,” with Alan Rendall and Gerhard Huisken, held July 2000 at Oberwolfach, Germany.

”Mathematical Aspects of General Relativity,” with Rick Schoen, Nick Kappouleas, and Hugh Bray, held in spring 2002 at the American Institute of Mathematics, Palo Alto.

“Mathematical Aspects of Gravitation,” with Alan Rendall and Gerhard Huisken, held February 2003 at Oberwolfach, Germany.

“Miami Waves”, with Lars Andersson, Greg Galloway, Gerhard Huisken, Sergiu Klainerman, Igor Rodnianski, Rick Schoen, and Gang Tian, held January 2004, at the University of Miami, Florida.

“Pacific Northwest Geometry Seminar”, held two or three times per year. I have been the NSF grant PI for this series of meetings since 2003, and am involved in the organization of all of the meetings.

“Einstein Constraint Equations”, with Piotr Chrusciel, held December 2005, at the Isaac Newton Institute.

“Mathematical Aspects of Gravitation,” with Alan Rendall and Piotr Chrusciel, held January 2006, at Oberwolfach, Germany.

## Grants

Research Grants: I have been awarded NSF grants for 1983-85, 1985-87, 1987-89, 1990-93, 1993-1998, 1998-2001, 2001-2004, 2004-2007, and 2007-2010.

Conference Grant: I have been PI for the Pacific Northwest Geometry Seminar grant for 2003-2006, and for 2006-2009.

I have organized the NSF travel grants for U.S. participants attending GR13 (Cordoba, Argentina), GR14 (Florence, Italy) and GR15 (Pune, India), and MGIX (Rome, Italy).

## Published Papers:

1. Effect of Temperature on Light Absorption by Crystalline Cadmium Sulfide. Chemistry, Vol. 42, No. 6 pp. 26-28 (1969).
2. Initial Value Problem of General Relativity. III. Coupled Fields and the Scalar Tensor Theory. Physical Review D., Vol. 13, No. 6, pp. 1532-1537, (1976) with J. York and N. O’Murchadha.
3. Torsion Singularities. Physical Review D. Vol. 15, No. 8, pp. 2078-2087, (1976) with J. Nester.
4. The Effect of Gravitational Interaction on Classical Fields: A Hamilton Dirac Analysis. Annals of Physics, Vol. 107, Nos. 1-2, pp. 56-81, (1977) with J. Nester.
5. Extension of the York Field Decomposition to General Gravitationally Coupled Fields. Annals of Physics, Vol. 108, No. 2, pp. 368-386, (1977) with J. Nester.
6. On the Determination of Cauchy Surfaces from Intrinsic Properties. Communications in Mathematical Physics, Vol. 61, pp. 87-95, (1978) with R. Budic, L. Lindholm and P. Yasskin.

7. Non Self-Dual Gauge Fields. *Physics Letter B.*, Vol. 78B, No. 2, pp. 462-464, (1978) with P. Yasskin and P. Green.
8. Waveless Approximation Theories of Gravity. Honorable mention in the Gravity Research Foundation Essay Contest (1978).
9. Kostant-Souriau Quantization of Robertson-Walker Cosmologies with a Scalar Field, in *Group Theoretical Methods in Physics* (edited by W. Beiglbock, A. Bohm and E. Takasugi) Springer-Verlag, New York (1979) with M. Gotay.
10. Line Space Construction of Non Self-Dual Yang-Mills Fields, in *Group Theoretical Methods in Physics* (edited by W. Beiglbock, A. Bohm and E. Takasugi) Springer-Verlag, New York (1979) with P. Yasskin and P. Green.
11. Twistor Description of Non Self-Dual Yang-Mills Fields, in *Complex Manifold Techniques in Theoretical Physics* (edited by D. Lerner and P. Sommers) Pitman, San Francisco (1979) with P. Yasskin.
12. Canonical Gravity. Invited review article in *General Relativity and Gravitation (Einstein Centenary Volume)*, edited by A. Held) Plenum, New York (1980) with J. Nester.
13. Inertia Here is Fixed by Mass-Energy There in Every W-Model Universe. Invited review article in *Relativity, Quanta and Cosmology (Einstein Centenary Volume)*, edited by M. Pantaleo and F. DeFinis) Johnson Reprint Corporation, New York (1980) with J. Wheeler.
14. Construction of Gauge Fields from Initial Data, in *Geometrical and Topological Methods in Gauge Theories* (edited by J.P. Harnard and S. Shnider) Springer, New York (1980).
15. K-Surfaces in the Schwarzschild Spacetime and the Construction of Lattice Cosmologies. *Journal of Mathematical Physics*, Vol. 21, No. 12, pp. 2789-2796, (1980) with D. Brill and J. Cavallo.
16. Geometric Quantization and Gravitational Collapse. *Physical Review D*, Vol. 22, No. 2, pp. 235-248, (1980) with Mark Gotay.
17. The Construction from Initial Data of Spacetimes with Nontrivial Spatial and Bundle Topology. *Annals of Physics*, Vol. 129, No. 2, pp. 223-248, (1980).
18. Can Quantum Effects Prevent Spacetime Collapse? in *Group Theoretical Methods in Physics* (edited by A. Wolff) Springer, Berlin (1980) with M. Gotay.
19. Wheeler-Einstein-Mach Spacetimes. *Physical Review D*, Vol. 24, No. 2, pp. 251-256, (1981).
20. Quantum Cosmology and Geometric Quantization. *General Relativity and Gravitation*, Vol. 13, No. 4, pp. 301-306, (1981) with M. Gotay.

21. Surfaces of Constant Mean Curvature in Schwarzschild, Reissner-Nordstrom, and Lattice Spacetimes, Proceedings of the Second Marcel Grossman Conference (edited by R. Ruffini) North Holland (1982) with D. Brill.
22. Non Self-Dual Nonlinear Gravitons. General Relativity and Gravitation, Vol. 14, No. 7, pp. 621-628, (1982) with Philip Yasskin.
23. A Slice Theorem for the Space of Solutions of Einstein's Equations. Physics Reports, Vol. 89, No. 2, pp. 179-222, (1982) with Jerrold Marsden.
24. The Existence of Constant Mean Curvature Foliations of Gowdy 3-Torus Spacetimes. Communications in Mathematical Physics, Vol. 86, pp. 485-493, (1982) with Vincent Moncrief.
25. On Cosmic Censorship: Does Compact Cauchy Horizon Imply Symmetry? in the Proceedings of the Third Marcel Grossman Meeting on General Relativity (edited by H. Ning) North Holland (1982) with V. Moncrief.
26. Is Supergravity Well-Posed? in Proceedings of the Third Marcel Grossman Meeting on General Relativity (edited by H. Ning) North Holland (1982) with D. Bao and P. Yasskin.
27. Symmetries of Cosmological Cauchy Horizons. Communications in Mathematical Physics, Vol. 89, pp. 387-413, (1983) with Vincent Moncrief.
28. On Classical Supergravity, in Proceedings of the XIIIth International Conference on Group Theoretical Methods in Mathematical Physics (edited by Y.S. Kim) (1984) with D. Bao and P. Yasskin.
29. The York Map is a Canonical Transformation. Journal of Geometry and Physics, Vol. 1, No. 1, pp. 85-105, (1984) with Jerrold Marsden.
30. Classical Supergravity. Invited contribution to Mathematical Aspects of Superspace (edited by H. J. Seifert, C. J. S. Clarke, and A. Rosenblum) Reidel (1984) with D. Bao and P. Yasskin.
31. The Well-Posedness of ( $N = 1$ ) Classical Supergravity. Journal of Mathematical Physics, Vol. 26, pp. 329-333, (1985) with David Bao, Yvonne Choquet-Bruhat and Philip Yasskin.
32. Symmetries of Cosmological Cauchy Horizons with Exceptional Orbits. Journal of Mathematical Physics, Vol. 26, pp. 1024-1027, (1985) with Vincent Moncrief.
33. The Dynamics of The Einstein-Dirac System I: A Principal Bundle Formulation of the Theory and its Canonical Analysis. Annals of Physics, Vol. 164, pp. 103-171, (1985) with David Bao and Philip Yasskin.

34. Effective Determination in a Classical Field Theory with Spacelike Characteristics. *Journal of Mathematical Physics*, Vol. 27, pp. 739-745, (1986) with G. Horndeski.
35. Homothetic and Conformal Symmetries of Solutions to Einstein's Equations. *Communications in Mathematical Physics*, Vol. 106, pp. 137-158, (1986) with Douglas Eardley, Jerrold Marsden, and Vincent Moncrief.
36. Steering the Universe. *Foundations in Physics*, Vol. 16, pp. 1651-1666 (1986).
37. Ambitwistors (and Strings?) in Proceedings of the Oregon Meeting (edited by R. Hwa), World Publishing (1986) with Philip Yasskin.
38. The Ambitwistor Program in Field Theory, in *Quantum Gravity and Strings II* (edited by H. J. deVega and N. Sanchez) Springer Verlag (1987).
39. Parametrization of the Space of Solutions of Einstein's Equations. *Physical Review Letters*, Vol. 59, pp. 2389-2393, (1987).
40. On the Smoothing of Cosmological Spacetimes and Ricci Flow, in the Proceedings of the Fifth Marcel Grossman Meeting on General Relativity (edited by D. Blaer), World Scientific (1989), with Mauro Carfora and Martin Jackson.
41. Convergence of the Ricci Flow for a Class of Metrics with Indefinite Ricci Curvature. *Journal of Differential Geometry*, Vol. 31, pp. 249-263 (1990), with Mauro Carfora and Martin Jackson.
42. Evolution of the Bel Robinson Energy in Gowdy  $T^3 \times R$  Spacetimes. *Journal of Mathematical Physics*. Vol. 31, pp. 517-519 (1990), with Martin Jackson and Vince Moncrief.
43. Asymptotic Behavior of the Gravitational Field and the Nature of Singularities in Gowdy Spacetimes. *Annals of Physics*, Vol. 199, pp. 84-122 (1990) with Vince Moncrief.
44. Strong Cosmic Censorship in Polarized Gowdy Spacetimes. *Classical and Quantum Gravity*, Vol. 7, pp. 1671-1679 (1990), with P. Chrusciel and V. Moncrief.
45. Ricci Flow of Locally Homogeneous Geometries on Closed Manifolds. *Journal of Differential Geometry*, Vol. 35, pp. 723-741 (1992) with Martin Jackson.
46. On Spacetimes Containing Killing Vector Fields with Nonclosed Orbits. *Classical and Quantum Gravity*, Vol. 9, pp. 1683-1691 (1992) with Vince Moncrief.
47. Progress in Strong Cosmic Censorship. *Mathematical Aspects of Classical Field Theory* (edited by M. Gotay, J. Marsden, and V. Moncrief), *Contemporary Mathematics*, Vol. 132, pp. 403-418 (1992).

48. Symplectifier la Science. *Gazette des Mathématiciens*, Vol. 54, pp. 59-80 (1992) with M. Gotay.
49. Solutions of Constraints for Einstein's Equations. *Comptes Rendue de l'Academie Scientifique de Paris*, Vol. 315, pp. 349-355 (1992) with Yvonne Choquet-Bruhat and Vince Moncrief.
50. Ricci Flow on Minisuperspaces and the Geometry-Topology Problem, in *Directions in General Relativity, Vol 1* (edited by B. L. Hu, M. P. Ryan, and C. V. Vishveshwara) Cambridge University Press (1993) with Martin Jackson.
51. Charles W. Misner: Insight and Discovery, in *Directions in General Relativity, Vol. 1* (edited by B. L. Hu, M. P. Ryan, and C. V. Vishveshwara) Cambridge University Press (1993) with Beverly Berger, Dieter Brill, and Richard Matzner.
52. Compact Cauchy Horizons and Compact Cauchy Surfaces, in *Directions in General Relativity Vol. 2* (edited by B. L. Hu and T. A. Jacobson) Cambridge University Press (1993) with Piotr Chrusciel.
53. Dieter R. Brill: A Spacetime Perspective, in *Directions in General Relativity, Vol. 2* (edited by B. L. Hu and T. A. Jacobson) Cambridge University Press (1993) with Theodore Jacobson, Charles Misner, and Herbert Pfister.
54. Non Isometric Vacuum Extensions of Vacuum Maximal Globally Hyperbolic Spacetimes. *Physical Review D*, Vol. 48, pp. 1616-1628 (1993) with Piotr Chrusciel.
55. Quasi Convergence of Ricci Flow for a Class of Metrics. *Communications in Analysis and Geometry*, Vol. 1, pp. 543-559 (1993) with Richard Hamilton.
56. Some Results on Non Constant Mean Curvature Solutions of the Einstein Constraint Equations, in *Physics on Manifolds* (edited by M. Flato, R. Kerner, and A. Lichnerowicz), pp. 295-302, Kluwer Academic Publishers (1994) with Vincent Moncrief.
57. Manifolds with a Circle Action and the Einstein Constraint Equations. *Differential Geometry and Mathematical Physics* (edited by J. Beem and K. Duggal), *Contemporary Mathematics*, Vol. 170, pp. 149-154 (1994), with Vincent Moncrief.
58. On the Dynamics of Generators of Cauchy Horizons, in *Proceedings of the Kananaskis Conference on Chaos in General Relativity* (edited by D. Hobill, A. Burd, and A. Coley) pp. 113-125, (1994), with Piotr Chrusciel.
59. On the Wheeler-Einstein-Mach Spacetimes, in *Mach's Principle: From Newton's Bucket to Quantum Gravity*, *Einstein Studies Vol. 6* (edited by J. Barbour and H. Pfister), Birkhauser (1995).
60. Constant Mean Curvature Solutions of the Einstein Constraint Equations on Closed Manifolds. *Classical and Quantum Gravity*, Vol. 12, pp. 2249-2273 (1995).

61. Solving the Einstein Constraint Equations, in Sixth Canadian Conference on General Relativity and Relativistic Astrophysics (edited by S. Braham, J. Gegenberg, and R. McKellar), Fields Institute Communications Series (1996).
62. A Set of Non Constant Mean Curvature Solutions of Einstein Constraint Equations on Closed Manifolds, *Classical and Quantum Gravity*, Vol. 13, pp. 1819-1847 (1996) with Vincent Moncrief.
63. Asymptotically Hyperbolic Non Constant Mean Curvature Solutions of the Einstein Constraint Equations. *Classical and Quantum Gravity*, Vol. 14, pp. A189-A202, (1997) with Jiseong Park.
64. Mathematical Relativity Workshop of GR14, in Proceedings of the 14th International Conference on General Relativity and Gravitation (edited by Francaviglia, Longhi, Lusanna and Scrace), World Scientific (1997).
65. On the Stability of the Differentiability of Cauchy Horizons. *Communications in Analysis and Geometry*, Vol. 5, pp. 249-277 (1997) with Piotr Chrusciel.
66. Global Foliations of Vacuum Spacetimes with  $T^2$  Isometry. *Annals of Physics*, Vol. 260, pp. 117-148 (1997) with Beverly Berger, Piotr Chrusciel, and Vincent Moncrief.
67. Mixmaster Behavior in Inhomogeneous Cosmological Spacetimes. *Physical Review Letters*, Vol. 80, pp. 2984-2987 (1998) with Marsha Weaver and Beverly Berger.
68. The Singularity in Generic Gravitational Collapse is Spacelike, Local and Oscillatory. *Modern Physics Letters A*, Vol. 13, pp. 1565-1573 (1998) with Beverly Berger, David Garfinkle, Vincent Moncrief, and Marsha Weaver.
69. Cosmological Spacetimes Not Covered by a Constant Mean Curvature Slicing. *Classical and Quantum Gravity*, Vol. 15, pp. 3679-3687 (1998) with Alan Randall.
70. Asymptotic Behavior in Polarized  $T^2$  Symmetric Vacuum Spacetimes. *Journal of Mathematical Physics*, Vol. 40, pp. 340-352, (1999) with Satyanad Kichenassamy.
71. Einstein Constraints on Asymptotically Euclidean Manifolds. *Physical Review D*, Vol. 61, 084034 (2000) with Yvonne Choquet-Bruhat and James York.
72. Existence, uniqueness and other properties of the BCT (minimal strain lapse and shift) gauge. *Classical Quantum Gravity*, Vol. 17, no. 18, pp. 3899-3904 (2000) with David Garfinkle, Carsten Gundlach, and Niall O'Murchadha.
73. Critical Phenomena in Nonlinear Sigma Models. *Journal of Mathematical Physics*, Vol. 41, pp. 5691-5700 (2000) with Steven Liebling and Eric Hirschmann.
74. Global Existence for Wave Maps with Torsion. *Communications in Partial Differential Equations*, Vol. 25, pp. 1669-1702 (2000) with Stephen Anco.

75. Towards an Ambitwistor Description of Gravity, in Further Advances in Twistor Theory Volume III: Curved Twistor Spaces (edited by L. J. Mason, L. P. Hughston, P. Z. Kobak, and K. Pulverer ), Chapman and Hall (2001), with Philip Yasskin.
76. Oscillatory Approach to the Singularity in Vacuum  $T^2$  Symmetric Spacetimes, in The Proceedings of the Ninth Marcel Grossman Meeting, (2001) with Marsha Weaver and Beverly Berger
77. Oscillatory Approach to the Singularity in Vacuum Spacetimes with  $T^2$  Isometry, Physical Review D, Vol. 64, 084006 (2001) with Beverly Berger and Marsha Weaver.
78. Singularity Formation in 2+1 Wave Maps. Journal of Mathematical Physics, Vol. 43, pp. 678-683 (2002) with Steven Liebling.
79. Stability of Ricci Flow at Ricci Flat Metrics. Communications in Analysis and Geometry, Vol. 10, pp 741-777 (2002) with Christine Guenther and Dan Knopf.
80. Gluing and Wormholes for the Einstein Constraint Equations. Communications in Mathematical Physics, Vol. 231, pp 529-568 (2002) with Rafe Mazzeo and Daniel Pollack.
81. Asymptotic Behavior in Polarized and Half-Polarized  $U(1)$ -Symmetric Vacuum Spacetimes. Classical and Quantum Gravity, Vol. 19, pp 5361-5386 (2002) with Vince Moncrief.
82. Constructing Solutions of the Einstein Constraint Equations, in Proceedings of the 16th International Conference on General Relativity and Gravitation (edited by N. Bishop and S. Maharaj) World Scientific, (2002) .
83. On the Topology of Vacuum Spacetimes. Annales Henri Poincare, Vol. 4, pp 369-383 (2003) with Rafe Mazzeo and Daniel Pollack.
84. On the Area of the Symmetry Orbits in  $T^2$  Symmetric Spacetimes. Classical and Quantum Gravity, Vol. 20, pp 3783-3796 (2003) with Marsha Weaver.
85. Non CMC Conformal Data Sets which Do Not Produce Solutions of the Einstein Constraint Equations. Classical and Quantum Gravity, Vol. 21, pp S233-S243 (2004) with Niall O'Murchadha.
86. Gluing Initial Data Sets for General Relativity. Physical Review Letters, Vol. 93, 081101 (2004) with Piotr Chrusciel and Daniel Pollack.
87. The Constraint Equations, in The Einstein Equations and the Large Scale Behavior of Gravitational Fields, (edited by P. Chrusciel and H. Friedrich), Birkhauser (2004), with Robert Bartnik.

88. Topologically General  $U(1)$  Symmetric Vacuum Spacetimes with AVTD Behavior. *Nuovo Cimento*, Vol. 119B pp 625-638, (2004) with Yvonne Choquet-Bruhat and Vincent Moncrief,
89. Critical Behavior in Ricci Flow, in *Geometric Evolution Equations* (edited by S. Chang, B. Chow, S. Chu, C. Lin) *Contemporary Mathematics*, 367 (2005) with David Garfinkle.
90. Initial Data Engineering. *Communications in Mathematical Physics*, Vol. 257 pp. 29-42, (2005) with Piotr Chrusciel and Dan Pollack.
91. Mathematical Study of the Field Equations (Review of GR 17 workshop), in *General Relativity and Gravitation* (edited by P. Florides , B. Nolan and A. Ottewill) *World Scientific* (2005).
92. A Gluing Construction for Non-Vacuum Solutions of the Einstein Constraint Equations. *Advances in Theoretical and Mathematical Physics*, Vol. 9, pp 129-172 (2005), with David Maxwell and Daniel Pollack.
93. Half Polarized  $U(1)$  Symmetric Vacuum Spacetimes with AVTD Behavior. *Journal of Geometry and Physics*, Vol. 56, pp 1191-1214 (2006), with Yvonne Choquet-Bruhat.
94. The Einstein-Scalar Field Constraints on Asymptotically Euclidean Manifolds. *Chinese Annals of Mathematics*, Vol. 27, pp 31-52, (2006) with Yvonne Choquet-Bruhat and Daniel Pollack.
95. Spherically Symmetric Dynamical Horizons. *Classical and Quantum Gravity*, Vol. 23, pp. 2559-2569 (2006), with Robert Bartnik.
96. Einstein Constraint Equations; The Initial Value Formulation, in *Encyclopedia of Mathematical Physics* (edited by J.-P. Francoise, G.L. Naber and Tsou S.T.) *Oxford: Elsevier*, 2006 (ISBN 978-0-1251-2666-3), Vol. 2, p. 173 (2006)
97. Ricci Flow on Locally Homogeneous Closed 4-Manifolds. *Communications in Analysis and Geometry*, Vol. 14, pp 345-386 (2006), with Martin Jackson and Peng Lu
98. Timelike Minimal Submanifolds of General Co-dimension in Minkowski Spacetime. *Journal of Hyperbolic Differential Equations*, Vol. 3, pp 691-700 (2006), with Paul Allen and Lars Anderson.
99. A Brief Review of Initial Data Engineering, in *Gravitation and Astrophysics*, (edited by C-M. Chen J.-P. Hsu and J. Nester) *World Scientific*, (2006), with Piotr Chrusciel and Dan Pollack.
100. The Constraint Equations for the Einstein-Scalar Field System on Compact Manifolds. *Classical and Quantum Gravity*, Vol. 24, pp 809-828 (2007) with Yvonne Choquet-Bruhat and Daniel Pollack.

101. Linear Stability of Homogeneous Ricci Solitons. International Mathematics Research Notices, Vol.2006, ID 96253 (2007), with Christine Guenther and Daniel Knopf.
102. Applications of Theorems of Jean Leray to the Einstein-Scalar Field Equations. Journal of Fixed Point Theory and Applications, Vol. 1, pp. 31-46 (2007), with Yvonne Choquet-Bruhat and Daniel Pollack.
103. Areal Foliation and AVTD Behavior in  $T^2$  Symmetric Spacetimes with Positive Cosmological Constant. Journal of Mathematical Physics, Vol. 48, pp. 082501:1-17 (2007), with Adam Clausen.
104. Waveless Approximation Theories of Gravity, International Journal of Modern Physics D, Vol. 17, pp. 265-273 (2008).
105. Near-Constant Mean Curvature Solutions of the Einstein Constraint Equations with Non-Negative Yamabe Metrics. Classical and Quantum Gravity, Vol. 25 pp. 075009:1-15 (2008), with Adam Clausen and Paul Allen.
106. The Modelling of Degenerate Neck Pinch Singularities in Ricci flow by Bryant Solitons. Journal of Mathematical Physics, Vol. 49, pp. 073505 (2008), with David Garfinkle.
107. Symmetries of Higher Dimensional Black Holes, submitted to Classical and Quantum Gravity, gr-qc:0805.1451, with Vincent Moncrief.

## Papers in Preparation

1. Symmetries of Cosmological Cauchy Horizons, with Nonclosed Orbits, with Vincent Moncrief.
2. Asymptotic Behavior in the Expanding Direction for Vacuum Solutions with  $T^2$  Isometry, with Beverly Berger.
3. Gluing Asymptotically Hyperbolic Solutions to the Constraint Equations, with Jack Lee and Iva Stavrov.
4. Ricci Flow of Asymptotically Flat Geometries with Non Trivial Topology, with Rafe Mazzeo and Natasa Sesum
5. Behavior Near the Singularity in Smooth (Non Analytic) Polarized  $T^2$  Symmetric Vacuum Spacetimes, with Adam Clausen.
6. Timelike Minimal Submanifolds in Expanding Spacetimes, with Paul Allen.
7. Asymptotically Flat and Asymptotically Hyperbolic Non CMC Solutions of the Einstein Constraint Equations, with Michale Holst and David Maxwell.
8. Solving the Einstein Constraint Equations (Invited review article for Living Reviews)

## Books

1. Mathematics in General Relativity, Contemporary Mathematics, Vol. 71, (1988); editor.
2. Spacetime Safari: Essays in Honor of Vincent Moncrief on the Classical Physics of Strong Gravitational Fields, published as special issue Vol. 21, Number 3 (2004) of Classical and Quantum Gravity, editor with Beverly Berger.
3. The Ricci Flow: Techniques and Applications. Part I Geometric Aspects, AMS Press, Mathematical Surveys and Monographs vol. 135 (2007), with Bennett Chow, Sun-Chin Chu, David Glickenstein, Christine Guenther, Tom Ivey, Dan Knopf, Peng Lu, Feng Luo, and Lei Ni.
4. The Ricci Flow: Techniques and Applications. Part II Analytic Aspects, AMS Press, Mathematical Surveys and Monographs vol. 144 (2008), with Bennett Chow, Sun-Chin Chu, David Glickenstein, Christine Guenther, Tom Ivey, Dan Knopf, Peng Lu, Feng Luo, and Lei Ni.
5. The Ricci Flow: Techniques and Applications. Part III Geometric-Analytic Aspects, AMS Press, Mathematical Surveys and Monographs vol. ??? (2008), with Bennett Chow, Sun-Chin Chu, David Glickenstein, Christine Guenther, Tom Ivey, Dan Knopf, Peng Lu, Feng Luo, and Lei Ni.
6. Momentum Maps and Classical Relativistic Fields, book to be published in MSRI series, Springer Verlag, with Mark Gotay, Jerrold Marsden, Richard Montgomery, Jędrzej Sniatycki and Philip Yasskin.

## Book Review

1. Black Hole Physics: Basic Concepts and New Developments, by Valeri Frolov and Igor Novikov, in Physics Today (2000).

## Talks Presented

1. Compact Cauchy Horizons, Texas A & M, March 1984. (Colloquium)
2. Classical Supergravity, Austin, April 1984.
3. Conformal Symmetries, Maryland, May 1984
4. Well-Posedness of Supergravity on Classical Supergravity, Stony Brook, NY, May 1984; Edmonton, Alberta, June 1985.
5. The Ambitwistor Program, Vancouver, B. C., Nov. 1984.
6. Cosmic Censorship, Seattle, Nov. 1984. (Colloquium)

7. Kaluza-Klein Theories, Berkeley, March 1985.
8. Cosmic Censorship, Minnesota, April 1985. (Colloquium)
9. The Yamabe-Schoen Theorem and the Gravitational Degrees of Freedom, Syracuse, April 1985.
10. Conformal Isometries, Chicago, June 1985.
11. Ambitwistors and Super Strings, Oregon, August 1985; Berkeley, February 1986.
12. Conformal Isometries, Toulouse, France, April 1986.
13. Ambitwistors, Paris, May 1986.
14. Evolution Singularities, Paris, May 1986.
15. Bel-Robinson and BLK, Santa Barbara, June 1986.
16. Bidual Spacetimes and Bitwistors, Oxford August, 1986.
17. The Initial Value Formulation of General Relativity (8 lectures), Barcelona, August 1986.
18. Bel-Robinson and BLK, Berkeley, Sept. 1986.
19. Ambitwistors and Gravity, Pittsburgh, Dec. 1986.
20. Parametrization of the Space of Solutions of Einstein's Equations, Tulane, March 1987. (Colloquium)
21. On the Space of Solutions of Einstein's Equations, Yale, March 1987.
22. Behavior of Singularities, Annapolis, March 1987.
23. Instantons and Twistors and Ambitwistors (4 lectures), Davis, CA, May 1987.
24. Asymptotic Dynamics of Gowdy Spacetimes, Boulder, CO, July 1987.
25. Open and Closed Problems in General Relativity, Aspen, August 1987.
26. The Yamabe Problem and the Space of Solutions of Einstein's Equations, San Diego, Nov. 1987.
27. Converging Ricci Flow for a Class of Metrics with Ricci Curvature of Indefinite Sign, San Diego, Nov. 1987.
28. On Ricci Flow Convergence, Rice, March 1988.
29. The BKL Conjecture and the Nature of Cosmological Singularities, Rice, March 1988. (Colloquium)

30. Cosmic Censorship and the BKL Conjecture, Harvard, April 1988.
31. Asymptotic Behavior of Solutions of Einstein's Equations, Canberra, July 1988; Perth.
32. Ricci Flow, Canberra, August 1988; Adelaide; Philadelphia, Nov. 1988.
33. Convergence and Quasiconvergence of Ricci Flow, Worcester, April 1989; Santa Barbara, May 1989; Hawaii, July 1989; Canberra, August 1989; Courant Institute, Nov. 1989; Maryland, April 1990.
34. Strong Cosmic Censorship in Gowdy Spacetimes, Maryland, April 1990.
35. Ricci Flow and the Thurston Geometrization Conjecture, Seattle, May 1990; Aspen, August 1990.
36. Ricci Flow of Locally Homogeneous Geometries, San Diego, March 1991.
37. Progress on Cosmic Censorship, Seattle, July 1991.
38. The Fate of the Universe, Portland, October 1991.
39. Non Constant Mean Curvature Solutions of the Einstein Constraint Equations, Philadelphia, Nov. 1991; Stony Brook, Nov. 1991; Salt Lake City, March 1992; Stanford, April 1992; Paris, June 1992; Cordoba (Argentina), July 1992; PNGS (Corvallis), October 1992.
40. On Ricci Flow, Santa Barbara, April 1993.
41. Wheeler-Einstein-Mach Spacetimes, Tuebingen, July 1993.
42. Non Constant Mean Curvature Solutions of the Einstein Constraint Equations, Munich, July 1993.
43. Solutions of Einstein's Equations on  $M^4 = \Sigma^3 \times R$  with  $\Sigma^3$  Admitting a Circle Action, Vancouver, August 1993; Raleigh, N.C., December 1993.
44. Non Constant Mean Curvature Solutions of the Einstein Constraint Equations, Vienna, August 1994.
45. Cosmic Censorship and Long Time Existence of Solutions of Einstein's Equations, Oberwolfach, August 1994.
46. The Fountain Conjecture, Tacoma, September 1994.
47. Solutions of the Einstein Einstein Constraint Equations, Frederickton, NB, May 1995.
48. Cosmic Censorship, Vienna, August 1995.

49. Time Machines, Chaos in the Horizon, and the Fountain Conjecture, Seattle, November 1995; Harvard, April 1996.
50. Non Constant Mean Curvature Solutions of the Einstein Constraint Equations, Warsaw, March 1996.
51. Convergence and Quasi-Convergence of Ricci-Flow, Tours France, August 1996.
52. Global Foliations for  $T^2$ -Symmetric Solutions of Einstein's Equations, Potsdam, Germany, October 1996; Maryland, January 1997; Oberwolfach, July 1997.
53. The Initial Value Problem, Budapest, November 1996; Prague, December 1996.
54. Velocity Dominated and Mixmaster Behavior in Cosmological Spacetimes, Columbus, Ohio, April 1998.
55. Asymptotic Behavior of Cosmological Solutions of Einstein's Equations, Davis, California, April 1998.
56. Global Existence for Wave Maps with Torsion, Seattle, November 1998; Santa Barbara, May 1999.
57. Understanding the Evolution of Cosmological Spacetimes, Seattle, March 1999; Santa Barbara, June 1999; Penn State, August 1999; Minneapolis, November 1999.
58. Solving the Einstein Constraint Equations, Madison, November 1999.
59. Critical Dimensions and Critical Behavior in Wave Maps, PNGS Corvallis, November 1999; Santa Barbara, March 2000.
60. Gluing Solutions of the Einstein Constraints, Santa Barbara, January 2000.
61. Gluing Wormholes onto Your Spacetime, Corvallis, November, 2000; Ann Arbor, February, 2001; Santa Barbara, March, 2001; Manhattan, Kansas, November, 2001.
62. Constructing Solutions of the Einstein Constraint Equations, Durban, South Africa, July, 2001; Vienna, August, 2001.
63. On the Behavior of Cosmological Solutions Near the Singularity, Elba, Italy, June 2002.
64. On the Topology of Vacuum Spacetimes. Golm, Germany, June 2002; Hsinchu, Taiwan, July 2002; Toronto, Canada, August 2002.
65. The Conformal Method for Studying the Einstein Constraint Equations, Cargese, Corsica, August 2002.
66. Are There Any Restrictions on the Spatial Topology of Vacuum Solutions of Einstein's Equations, University of California (Irvine) March, 2003.

67. Gluing Solutions of the Einstein Constraint Equations. PNGS Vancouver, April 2003; University of California (Los Angeles) May 2003; ANU Canberra, August 2003 .
68. Invited Lecture Series on General Relativity and its Cauchy Formulation. University of California (San Diego) March, 2003.
69. On Solutions of the Einstein Constraint Equations. Caltech , May, 2003.
70. Constructing Solutions of the Einstein Constraint Equations and Gluing Them Together, KITP Santa Barbara, June 2003.
71. What We Know and Don't Know about Solutions of the Einstein Constraint Equations, CRM, Montreal, September 2003; AIM, November 2003.
72. Vacuum Spacetimes with No CMC Cauchy Surfaces, Paris, March 2004; Cornell, July 2004; Dublin, July 2004; Austin, January 2005.
73. Invited Lecture Series on Mathematical Aspects of General Relativity, Hsinchu, Taiwan, August 2004.
74. Understanding the Nature of Cosmological Singularities, Stanford, February, 2005; Southampton, England, October, 2005; Warwick, England, October, 2005; Jongli, Taiwan, November, 2005.
75. Ricci Flow of Locally Homogeneous Geometries, University of California (San Diego), July, 2005.
76. Initial Data Engineering, Cambridge England, August, 2005; Oxford England, December 2005; Beijing, July 2006.
77. Spherically Symmetric Dynamical Horizons, Cambridge, England, December, 2005; Santa Barbara, March, 2006.
78. Symmetries of Higher Dimensional Stationary Black Holes, Santa Barbara, March, 2006; San Francisco, April 2006.
79. Black Hole Rigidity, Beijing, July, 2006; Cambridge, October, 2006; Paris, November, 2006; Warwick, March 2007, New York City, November 2007
80. Ricci Flow of Homogeneous Geometries and the Einstein Evolution of Spatially Homogenous, Tucson, March 2007.
81. Constructing Solutions of the Einstein Constraint Equations, Birmingham, Alabama, December 2007; Durham, North Carolina, February 2008.
82. Black Holes (Science Pub lecture), Eugene, June 2008.

(Revised June 2008)