

**Address**

Department of Pure Mathematics and Mathematical Statistics  
 Centre for Mathematical Sciences  
 Wilberforce Road  
 Cambridge CB3 0WB United Kingdom  
 M.Dafermos at the address `dpmps.cam.ac.uk`

**Education**

Harvard University Mathematics B.A. *summa cum laude* 1997  
 Princeton University Mathematics Ph.D. 2001  
*doctoral thesis advisor: Demetrios Christodoulou, ETH Zürich*

**Research interests**

partial differential equations, general relativity, differential geometry

**Professional History**

C. L. E. Moore Instructor	Massachusetts Institute of Technology	2001–2004
University Lecturer	University of Cambridge	2004–2006
Reader in Mathematical Physics	University of Cambridge	2006–

**Prizes**

Adams Prize 2005  
 Bodossaki Prize 2008  
 Whitehead Prize 2009  
 IAMP Early Career Award 2009

**Awards**

NSF grant DMS-0302748	(July 1, 2003–June 30, 2007)
EC Marie Curie International Reintegration Grant	(May 1, 2005–April 30, 2007)
Clay Research Scholarship	(January 1–December 31, 2007)
ERC Starting Grant	(September 1, 2008–September 1, 2013)

**Publications**

1. *Exhaustions of complete manifolds of bounded curvature*, Tsing-Hua lectures on geometry and analysis, 319–322, Int. Press, Cambridge, MA, 1997
2. *Stability and instability of the Cauchy horizon for the spherically symmetric Einstein-Maxwell-scalar field equations*, Ann. of Math. **158** (2003), no. 3, 875–928
3. *On “time-periodic” black-hole solutions to certain spherically symmetric Einstein-matter systems*, Commun. Math. Phys. **238** (2003), 411–427
4. *Stability and Instability of the Reissner-Nordstrom Cauchy horizon and the problem of uniqueness in general relativity* Contemp. Math. **350** (2004), 99–113
5. *Price’s law, mass inflation, and strong cosmic censorship*, in Racz, I, ed. Relativity today: Proceedings of the Seventh Hungarian Relativity Workshop, Budapest, 2004, pp. 79–90
6. *Spherically symmetric spacetimes with a trapped surface*, Class. Quantum Grav. **22** (2005), no. 11, 2221–2232
7. *The interior of charged black holes and the problem of uniqueness in general relativity*, Comm. Pure Appl. Math. **58** (2005), 0445–0504

8. with Igor Rodnianski, *Small-amplitude nonlinear waves on a black hole background*, J. Math. Pures Appl. **84** (2005) 1147–1172
9. with Igor Rodnianski, *A proof of Price’s law for the collapse of a self-gravitating scalar field*, Invent. Math. **162** (2005), 381–457
10. *Linear and non-linear waves in general relativity*, Oberwolfach Rep. **2** (2005) pp. 1399–1403
11. with Alan Rendall, *An extension principle for the Einstein-Vlasov system under spherical symmetry*, Ann. Henri Poincaré **6** (2005), 1137–1155
12. with Alan Rendall, *Inextendibility of expanding cosmological models with symmetry*, Class. Quantum Grav. **22** (2005), no. 23, L143–L147
13. *On naked singularities and the collapse of self-gravitating Higgs fields*, Adv. Theor. Math. Phys. **9** (2005), no. 4, 575–591
14. *A note on the collapse of small-data collisionless matter* J. Hyperbolic Differ. Equ. **3** (2006), no. 4., 589–598
15. with Igor Rodnianski, *A note on boundary value problems for black hole evolutions*, available online at <http://www.arxiv.org/abs/gr-qc/0403034>, 8 pages
16. *Black hole formation from a complete regular past*, Commun. Math. Phys. **289** (2009), no. 2, 579–596
17. with Gustav Holzegel, *On the nonlinear stability of triaxial Bianchi IX black holes*, Adv. Theor. Math. Phys. **10** (2006), 503–523
18. with Igor Rodnianski, *The redshift effect and radiation decay on black hole spacetimes*, Comm. Pure Appl. Math. **62** (2009), no. 7, 859–919
19. with Alan Rendall, *Strong cosmic censorship for  $T^2$ -symmetric cosmological spacetimes with collisionless matter*, available online at <http://www.arxiv.org/abs/gr-qc/0610075>, 17 pages
20. with Alan Rendall, *Strong cosmic censorship for surface-symmetric cosmological spacetimes with collisionless matter*, available online at <http://www.arxiv.org/abs/gr-qc/0701034>, 83 pages
21. with Igor Rodnianski, *The wave equation on Schwarzschild-de Sitter spacetimes*, available online at <http://www.arxiv.org/abs/0709.2766>, 48 pages
22. with Igor Rodnianski, *A note on energy currents and decay for the wave equation on a Schwarzschild background*, available online at <http://www.arxiv.org/abs/0710.0171>, 10 pages
23. *General relativity and the Einstein equations*, In Princeton Companion to Mathematics (T. Gowers and J. Barrow-Green, eds.), Princeton Univ. Press, pp. 483–493
24. with Igor Rodnianski, *A proof of the uniform boundedness of solutions to the wave equation on slowly rotating Kerr backgrounds*, available online at <http://www.arxiv.org/abs/0805.4309>, 71 pages

25. with Igor Rodnianski, *Lectures on black holes and linear waves*, to appear in Clay Lecture Notes, available online at <http://www.arxiv.org/abs/0811.0354>, 116 pages
26. *The evolution problem in general relativity*, In Current Developments in Mathematics, Volume 2008, International Press, 2009, pp. 1–66
27. *The wave equation on axisymmetric stationary black hole backgrounds*, In Physics and Mathematics of Gravitation, Proceedings of the Spanish Relativity Meeting (K.E. Kunz, M. Mars, and M. A. Vázquez-Mozo, eds.), American Institute of Physics, 2009, pp. 19–38

### Invited Talks

1. Global problems in mathematical relativity, Maxwell Institute, Edinburgh, September 1–8, 2010.
2. Current topics in Mathematical physics, Aarhus, July 26–31, 2010.
3. 19th International Conference on General Relativity and Gravitation, Mexico City, July 5–9, 2010.
4. Mathematical Relativity Conference, Grenada, April 5–9, 2010.
5. Quantitative studies of nonlinear waves, Vienna, January 11–February 28, 2010.
6. LMS meeting in Harmonic Analysis and PDE, Warwick, December 14, 2009.
7. Paris-London Analysis Seminar, Institut Henri Poincaré, December 4, 2009.
8. Mathematical Physics Seminar, University of York, December 3, 2009.
9. Applied Mathematics Seminar, University College London, November 30, 2009.
10. Workshop in General Relativity, Simons Center for Geometry and Physics, Stony Brook, November 16–20, 2009.
11. Workshop in Mathematical General Relativity, Paris 6, November 4–6, 2009.
12. CMS Colloquium, Cambridge, October 19, 2009.
13. Mathematical Aspects of General Relativity, Oberwolfach, October 11–17, 2009.
14. Fourth French-Tunisian PDE meeting, Hammamet, Tunisia, September 28–October 2, 2009.
15. Black holes in general relativity, MSRI, Berkeley, September 17, 2009.
16. Black holes in general relativity, MSRI, Berkeley, September 14, 2009.
17. Partial Differential Equations Session, International Congress on Mathematical Physics, Prague, August 3–8, 2009.
18. Geometry of Einstein manifolds workshop, University of Nantes, June 29–July 3, 2009.
19. Mathematical Relativity at Lisbon: A Tribute to Mira Fernandes, June 18–19, 2009.
20. Asymptotics and singularities for non-linear waves workshop, Institut Henri Poincaré, April 27–30, 2009.
21. The Conference on Geometry, Warsaw, April 6–8, 2009.
22. High Energy Physics Seminar, University of Durham, March 20, 2009.
23. Seminar, University of Bilbao, March 18, 2009.
24. High energy physics/General relativity seminar, DAMTP, January 28, 2009.
25. Analysis Seminar, Princeton, December 1, 2008.
26. Current Developments in Mathematics Conference, Harvard, November 21–22, 2008.
27. Spanish relativity meeting, Salamanca, September 15–19, 2008.
28. Conference on nonlinear dispersive equations, İstanbul, August 25–29, 2008.
29. Hyperbolic equations in relativity, Bordeaux, June 16–20, 2008.
30. Triennial Differential Geometry Conference, Harvard University, May 4, 2008.

31. Department Colloquium, Columbia University, April 30, 2008.
32. Analysis Seminar, Princeton University, April 28, 2008.
33. Seminar, Institut Henri Poincaré, Paris, April 22, 2008.
34. Niels Bohr Academy, Copenhagen, April 17, 2008.
35. Mathematical Aspects of General Relativity, Niels Bohr Academy, Copenhagen, April 16, 2008.
36. Theoretical Physics Seminar, Imperial College, January 22, 2008.
37. Mathematical Physics Seminar, Ludwig-Maximilians-Universität München, January 11, 2008.
38. Mathematisches Kolloquium, Ludwig-Maximilians-Universität München, January 11, 2008.
39. Differential Geometry/PDE Seminar, University of Washington, November 28, 2008.
40. Department Colloquium, University of Washington, November 27, 2007.
41. Analysis/PDE seminar, MIT, November 22, 2007.
42. Analysis Seminar, Courant Institute, November 15, 2007.
43. Analysis Seminar, University of Pennsylvania, November 13, 2007.
44. Analysis Seminar, Johns Hopkins University, November 12, 2007.
45. Differential Geometry Seminar, Harvard University, November 6, 2007.
46. Evolution equations and self-gravitating systems, Albert Einstein Institute, Potsdam, September 14, 2007.
47. Nonlinear hyperbolic equations and related topics, De Giorgi Centre, Pisa, September 3–8, 2007.
48. Analysis and Geometric Singularities, Oberwolfach, August 19–25, 2007.
49. Relativity Seminar, University of Oxford, May 1, 2007.
50. High Energy Physics Seminar, University of Durham, April 27, 2007.
51. Kuwait Lecture, Kuwait University, March 27, 2007.
52. Lecture, Public Authority for Applied Education and Training, Kuwait, March 25, 2007.
53. PDE Seminar, Brown University, March 9, 2007.
54. PDE Seminar, University of Maryland, March 1, 2007.
55. Department Colloquium, Princeton University, February 28, 2007.
56. PDE Seminar, Université Paris-Sud XI (Orsay), January 18, 2007.
57. Applied Mathematics Seminar, University of Crete, December 21, 2006.
58. General Relativity Seminar, University of Southampton, December 14, 2006.
59. Analysis Seminar, University of Warwick, November 16, 2006.
60. Particle Physics Seminar, University of Sussex, October 30, 2006.
61. Global Problems in Mathematical Relativity, Newton Institute, October 10, 2006.
62. Nonlinear evolution problems, De Giorgi Centre, Pisa, September 22, 2006.
63. International Conference on Modern Mathematical Methods in Science and Technology, Paros, September 9, 2006.
64. 2nd Interdisciplinary Symposium on Mathematical Modeling in Modern Technologies and Economics, NTUA, Athens, September 5, 2006.
65. Geometric and Nonlinear Analysis, Banff International Research Station, Alberta, Canada, August 12–17, 2006.
66. International Congress of Mathematical Physics, Rio de Janeiro, August 6, 2006.
67. Cosmological Singularities Session, Marcel Grossmann Meeting, Berlin, July 23, 2006.

68. Mathematical Physics seminar, Université de Bordeaux I, May 23, 2006.
69. Partial differential equations seminar, Trinity College Dublin, May 5, 2006.
70. Relativity seminar, DAMTP, University of Cambridge, April 28, 2006.
71. British Mathematical Colloquium 2006, Newcastle upon Tyne, April 8–13, 2006.
72. Geometry Seminar, Imperial College, March 3, 2006.
73. Mathematical Physics Seminar, DAMTP, University of Cambridge, February 28, 2006.
74. Mathematical Aspects of General Relativity, Oberwolfach, January 10, 2006.
75. Seminar, Department of Mathematics and Physics, Osaka City University, December 5, 2005.
76. 15th International Workshop on General Relativity and Gravitation, Tokyo, November 28–December 2, 2005.
77. Joint Applied Mathematics/Analysis/Geometry Seminar, University of Edinburgh, September 24, 2005.
78. Minisymposium on black holes, Newton Institute, University of Cambridge, September 2, 2005.
79. Euroconference on Global General Relativity, Newton Institute, University of Cambridge, August 22, 2005.
80. Mathematics Summer School, University of Crete, July 18, 2005.
81. Nonlinear Evolution Equations, Oberwolfach, June 8, 2005.
82. Recent Advances in Calculus of Variations and PDE's, Pisa, March 3, 2005.
83. Geometry and Analysis Seminar, University of Oxford, February 14, 2005.
84. Analysis Seminar, University of Cambridge, February 9, 2005.
85. Analysis Seminar, ETH Zürich, February 1, 2005.
86. Applied Math Colloquium, Penn State, December 3, 2004.
87. Pure and Applied Mathematics Seminar, University of Bath, October 22, 2004.
88. 10th Hellenic Conference on Mathematical Analysis, Athens, September 30, 2004.
89. 19th International Conference on General Relativity and Gravitation, Dublin, July 22, 2004.
90. Singularity Formation in Nonlinear Evolution Equations, Schrödinger Institute, Vienna, July 12, 2004.
91. Recent Developments in Gravity, Mytilene, June 3, 2004.
92. International Conference on Mechanics and PDEs, Madison, April 30, 2004.
93. Applied Mathematics Colloquium, Columbia University, February 17, 2004.
94. DPMMS, University of Cambridge, January 19, 2004.
95. Colloquium, University of Washington, January 15, 2004.
96. P.D.E. Seminar, Northwestern University, January 13, 2004.
97. Colloquium, University of Minnesota, December 12, 2003.
98. Differential Geometry/P.D.E. Seminar, University of Washington, December 2, 2003.
99. Differential Geometry Seminar, Harvard University, November 18, 2003.
100. P.D.E. Seminar, Northwestern University, November 11, 2003.
101. Joint Analysis Seminar, Princeton University, November 6, 2003.
102. Workshop on the Interaction of Gravity with Classical Fields, University of Montreal, October 5, 2003.
103. Seventh Hungarian Relativity Workshop, Sarospatak, August 14, 2003.
104. Applied Mathematics Seminar, University of Crete, July 24, 2003.
105. Conference on Hyperbolic Models in Astrophysics and Cosmology, Cambridge University, June 24, 2003.
106. Applied Mathematics Seminar, University of Massachusetts Amherst, March 25, 2003.

107. Applied Mathematics Seminar, University of Toronto, March 7, 2003.
108. Conference on General Relativity, Oberwolfach, February 14, 2003.
109. Conference on 50 years of the Cauchy problem in General Relativity, Cargese, August 2, 2002.
110. Colloquium, University of Athens, June 27, 2002.
111. General Relativity Workshop, Stanford University, May 28, 2002.
112. Conference on Dispersion Equations and Curvature, Oberwolfach, April 25, 2002.
113. Analysis Seminar, ETH Zurich, January 21, 2002.
114. Differential Geometry Seminar, Harvard University, November 20, 2001.
115. Conference on Noncompact Variational Problems and General Relativity, in honor of H. Brezis and F. E. Browder, Rutgers University, October 18, 2001.
116. PDE Seminar, Brown University, October 12, 2001.
117. Differential Geometry Seminar, MIT, September 17, 2001.
118. Relativity Seminar, Oxford University, May 29, 2001.
119. Conference on Nonlinear Evolution Problems, Oberwolfach, May 21, 2001.
120. Calderon-Zygmund Seminar, University of Chicago, February 5, 2001.
121. Analysis Seminar, Courant Institute, January 30, 2001.

### Minicourses

1. Mittag-Leffler Institute, Stockholm, September 1, 2008–September 27, 2008 (4 lectures)
2. Clay Summer School, Zürich, June 23–July 18, 2008 (6 lectures)
3. Massachusetts Institute of Technology, Fall 2007 (6 lectures)

### Conference organisation

- Relativity Session in Miami Waves Conference, January 2004 (jointly with L. Andersson)
- BritGrav7, DAMTP, April 2007 (jointly with E. Anderson, G. Gibbons, and J. Stewart)
- Workshop on Evolution Equations and Self-gravitating Systems, AEI Potsdam, September 2007 (jointly with L. Andersson, A. Rendall, I. Rodnianski)
- Scientific committee, Geometry and Analysis conference, Royal Institute of Technology, Stockholm, August 2008
- Mathematical Aspects of General Relativity, Niels Bohr Institute, April 2008 (jointly with Piotr Chruściel, Tobias Colding, Bergfinnur Durhuus, Niels Obers, Jan Philip Solovej, Paul Tod)
- Mathematical Challenges of General Relativity, AMS program at Snowbird, Utah for mentoring graduate students and postdocs, June 13–June 19, 2009 (jointly with Sergiu Klainerman, Richard Schoen and Alexander Ionescu)
- Black holes in relativity, MSRI Hot Topics Workshop, September 14–18, 2009 (jointly with Igor Rodnianski)
- Geometric Analysis and General Relativity (jointly with L. Andersson, G. Galloway, and D. Pollack) Banff International Research Station, June 20–25, 2010