Daniel Kennefick -- Curriculum Vitae

Institutional Address

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Education

Ph.D. in Physics with Minor in Science, Ethics and Society, 1997
California Institute of Technology, Pasadena, California

Thesis: Radiation Reaction in Binary Systems in General Relativity
Physics Thesis: Part I: Gravitational Waves from Coalescing Binary Systems in General Relativity
History Thesis: Part II: Controversies in the History of the Radiation Reaction Problem in GR

M.S. in Physics, 1991, California Institute of Technology

M.Sc. in Physics, 1989, University College Cork, Ireland
Thesis: Static and Stationary Solutions of Einstein's Equations

B.Sc. in Physics, 1987, 1st class honours, University College Cork

Personal Information

Born: 21st June, 1966, Lurgan, Co. Armagh, Ireland
Languages: French and German

Work Experience

Dec 1997 – Aug 2000 Research Associate, Cardiff University, Wales
Aug 2000 – Dec 2000 Visiting Assistant Professor, University of Arkansas
Jan 2001 – Jan 2004 Senior Research Fellow, California Institute of Technology
Jan 2004 – Jul 2008 Visiting Assistant Professor, University of Arkansas
and Editor, Einstein Papers Project, Princeton University Press
Aug 2008 – Aug 2015 Assistant Professor, University of Arkansas
Sep 2015 – present Associate Professor, University of Arkansas

Awards, Honours and Grants

1983—89 Keliher Scholarship, UCC
1989—91 National University of Ireland Travelling Studentship
1994—95 NSF Doctoral Dissertation Improvement Grant
1997 Milton and Francis Clauser Doctoral Prize, Caltech
1997—98 NSF International Postdoctoral Fellowship
1998—99 European Commission Marie Curie Postdoctoral Fellowship
1998—00 Economic and Social Research Council (UK) Research Grant
2003—06 Co-I on NASA-Ames grant NAG5-12834 "Foundations for LISA Data Analysis"
2007—08 Principal Investigator on NASA EPSCoR Reseach in Development Grant,
2008—11 PI on NASA EPSCoR Grant "A Census of Supermassive Black Holes in the Universe,"
2008 Elected Fellow of the American Physical Society
2009—15 Served on advisory committee of the AIP Center for the History of Physics
2015 Elected Vice Chair of the APS Forum for the History of Physics

Teaching Experience

1985—89 Instructing and Grading Physics Lab Sessions and Problem Sets, UCC
1989—96 Teaching Assistant for Freshman Physics Lab, Caltech
1995—96 Presenting lectures on Newton, Einstein and General Relativity, Caltech
1997—99 Presenting occasional lectures on science and society at Cardiff University
2000 Taught University Physics III at Univ. of Arkansas, Fayetteville
2001—03 Taught course on Einstein and the History of Modern Physics at Caltech
2004 Taught Physics and Human Affairs at University of Arkansas, Fayetteville
2004—07 Taught College Physics II at University of Arkansas, Fayetteville
2006—14 Teaching upper level and graduate courses at Univ. of Arkansas, Fayetteville

Outreach

Appeared in documentary film "Einstein," aired on the History Channel, Nov 17, 2008 and available on DVD.
Contributed to the commemorative catalog of the 2005 Einstein Year Museum Exhibit in Berlin, "Albert Einstein: Chief Engineer of the Universe."
Gave seminar at the American Museum of Natural History, New York in conjunction with their exhibit "Einstein," February, 2003.
Give presentations on astronomy to elementary schools in Arkansas.

Mentoring

Ph. D. students collaborated with while I was a postdoc: 1
M. Sc. students advised: 2
Ph. D. students currently advising: 6
Undergraduate research students mentored: 10
Summer REU students mentored: 10

Published works

Books:

"Traveling at the Speed of Thought: Einstein and the Quest for Gravitational Waves" – Daniel Kennefick – (Princeton University Press, 2007). This book has been translated and published in Japanese by The English Agency (Japan) Ltd. (2008) and in Chinese as part of the Philosopher's Stone series (2010).

"An Einstein Encyclopedia" – Alice Calaprice, Daniel Kennefick and Robert Schulmann (Princeton Univ. Press, Princeton, NJ, 2015).

The Collected Papers of Albert Einstein Volume 13: The Berlin Years: Writings and Correspondence January 1922 to March 1923 – Diana Kormos Buchwald, Jozsef Illy, Ze'ev Rosenkranz and Tilman Sauer, Editors – Jeroen van Dongen, Daniel Kennefick, Anne J. Kox, Dennis Lehmkuhl, Osik Moses and Issachar Unna, Associate Editors (Princeton University Press, 2012).

"The Collected Papers of Albert Einstein Volume 12: The Berlin Years: Correspondence 1920" – Diana Kormos Buchwald, Tilman Sauer, Ze'ev Rosenkranz, Jozsef Illy and Virginia Holmes, Editors – Jeroen van Dongen, Daniel Kennefick and Anne J. Kox, Associate Editors (Princeton University Press, 2009).

"The Collected Papers of Albert Einstein Volume 10: The Berlin Years: Correspondence 1920" – Diana Kormos Buchwald, Tilman Sauer, Ze'ev Rosenkranz, Jozsef Illy and Virginia Holmes, Editors – Jeroen van Dongen, Daniel Kennefick and Anne J. Kox, Associate Editors (Princeton University Press, 2006).

"The Collected Papers of Albert Einstein Volume 9: The Berlin Years: Correspondence 1919-1920" – Diana Kormos Buchwald, Robert Sculmann, József Illy, Daniel Kennefick and Tilman Sauer, Editors – (Princeton University Press, 2004).

"The Collected Papers of Albert Einstein Volume 7: The Berlin Years: Writings 1918-1921" – Michel Janssen, Robert Sculmann, József Illy, Christoph Lehner and Diana Kormos Buchwald, Editors – Daniel Kennefick, Anne J. Kox and David Rowe, Associate Editors (Princeton University Press, 2001).

Articles:

"Relativity in America" Daniel Kennefick in *A Companion to the History of American Science* edited by Georgina M. Montgomery and Mark A. Largent pp. 512 – 527 (Wiley Blackwell Companions to American History, Oxford, 2015).

"A Fundamental Plane of Spiral Structure in Disk Galaxies" Benjamin L. Davis, Daniel Kennefick, Julia Kennefick, Kyle B. Westfall, Douglas W. Shields, Russell Flatman, Matthew Hartley, Joel C. Berrier, Thomas P. K. Martinsson, Rob A. Swaters *The Astrophysical Journal Letters* **802**, L13 (2015).

"Constraining Dark Matter Halo Profiles and Galaxy Formation Models Using Spiral Arm Morphology. II. Dark and Stellar Mass Concentrations for 13 Nearby Face-on Galaxies" Seigar, Marc S.; Davis, Benjamin L.; Berrier, Joel; Kennefick, Daniel *The Astrophysical Journal* **795**, 90 (2014).

"The Black Hole Mass Function Derived from Local Spiral Galaxies" Benjamin L. Davis, Joel C. Berrier, Lucas Johns, Douglas W. Shields, Matthew Hartley, Daniel Kennefick, Julia Kennefick, Marc S. Seigar and Claud H. S. Lacy *The Astrophysical Journal* **789**, 124 (2014).

"Einstein, Gravitational Waves and the Theoreticians' Regress" Daniel Kennefick in *The Cambridge Companion to Einstein* edited by Michel Janssen and Christoph Lehner pp. 270 - 280 (Cambridge Univ. Press, 2014).

"On the Superradiance-tidal friction correspondence" Kostas Glampedakis, Shasvath J Kapadia and Daniel Kennefick – *Physical Review* **89**, 024007 (2014).

"Three and a half Principles: The Origins of Modern Relativity Theory" Daniel Kennefick in *The Oxford Handbook of the History of Physics* edited by Jed Z. Buchwald and Robert Fox pp. 789 – 813 (Oxford Univ. Press, 2013).

"Further Evidence for a Supermassive Black Hole Mass-Pitch Angle Relation" Joel C. Berrier, Benjamin L. Davis, Daniel Kennefick, Julia D. Kennefick, Marc S. Seigar, R. Scott Barrows, Matthew Hartley, Doug Shields, Misty C. Bentz and Claud H. S. Lacy – *The Astrophysical Journal* **769**, 132 (2013).

"Do Floating Orbits in Extreme Mass Ratio Binary Black Holes Exist?" Shasvath J. Kapadia, Daniel Kennefick and Kostas Glampedakis – *Physical Review* **87**, 044050 (2013).

"Investigating the Outflow or Dual Active Galactic Nucleus Origins of High-Ionization Double-Peaked Emission lines in SDSS Quasars at z = 0.8-1.6" - R. Scott Barrows, Claud H. Sandberg Lacy, Julia D. Kennefick, Daniel Kennefick, Joel Berrier and Daniel Stern, *Astrophysical Journal,* **769**, 95 (2013).

"On the Link Between Central Black Holes, Bar Dynamics, and Dark Matter Halos in Spiral Galaxies" Patrick Treuthardt, Marc S. Seigar, Amber D. Sierra, Ismaeel Al-

Baidhany, Heikki Salo, Daniel Kennefick, Julia Kennefick, and Claud H. S. Lacy - *Monthly Notices of the Royal Astronomical Society* **423**, 3118-3133 (2012).

"Not Only Because of Theory: Dyson, Eddington and the Competing Myths of the 1919 Eclipse Expedition" Daniel Kennefick in *Einstein and the Changing World Views of Physics* edited by Christoph Lehner, Juergen Renn and Matthias Schemmel pp. 201-232 (Birkhauser, 2012).

"Measurement of Galactic Logarithmic Spiral Arm Pitch Angle Using Two-dimensional Fast Fourier Transform Decomposition" - Benjamin Davis, Joel Berrier, Doug Shields, Julia Kennefick, Daniel Kennefick, Marc Seigar, Claud Lacy and Invanio Puerari - *The Astrophysical Journal Supplement* **199**, 33 (2012).

"Unusual double-peaked emission in the SDSS quasar J093201.60 + 031858.7" - Scott Barrows, Claud Lacy, Daniel Kennefick, Julia Kennefick and Marc Seigar - *New Astronomy* **16**, 122-127 (2011).

"Testing Relativity from the 1919 Eclipse – A Question of Bias" – Daniel Kennefick – *Physics Today* **62**, 37-42 (2009).

"Discovery of a Relationship between Spiral Arm Morphology and Supermassive Black Hole Mass in Disk Galaxies" – Marc Seigar, Daniel Kennefick, Julia Kennefick and Claud Lacy – *Astrophysical Journal Letters* **678**, L93 (2008).

"Computational efficiency of frequency- and time-domain calculations of extreme mass-ratio binaries: Equatorial orbits" – Jonathan L. Barton, David J. Lazar, Daniel J. Kennefick, Gaurav Khanna, Lior M. Burko – *Physical Review D* **78**, 064042 (2008).

"Einstein versus the Physical Review" – Daniel Kennefick – *Physics Today* **58**, Number 9 (September 2005) 43-48. This article has been translated and reprinted in a Japanese journal *Parity* **21** (May 2006), 11-20.

"Astronomers Test General Relativity: Light-bending and the Solar Redshift" – Daniel Kennefick – in *Albert Einstein, Chief Engineer of the Universe: One Hundred Authors for Einstein* ed., Juergen Renn, pgs. 178–181 (Wiley-VCH, Weinheim, 2005). Published in German edition as "Astronomen Testen die Allgemeine Relativitaet: Lichtablenkung und Solare Rotverscheibung" *Ingenieur des Universums, Albert Einstein: Hundert Autoren fuer Einstein*

"Einstein and the Problem of Motion: A Small Clue" – D. Kennefick – in *The Universe of General Relativity* Einstein Studies vol. XI, eds. Jean Eisenstaedt and Anne J. Kox pp. 109—124 (Birkhauser, Boston, 2005).

"Gravitational radiation timescales for extreme mass ratio inspirals" – J. R. Gair, D. Kennefick and S. L. Larson – *Astrophysical Journal* **639**, 999-1006 (2006).

"Semi-relativistic approximation to gravitational radiation from encounters with black holes" – J. R. Gair, D. Kennefick and S. L. Larson – *Physical Review D* **72**, 084009 (2005).

"Approximating the Inspiral of Test-Bodies into Kerr Black Holes" – K. Glampedakis, S. Hughes and D. Kennefick – *Physical Review D* **66**, 064005 (2002).

"Zoom and Whirl: Eccentric Equatorial Orbits around Spinning Black Holes and their Evolution under Gravitational Radiation Reaction'' –K. Glampedakis and D. Kennefick – *Physical Review D* **66**, 044002 (2002).

"Star Crushing: Theoretical Controversy and the Theoreticians' Regress" – D. Kennefick – *Social Studies of Science*, **30/1**, 5—40 (Feb 2000)

"Controversies in the History of the radiation reaction problem in General Relativity" – D. Kennefick – in *The Expanding Worlds of General Relativity* (*Einstein Studies*, *volume 7*) eds. H. Goenner, J. Renn, J. Ritter and T. Sauer, pgs. 207—234 (Birkhauser Verlag, Boston, 1999).

"Stability, under gravitational radiation reaction, of circular equatorial orbits of particles around Kerr black holes." – D. Kennefick – *Physical Review D*, **58**, 06/4012—4026 (1998).

"Gravitational radiation reaction in the case of quasi-circular orbits around a Kerr black hole" – D. Kennefick and A. Ori – *Physical Review D*, **53**, 4319—4326 (1996).

"Weakly decaying asymptotically flat static and stationary solutions to the Einstein equations" – D. Kennefick and N. Ó Murchadha – *Classical and Quantum Gravity,* **12**, 149—158 (1995).

"Gravitational radiation reaction for bound motion around a Schwarzschild black hole" – C. Cutler, D. Kennefick and E. Poisson – *Physical Review D*, **50**, 3816—3835 (1994).

"Prospects for detecting the Christodoulou memory of gravitational waves from a coalescing compact binary and using it to measure neutron-star radii" – D. Kennefick – *Physical Review D*, **50**, 3587—3595 (1994).

"Gravitational radiation from a particle in circular orbit around a black hole III. Stability of circular orbits under radiation reaction" – T.A. Apostolatos, D. Kennefick, A. Ori and E. Poisson – *Physical Review D*, **47**, 5376—5388 (1993).

"The last three minutes: Issues in gravitational-wave measurements of coalescing compact binaries" – C. Cutler, T.A. Apostolatos, L. Bildsten, L.S. Finn, E.E. Flanagan, D. Kennefick, D.M. Markovic, A. Ori, E. Poisson, G.J. Sussman and K.S. Thorne – *Physical Review Letters*, **70**, 2984—2987 (1993).

Conference Proceedings:

"The Black Hole Mass Function Derived from Local Spiral Galaxies" Davis, B. L.; Berrier, J. C.; Johns, L.; Shields, D. W.; Hartley, M. T.; Kennefick, D.; Kennefick, J.; Seigar, M. S.; Lacy, C. H. S. in *Structure and Dynamics of Disk Galaxies. Proceedings of the Conference held 12-16 August, 2013 at the Winthrop Rockefeller Institute* Eds. M.S. Seigar and P. Treuthardt ASP Conference Series, Vol. 480, 2014, p.204.

"The Arkansas Galaxy Evolution Survey: SMBH Mass and Spiral Arm Morphology" Seigar, M. S.; Berrier, J. C.; Davis, B. L.; Kennefick, D.; Kennefick, J.; Barrows, R. S.; Hartley, M. T.; Shields, D. W.; Bentz, M. C.; Lacy, C. H. S. *Structure and Dynamics of Disk Galaxies. Proceedings of the Conference held 12-16 August, 2013 at the Winthrop Rockefeller Institute, Petit Jean Mountain, Arkansas, USA*. Eds M.S. Seigar and P. Treuthardt. ASP Conference Series, Vol. 480, 2014, p.196.

"The Spiral Structure of AGN Host Galaxies" Kennefick, J.; Barrows, R. S.; Hughes, J. A.; Schilling, A.; Davis, B.; Shields, D.; Madey, A.; Kennefick, D.; Lacy, C.; Seigar, M. *Structure and Dynamics of Disk Galaxies. Proceedings of the Conference held 12-16 August, 2013 at the Winthrop Rockefeller Institute, Petit Jean Mountain, Arkansas, USA*. Eds. M.S. Seigar and P. Treuthardt. ASP Conference Series, Vol. 480, 2014, p.133.

"Evolution of Spiral Arm Pitch Angle" Shields, D. W.; Henderson, C.; Davis, B. L.; Johns, L.; Berrier, J. C.; Kennefick, D.; Kennefick, J.; Seigar, M. S.; Lacy, C. H. S. *Structure and Dynamics of Disk Galaxies. Proceedings of the Conference held 12-16 August, 2013 at the Winthrop Rockefeller Institute, Petit Jean Mountain, Arkansas, USA*. Eds. M.S. Seigar and P. Treuthardt. ASP Conference Series, Vol. 480, 2014, p.130.

"Spiral Arm Pitch Angle and its Significance for Theories of Galactic Structure" Kennefick, Daniel *Structure and Dynamics of Disk Galaxies. Proceedings of the Conference held 12-16 August, 2013 at the Winthrop Rockefeller Institute* Eds. M.S. Seigar and P. Treuthardt. ASP Conference Series, Vol. 480, 2014, p.125.

"NGC 3124: A Resonance Ring Disk Galaxy with a Skewed Bar" Treuthardt, P.; Seigar, M. S.; Salo, H.; Kennefick, D.; Kennefick, J.; Lacy, C. H. S. *Structure and Dynamics of Disk Galaxies. Proceedings of the Conference held 12-16 August, 2013 at the Winthrop Rockefeller Institute, Petit Jean Mountain, Arkansas, USA*. Eds. M.S. Seigar and P. Treuthardt. ASP Conference Series, Vol. 480, 2014, p.69.

"Analogy and the History of Gravitational Waves" -- in *Proceedings of the second International A.D. Sakharov conference on* physics: *Moscow*, *Russia*, *20-24 May*, *1996* eds. I.M. Dremin and A.M. Semikhatov, pgs. 267-270 (Singapore, World Scientific, 1997).

"Prospects for deducing the equation of state of nuclear matter from gravitational-wave measurements of neutron-star binary coalescences" – D. Kennefick, D. Laurence and K.S. Thorne – in *The 7th Marcel Grossman conference on recent developments in theoretical and experimental General Relativity*, *gravitation and relativistic field theories*: *proceedings of the meeting held at Stanford University*, *24-30 July 1994*, eds. Robert T. Jantzen and G. MacKeiser, pgs. 1090-1092 (Singapore, World Scientific, 1996).

Book Reviews and Essays:

"A Few Beasts Hissed: Buzz Lightyear and the Refusal to Believe" Daniel Kennefick in *The Galaxy is Rated G: Essays on Children's Science Fiction Film and Television* edited by Ryan Neighbors and Sandy Rankin (McFarland, 2011)

"Gravitational Waves: A Prehistory" – D. Kennefick – *Sky and Telescope*, **100/4**, 58—64 (October 2000).

Review of *Cracking the Einstein Code: Relativity and the Birth of Black Hole Physics* by Fulvio Melia in *Metascience* **20**, 91-93 (2011).

Review of *Einstein's Unification* by Jeroen van Dongen in *Foundations of Physics* **41**, 278-280 (2011).

Review of *Einstein for the 21st Century: His Legacy in Science, Art, and Modern Culture* edited by Peter L. Galison, Gerald Holton and Silvan S. Schweber in *American Scientist* (2008).

Review of *The Universal Force: Gravity, Creator of Worlds* by Louis Girifalco in *Physics World* 36-37 (April 2008).

Review of *Einstein: His Life and Universe* by Walter Isaacson in *American Scientist* (September 2007).

Review of *Empire of the Stars* by Arthur Miller in *The Times Literary Supplement* (August 2005).

Review of *Ways of Knowing* by John V. Pickstone (Univ. of Chicago Press, 2001) in *Journal of Interdisciplinary History* **33**, 279 – 280 (2002).

Review of *Einstein in Berlin* by Thomas Levenson (Bantam Books, 2003) in *American Scientist* **91**, 572-573 (2003).