

Ilya Mandel

CONTACT INFORMATION	School of Physics and Astronomy, University of Birmingham, Edgbaston B15 2TT Birmingham, United Kingdom <i>E-mail:</i> imandel@star.sr.bham.ac.uk <i>WWW:</i> www.sr.bham.ac.uk/~imandel	
RESEARCH INTERESTS	Gravitational-Wave Astronomy Astrophysics of Compact Objects	Compact-Object Binaries Gravitational-Wave Data Analysis
EDUCATION	California Institute of Technology , Pasadena, CA USA Ph.D. in Physics (defended June 2007, officially conferred June 2008) <ul style="list-style-type: none">• Dissertation Title: “The Three Ss of Gravitational Wave Astronomy: Sources, Signals, Searches”• Advisor: Kip S. Thorne M.S. in Physics, 2003 Stanford University , Stanford, CA USA M.S. in Computer Science (Theory specialization), 2001 B.S. in Physics, with Distinction and Departmental Honors, 2000	
ACADEMIC EXPERIENCE	University of Birmingham, UK <i>Lecturer, School of Physics and Astronomy</i>	2010 - present
	NSF Astronomy & Astrophysics Postdoctoral Fellow At Northwestern 9/2009-6/2010; at MIT since 7/2010.	2009-2011
	Northwestern University , Evanston, IL USA <i>Postdoctoral Scholar in Theoretical Astrophysics</i>	2007 - 2009
	California Institute of Technology , Pasadena, CA USA <i>Research Assistant</i>	2006 - 2007
	<i>Teaching Assistant</i>	2001 - 2006
	Stanford University , Stanford, CA USA <i>Research Assistant, Gravity Probe B</i>	1996 - 2003
	<i>Research and Teaching Assistant, Computer Science</i>	1999
AWARDS	NSF Astronomy and Astrophysics Postdoctoral Fellowship Dean’s Award for Academic Achievement (excellence in research), Stanford University Tau Beta Pi (engineering honor society) Member National Merit Scholar National Advanced Placement Scholar	
SERVICE	Reviewer for the Astrophysical Journal, Physical Review D, Classical and Quant. Gravity, MNRAS NASA and NSF grant reviewer LIGO Scientific Collaboration member, LSC Council member LSC internal reviewer Mock LISA Data Challenge and Parameter Estimation Taskforce member Einstein Telescope Science Working Group member	

MENTORING

Graduate students:

Vivien Raymond (2007 – 2012, co-advised with Vicky Kalogera), parameter estimation on spinning binaries; currently a Millikan Prize Fellow at Caltech

Ben Farr (2009 – present, co-advised with Vicky Kalogera), MCMC techniques in LIGO data analysis

Carl Rodriguez (2010 – present, co-advised with Vicky Kalogera), signatures of deviations from Kerr spacetime

Rory Smith (2011 – present, co-advising with Alberto Vecchio), intermediate-mass-ratio waveforms

Will Vausden (2011 – present), astrophysics from gravitational-wave detections

Kat Grover (2011 – present, co-advising with Alberto Vecchio), testing GR with compact-binary coalescences

Undergraduate students:

Matthew Dodelson (NASA summer student, 2009), testing GR with EMRIs

Daniel Douglas (2010), testing GR with EMRIs

Frederick Robinson (2009 – 2010), Fisher matrix analysis

Luke Kelley (2010 – 2011, co-advised with Enrico Ramirez-Ruiz), electromagnetic counterparts to LIGO searches

GRANTS

PI on NSF Astronomy and Astrophysics Postdoctoral Fellowship grant “Gravitational-wave astronomy: a new window on the universe” [total grant amount over 3 years: \$249,000]

Co-I on NASA ATP grant “Binary White Dwarfs: Gravitational Wave Astrophysics and Data Analysis”

PERSONAL

Born in St. Petersburg, Russia, on June 11, 1979

U.S. Citizen

SELECTED
PUBLICATIONS

(Papers accepted for publication in refereed journals are indicated with a bullet.)

- L. Z. Kelley, I. Mandel, E. Ramirez-Ruiz. 2012. Electromagnetic transients as triggers in searches for gravitational waves from compact binary mergers. arXiv:1209.3027
- K. Belczynski, T. Bulik, I. Mandel, B. S. Sathyaprakash, A. Zdziarski, J. Mikolajewska. 2012. Cyg X-3: a Galactic double black hole or black hole-neutron star progenitor. arXiv:1209.2658
- J. Chennamangalam, D. R. Lorimer, I. Mandel, M. Bagchi. 2012. Constraining the luminosity function parameters and population size of radio pulsars in globular clusters. arXiv:1207.5732
- M. Dominik, K. Belczynski, C. Fryer, D. Holz, E. Berti, T. Bulik, I. Mandel, R. O'Shaughnessy. 2012. Double Compact Objects I: The Significance Of The Common Envelope On Merger Rates. arXiv:1202.4901
- J. Veitch, I. Mandel, B. Aylott, B. Farr, V. Raymond, C. Rodriguez, M. van der Sluys, V. Kalogera, A. Vecchio. 2012. Estimating parameters of coalescing compact binaries with proposed advanced detector networks. *Phys. Rev. D* 85, 104045. arXiv:1201.1195
 - C. L. Rodriguez, I. Mandel, J. R. Gair. 2012. Verifying the no-hair property of massive compact objects with intermediate-mass-ratio-inspirals in advanced gravitational-wave detectors. *Phys. Rev. D* 85, 062002. arXiv:1112.1404
 - S. Vitale, W. Del Pozzo, T. G. F. Li, C. Van Den Broeck, I. Mandel, B. Aylott, J. Veitch. 2011. Effect of calibration errors on Bayesian parameter estimation for gravitational wave signals from inspiral binary systems in the Advanced Detectors era. *Phys. Rev. D* 85, 064034. arXiv:1111.3044
- I. Mandel, L. Z. Kelley, E. Ramirez-Ruiz. 2011. Towards improving the prospects for coordinated gravitational-wave and electromagnetic observations. arXiv:1111.0005
- S. R. Taylor, J. R. Gair, I. Mandel. 2012. Hubble without the Hubble: cosmology using advanced gravitational-wave detectors alone. *Phys. Rev. D* 85:023535. arXiv:1108.5161
- W. Farr and I. Mandel. 2011. An Efficient Interpolation Technique for Jump Proposals in Reversible-Jump Markov Chain Monte Carlo Calculations. arXiv:1104.0984
- J. Abadie et al. (LIGO Scientific Collaboration and Virgo Collaboration), as internal reviewer. 2011. Search for gravitational waves from binary black hole inspiral, merger and ringdown. *Phys. Rev. D* 83:122005. arXiv:1102.3781
 - W. Farr, N. Sravan, A. Cantrell, L. Kreidberg, C. D. Baily, I. Mandel, V. Kalogera. 2011. The Mass Distribution of Stellar-Mass Black Holes. *ApJ* 741, 103. arXiv:1011.1459
 - L. Z. Kelley, E. Ramirez-Ruiz, M. Zemp, J. Diemand, I. Mandel. 2010. The Distribution of Coalescing Compact Binaries in the Local Universe: Prospects for Gravitational-Wave Observations. *ApJL* 725, L91. arXiv:1011.1256
 - M. Punturo et al. 2010. Third generation of gravitational wave observatories and their science reach. *Class. Quantum Grav.* 27, 084007.
 - J. Abadie et al. (LIGO Scientific Collaboration and Virgo Collaboration), as lead author. 2010. Predictions for the Rates of Compact Binary Coalescences Observable by Ground-based Gravitational-wave Detectors. *Class. Quant. Grav.* 27, 173001. arXiv:1003.2480

- I. Mandel, R. O’Shaughnessy, V. Kalogera. 2010. Unraveling Binary Evolution from Gravitational-Wave Signals and Source Statistics. arXiv:1001.2583
- I. Mandel. 2010. Parameter estimation on gravitational waves from multiple coalescing binaries. Phys. Rev. D 81, 084029. arXiv: 0912.5531
- I. Mandel, J. R. Gair, M. C. Miller. 2010. Detecting coalescences of intermediate-mass black holes in globular clusters with the Einstein Telescope. arXiv:0912.4925
- V. Raymond, M. V. van der Sluys, I. Mandel, V. Kalogera, C. Roever, N. Christensen. 2010. The effects of LIGO detector noise on a 15-dimensional Markov-chain Monte-Carlo analysis of gravitational-wave signals. Class. Quantum Grav. 27, 114009. arXiv:0912.3746
 - I. Mandel and R. O’Shaughnessy. 2010. Compact Binary Coalescences in the Band of Ground-based Gravitational-Wave Detectors. Class. Quantum Grav. 27, 114007. arXiv:0912.1074
 - S. Babak et al. (Mock LISA Data Challenge Team). 2010. The Mock LISA Data Challenges: from Challenge 3 to Challenge 4 Class. Quantum Grav. 27, 084009. arXiv:0912.0548
 - J. Gair, I. Mandel, M. C. Miller, M. Volonteri. 2011. Exploring intermediate and massive black-hole binaries with the Einstein Telescope. General Relativity and Gravitation, 43, 485-518. arXiv:0907.5450
 - J. Gair, I. Mandel, A. Sesana, A. Vecchio. 2009. Probing seed black holes using the next generation of gravitational-wave detectors. Class. Quant. Grav. 26, 204009. arXiv:0907.3292
 - L. Cadonati et al. (NINJA collaboration). 2009. Status of NINJA: the numerical INJection Analysis project. Class. Quant. Grav. 26, 114008. arXiv:0905.4227
 - M. van der Sluys, I. Mandel, V. Raymond, V. Kalogera, C. Roever, N. Christensen. 2009. Parameter estimation for signals from compact binary inspirals injected into LIGO data. Class. Quant. Grav. 26, 204010. arXiv:0905.1323
 - A. Sesana, J. Gair, I. Mandel, A. Vecchio. 2009. Observing gravitational waves from the first generation of black holes. ApJL 698, L129. arXiv:0903.4177
 - B. Aylott et al. (NINJA collaboration). 2009. Testing gravitational-wave searches with numerical relativity waveforms: Results from the first Numerical INJection Analysis (NINJA) project. Class. Quant. Grav. 26, 165008. arXiv:0901.4399
 - V. Raymond, M. van der Sluys, I. Mandel, V. Kalogera, C. Roever, N. Christensen. 2009. Degeneracies in Sky Localisation Determination from a Spinning Coalescing Binary through Gravitational Wave Observations: a Markov-Chain Monte-Carlo Analysis for two Detectors. Class. Quant. Grav. 26, 114007. arXiv:0812.4302
 - K. G. Arun et al. (LISA PE taskforce). 2009. Massive Black Hole Binary Inspirals: Results from the LISA Parameter Estimation Taskforce. Class. Quant. Grav. 26, 094027. arXiv: 0811.1011
 - I. Mandel, J. R. Gair. 2009. Can we Detect Intermediate Mass Ratio Inspirals? Class. Quant. Grav. 26, 094036. arXiv:0811.0138
 - M. van der Sluys, C. Roever, A. Stroeer, V. Raymond, I. Mandel, N. Christensen, V. Kalogera, R. Meyer, A. Vecchio. 2008. Gravitational-Wave Astronomy with Inspirational Signals of Spinning Compact-Object Binaries. ApJL 688, L61. arXiv:0710.1897

- S. Babak et al. (Mock LISA Data Challenge Team). 2008. The Mock LISA Data Challenges: from Challenge 1B to Challenge 3. *Class. Quant. Grav.* 25, 184026. arXiv:0806.2110
 - M. van der Sluys, V. Raymond, I. Mandel, C. Roever, N. Christensen, V. Kalogera, R. Meyer, A. Vecchio. 2008. Parameter Estimation of Spinning Binary Inspirals Using Markov-Chain Monte Carlo. *Class. Quant. Grav.* 25, 184011. arXiv:0805.1689
 - J. R. Gair, I. Mandel, L. Wen. 2008. Improved Time-Frequency Analysis of Extreme-Mass-Ratio Inspirals in Mock LISA Data. *Class. Quant. Grav.* 25, 184031. arXiv:0804.1084
 - S. Babak et al. (Mock LISA Data Challenge Team). 2008. Report on the Second Mock LISA Data Challenge. *Class. Quant. Grav.* 25, 114037. arXiv:0711.2667
- J. R. Gair, I. Mandel, L. Wen. 2008. Time-Frequency Analysis of Extreme-Mass-Ratio Inspiral Signals in Mock LISA Data. *J. Phys.: Conf. Ser.* 122 012037. arXiv:0710.5250
- J. R. Gair, C. Li, I. Mandel. 2008. Observable Properties of Orbits in Exact Bumpy Spacetimes. *Phys. Rev. D* 77 024035. arXiv:0708.0628
- I. Mandel. 2007. Spin Distribution Following Minor Mergers and the Effect of Spin on the Detection Range for Low-Mass-Ratio Inspirals. arXiv:0707.0711
- I. Mandel, D. A. Brown, J. R. Gair, M. C. Miller. 2008. Rates and Characteristics of Intermediate-Mass-Ratio Inspirals Detectable by Advanced LIGO. *ApJ* 681 1431-1447. arXiv:0705.0285
 - D. A. Brown, J. Crowder, C. Cutler, I. Mandel, M. Vallisneri. 2007. A Three-Stage Search for Supermassive Black Hole Binaries in LISA data. *Class. Quant. Grav.* 24, S595-S605. arXiv:0704.2447
 - P. Amaro-Seoane, J. R. Gair, M. Freitag, M. C. Miller, I. Mandel, C. Cutler, S. Babak. 2007. Intermediate and Extreme Mass-Ratio Inspirals – Astrophysics, Science Applications and Detection using LISA. *Class. Quant. Grav.* 24 R113-R170. arXiv:astro-ph/0703495
 - K. Arnaud et al. (Mock LISA Data Challenge Team). 2007. Report on the First Round of the Mock LISA Data Challenges. *Class. Quant. Grav.* 24, S529-S539. arXiv:gr-qc/0701139
 - D. A. Brown, J. Brink, H. Fang, J. R. Gair, C. Li, G. Lovelace, I. Mandel, K. S. Thorne. 2007. Gravitational Waves from Intermediate-Mass-Ratio Inspirals for Ground-based Detectors. *Phys. Rev. Lett.* 99, 201102. arXiv:gr-qc/0612060
 - I. Mandel. 2005. The Geometry of a Naked Singularity Created by Standing Waves Near a Schwarzschild Horizon, and Its Application to the Binary Black Hole Problem. *Phys. Rev. D* 72 084025. arXiv:gr-qc/0505149
 - A. Silbergleit, I. Mandel, I. Nemenman. 2003. Potential and Field Singularity at a Surface Point Charge. *J. Math. Phys.* 44 (10) 4460-4466. arXiv:math-ph/0306039
- A. Silbergleit, I. Nemenman, I. Mandel. 2003. On the Interaction of Point Charges in an Arbitrary Domain. *J. Tech. Phys.* 48 (2), 146-151. arXiv:physics/0105052

- SELECTED RECENT PRESENTATIONS
- 9/2006 Talk at LISA Astro-GR@AEI, Golm, Germany. “Using EMRIs to probe bumpy black-hole spacetimes”
- 1/2007 Seminar at Leyden, Netherlands. “Gravitational waves from intermediate-mass-ratio inspirals in ground-based detectors”
- 4/2007 Talk at APS, Jacksonville, FL. “Intermediate-mass-ratio inspirals into intermediate-mass black holes”
- 7/2007 Talk at Amaldi 7, Sydney, Australia. “Time-Frequency Analysis of Extreme-Mass-Ratio Inspirals: Mock LISA Data Challenge, Round 2”
- 10/2007 Astrophysics Seminar at Northwestern University, Evanston, IL. “Testing the No-Hair Theorem with Gravitational-Wave Observations”
- 11/2007 Talk at 17th Midwest Relativity Meeting, St Louis, MO. “Black-Hole Spins Following Minor Mergers”
- 12/2007 Talk at GWDAAW-12, Boston, MA. “Extracting Extreme Mass Ratio Inspiral Parameters via Time-Frequency Methods”
- 2/2008 Seminar at Center for Gravitation and Cosmology, University of Wisconsin-Milwaukee. “Ground-based detection of gravitational waves from intermediate-mass-ratio inspirals”
- 3/2008 Talk at 24th Pacific-Coast Gravity Meeting, Santa Barbara, CA. “Extracting Extreme Mass Ratio Inspiral Parameters via Time-Frequency Methods”
- 6/2008 Talk at 7th LISA Symposium, Barcelona, Spain. “Can we detect IMRIs?”
- 9/2008 Short seminar at Institute of Astronomy, Cambridge, UK. “Ground-based detection of gravitational waves from intermediate-mass-ratio inspirals”
- 10/2008 Talk at 18th Midwest Relativity Meeting, Notre Dame, IN. “Can we detect intermediate-mass-ratio inspirals?”
- 12/2008 Seminar at HEP/Astrophysics Seminar, Purdue, West Lafayette, IN. “Prospects in Gravitational-Wave Astronomy”
- 2/2009 Seminar Southampton, UK “Compact binaries as sources for ground-based gravitational-wave detectors”
- 3/2009 Seminar KITP, UC Santa Barbara “Compact Binaries, Intermediate-Mass-Ratio Inspirals, and Other Prospects in Gravitational-Wave Astronomy”
- 4/2009 Talk at IMBH Workshop, UC Irvine. “Gravitational Waves from Binary Systems Containing Intermediate-Mass Black Holes”
- 6/2009 Talk at Amaldi-8 conference, Columbia University. “Compact binaries as sources for ground-based gravitational-wave detectors”
- 7/2009 Invited Talk at NRDA-2 at AEI, Golm, Germany. “Predictions for Detectable Coalescences of Compact Binaries Including Black Holes”
- 7/2009 Talk at Marcel Grossmann 12 in Paris, France. “Probing Light Seeds of Massive Black Holes”

with Gravitational Waves”

7/2009 Invited talk at MG-12, Paris. “Unravelling Binary Evolution from Gravitational-Wave Signals and Source Statistics”

10/2009 Invited talk at the CfA, Cambridge, MA. “Gravitational Waves from Binaries”

1/2010 Talk at NSF Fellows’ Symposium, AAS, Washington, DC. “Prospects in Gravitational-Wave Astronomy”

1/2010 Poster at GWDAAW, Rome. “Parameter estimation on gravitational waves from multiple coalescing binaries”

2/2010 Talk at Aspen Winter School on Formation and Evolution of Black Holes, Aspen, CO. “Extracting the distribution of black-hole parameters from gravitational-wave observations”

3/2010 Seminar, University of California, Santa Cruz. “Prospects in Gravitational-Wave Astronomy”

5/2010 Seminar, Northwestern University. “Prospects in Gravitational-Wave Astronomy”

5/2010 Seminar, Rochester Institute of Technology. “Prospects in Gravitational-Wave Astronomy”

6/2010 Talk at NRDA at the Perimeter Institute, Waterloo, Canada. “Bayesian Inference on Numerical Injections”

6/2010 Poster at LISA Symposium, Stanford, CA. “Extracting the distribution of black-hole parameters from gravitational-wave observations”

7/2010 Invited talk at GR-19, Mexico City. “The Mock LISA Data Challenges”

7/2010 Seminar, University of Birmingham, UK. “GWastrophysics”

7/2010 Talk, COSPAR-2010, Bremen. “Testing General Relativity with Gravitational Waves from Extreme Mass Ratio Inspirals”

1/2011 Talk at NSF Fellows Symposium, Seattle. “Gravitational waves from compact binaries: Status and prospects”

1/2011 Talk at AAS, Seattle. “Searching For Gravitational-wave Signals From Compact Binaries With LIGO And Virgo”

1/2011 Talk at GWPAW, Milwaukee, WI. “The Distribution of Coalescing Compact Binaries in the Local Universe: Prospects for Gravitational-Wave Observations”

2/2011 Seminar, West Virginia University, Morgantown, WV. “Markov Chain Monte Carlo techniques for parameter estimation”

2/2011 Seminar, University of Florida, Gainesville, FL. “GWastrophysics with compact binaries”

3/2011 Talk at Evolution of Compact Binaries, Valparaiso, Chile. “Compact Binary Coalescences: Connections to Gravitational-Wave Astronomy”

4/2011 Talk at MKI Postdoc Symposium, MIT. “Gravitational-wave Astrophysics with Compact

Binaries”

5/2011 Seminar at Princeton University. “GWastrophysics”

5/2011 Seminar at University of Maryland, College Park. “GW astrophysics with compact binaries”

5/2011 Talk at Aspen Center for Physics. “Why compact binaries are not boring”

9/2011 Poster at New Horizons in Time Domain Astronomy, Oxford, UK. “Electromagnetic transients as triggers in searches for gravitational waves from compact binary inspirals”

10/2011 Invited talk at LOFT Science Meeting, Amsterdam. “Gravitational wave observatories and LOFT”

11/2011 Seminar at Warsaw University, Poland. “Gravitational-wave Astrophysics of Compact Binaries”

12/2011 Seminar at Cardiff University. “GWastrophysics of Compact Binaries”

12/2011 Invited talk at LOFT and the Variable X-ray Sky, RAS, London. “LOFT and the EM counterparts to gravitational wave sources”

12/2011 Talk at Gravitation, Astrophysics and Cosmology conference, Quy Nhon, Vietnam. “Astrophysics, Cosmology and Fundamental Physics with ground-based gravitational-wave detectors”

3/2012 Invited talk at April APS Meeting, Atlanta, GA. “Intermediate-mass black holes: A theoretical perspective”

4/2012 Talk at April APS Meeting, Atlanta, GA. “What Waveforms do Data Analysts Want?, or the dangers of systematic errors in parameter estimation”

5/2012 Invited talk at Sackler conference: testing GR with astrophysical systems, Cambridge, MA. “Testing GR with Binary Coalescence Events”

6/2012 Talk at GWPAW, Hannover. “What Waveforms do Data Analysts Want?, or the dangers of systematic errors in parameter estimation”

6/2012 Invited talk at Exploring New Horizons with Gravitational Waves, Hannover. “Astrophysical Sources and Parameter Estimation”

7/2011 Invited course at Nijmegen Astroparticle summer school. “Gravitational Wave Astrophysics”

SELECTED 11/2008 Manned LIGO Scientific Collaboration both at the Society of Physics Students congress at
OUTREACH EVENTS Fermilab

12/2008 Co-presented *The Wonders of the Night Sky: The Life and Death of Stars* at the Theodore Roosevelt Elementary School's science fair in Park Ridge, Illinois

4/2009 Participated in special event at Dearborn Observatory as part of the *100 Years of Astronomy* celebration of the International Year of Astronomy

5/2009 Science Club at Roosevelt elementary school

5/2009 Judging Meaningful Science Consortium *Project Showcase* for Chicago public high school students

7/2009 Answered questions and assisted the public at the LIGO traveling exhibit at Adler Planetarium.

12/2009 Co-presented *The Wonders of the Night Sky: The Life and Death of Stars* at the Theodore Roosevelt Elementary School's science fair in Park Ridge, Illinois

3/2010 Co-organized the presentation of *Einstein's Cosmic Messengers*, a multimedia concert by Andrea Centazzo and Michele Vallisneri, at Northwestern University.