

Carl Rodriguez | Curriculum Vitae

MIT, 37-664L – 77 Massachusetts Ave – Cambridge, MA, 02139

📞 318.469.1779 • ✉ carlrodr@mit.edu • 🌐 bhdynamics.com

Pappalardo Fellow at MIT studying compact objects, star clusters, and gravitational waves. Strongly interested in the applications of astrophysics to STEM education and outreach.

Education

Northwestern University <i>Evanston, IL</i> Thesis – Modeling Dense Star Clusters and Their Implications for Advanced LIGO Advisor – Frederic Rasio	Ph.D. Physics 2016
Reed College <i>Portland, OR</i> Thesis – Accretion Disk Geodesics in Extreme Kerr Geometries Advisor – Joel Franklin	B.A. Physics 2010

Honors and Awards

○ MIT Pappalardo Fellowship	2016-2019
○ NSF Graduate Research Fellowship	2011-2016
○ NSF GK12 Fellowship	2013-2014
○ Illinois Space Grant Consortium Fellowship	2010-2011, 2015-2016
○ NSF STEM Scholar	2008-2010

Grants And Proposals

Modeling Dense Star Clusters and their Gravitational-wave Sources from Cosmological Simulations <i>PI: C. L. Rodriguez; 1.1M CPU Hours (\$20,000 Value)</i>	XSEDE 2018
---	----------------------

First Author Papers (with links)

Post-Newtonian Dynamics in Dense Star Clusters: Formation, Masses, and Merger Rates of Highly-Eccentric Black Hole Mergers <i>C. L. Rodriguez, P. Amaro-Seoane, S. Chatterjee, K. Kremer, F. Rasio, J. Samsing, S. Ye, M. Zevin;</i> Phys. Rev. D (in press)	PRD 2018
Redshift Evolution of the Black Hole Merger Rate From Globular Clusters <i>C. L. Rodriguez, A. Loeb;</i> ApJL, 865 , L5	ApJL 2018
A Triple Origin for the Heavy and Low-Spin Binary Black Holes Detected by LIGO/Virgo <i>C. L. Rodriguez, F. Antonini;</i> ApJ, 963 , 1, 7	ApJ 2018
A New Hybrid Technique for Modeling Dense Star Clusters <i>C. L. Rodriguez, B. Pattabiraman, S. Chatterjee, M. Morscher, F. Rasio, A. Choudhary, W-K. Liao;</i> Computational Astrophysics and Cosmology, 5 , 1	CompAC 2018
Post-Newtonian Dynamics in Dense Star Clusters: Highly-Eccentric, Highly-Spinning, and Repeated Binary Black Hole Mergers <i>C. L. Rodriguez, P. Amaro-Seoane, S. Chatterjee, F. Rasio;</i> Phys. Rev. Lett, 120 , 151101 - Articles in <i>Boston Globe</i> , <i>MIT News</i> (Links),	PRL 2018

Illuminating Black Hole Binary Formation Channels with Spins in Advanced LIGO <i>C. L. Rodriguez, M. Zevin, C. Pankow, V. Kalogera, F. Rasio; ApJL, 832, L2</i>	ApJL 2016
Dynamical Formation of the GW150914 Binary Black Hole <i>C. L. Rodriguez, C.-J. Haster, S. Chatterjee, V. Kalogera, F. Rasio; ApJL, 824, L8</i> - Articles in <i>New Scientist</i> , <i>Sky News</i> (Links), - Synopsis in <i>Astrobites</i> (Link)	ApJL 2016
Binary Black Hole Mergers from Globular Clusters: Masses, Merger Rates, and the Impact of Stellar Evolution <i>C. L. Rodriguez, S. Chatterjee, F. Rasio; Phys. Rev. D, 93, 084029</i>	PRD 2016
Million-Body Star Cluster Simulations: Comparisons between Monte Carlo and Direct N-body <i>C. L. Rodriguez, M. Morscher, L. Wang, S. Chatterjee, F. Rasio, R. Spurzem; MNRAS 463, 2109</i>	MNRAS 2016
Binary Black Hole Mergers from Globular Clusters: Implications for Advanced LIGO <i>C. L. Rodriguez, M. Morscher, B. Pattabiraman, S. Chatterjee, C.J. Haster, and F. Rasio; Phys. Rev. Lett. 115, 051101</i> - Synopsis by APS in <i>Physics</i> (Link) - Synopsis in popular science blog <i>IFLS</i> (Link)	PRL 2015
Basic Parameter Estimation of Binary Neutron Star Systems by the Advanced LIGO/Virgo Network <i>C. L. Rodriguez, B. Farr, V. Raymond, W. Farr, T. Littenberg, D. Fazi, V. Kalogera; ApJ, 785, 2, 119</i>	ApJ 2014
Inadequacies of the Fisher Information Matrix in gravitational-wave parameter estimation <i>C. L. Rodriguez, B. Farr, W. Farr, I. Mandel; Phys. Rev. D, 88, 8, 084013</i>	PRD 2013
Verifying the no-hair property of massive compact objects with intermediate-mass-ratio inspirals in advanced gravitational-wave detectors <i>C. L. Rodriguez, I. Mandel, J. Gair; Phys. Rev. D, 85, 6, 062002</i> - Synopsis in <i>Astrobites</i> (Link)	PRD 2012

Second Author Papers (with links)

Post-Newtonian Dynamics in Dense Star Clusters: Binary Black Holes in the LISA Band <i>K. Kremer, C. L. Rodriguez, P. Amaro-Seoane, K. Breivik, S. Chatterjee, M. Katz, S. Larson, F. Rasio, J. Samsing, S. Ye, M. Zevin; Phys. Rev. D (submitted)</i>	2018
Precessional Dynamics of Black Hole Triples: Binary Mergers with near-zero Effective Spin <i>F. Antonini, C. L. Rodriguez, C. Petrovich, C. Fischer; MNRAS Letters, 480, 1, L58</i>	MNRASL 2018
Binary Black Holes in Dense Star Clusters: Exploring the Theoretical Uncertainties <i>S. Chatterjee, C. L. Rodriguez, F. Rasio; ApJ, 834, 1, 68</i>	ApJ 2017
Dynamical Formation of Low-mass Merging Black Hole Binaries like GW151226 <i>S. Chatterjee, C. L. Rodriguez, V. Kalogera, F. Rasio; ApJL, 836, L26</i>	ApJL 2017
Distinguishing Between Formation Channels for Binary Black Holes with LISA <i>K. Breivik, C. L. Rodriguez, S. Larson, V. Kalogera, F. Rasio; ApJL, 830, L18</i>	ApJL 2016

Contributing Author (with links)

Eccentric Black Hole Mergers in Dense Star Clusters: The Role of Binary-Binary Encounters <i>M. Zevin, J. Samsing, C. L. Rodriguez, C. Haster, E. Ramirez-Ruiz; ApJ (in press)</i>	ApJ 2018
Predicting Stellar-mass Black Hole Populations in Globular Clusters <i>N. Weatherford, S. Chatterjee, C. L. Rodriguez, F. Rasio; ApJ, 864, 13</i>	ApJ 2018

How initial size governs core collapse in globular clusters <i>K. Kremer, S. Chatterjee, C. Ye, C. L. Rodriguez, F. Rasio; ApJ (in press)</i>	ApJ 2018
LISA Sources in Milky Way Globular Clusters <i>K. Kremer, S. Chatterjee, K. Breivik, C. L. Rodriguez, S. Larson, F. Rasio; PRL, 120, 19</i>	PRL 2018
How Black Holes Shape Globular Clusters: Modeling NGC 3201 <i>K. Kremer, C. Ye, S. Chatterjee, C. L. Rodriguez, F. Rasio; ApJL, 855, 15</i>	ApJL 2018
Low-mass X-ray binaries ejected from globular clusters <i>K. Kremer, S. Chatterjee, C. L. Rodriguez, F. Rasio; ApJ (submitted)</i>	2018
Accreting Black Hole Binaries in Globular Clusters <i>K. Kremer, S. Chatterjee, C. L. Rodriguez, F. Rasio; ApJ, 852, 29</i>	ApJ 2017
Constraining Models of Binary Black Hole Formation with Gravitational-Wave Observations <i>M. Zevin, C. Pankow, C. L. Rodriguez, L. Sampson, E. Chase, V. Kalogera, F. Rasio; ApJ, 846, 82Z</i>	ApJ 2017
Black Hole Mergers and Blue Stragglers from Hierarchical Triples Formed in Globular Clusters <i>F. Antonini, S. Chatterjee, C. L. Rodriguez, M. Morscher, B. Pattabiraman, V. Kalogera, F. Rasio; ApJ, 816, 2, 65</i>	ApJ 2016
The Dynamical Evolution of Stellar Black Holes in Globular Clusters <i>M. Morscher, B. Pattabiraman, C. L. Rodriguez, F. Rasio, S. Umbreit; ApJ, 800, 1, 21</i>	ApJ 2015
Parameter estimation for compact binaries with ground-based gravitational-wave observations using the LALInference software library <i>J. Veitch, V. Raymond, B. Farr, W. Farr, P. Graff, S. Vitale, B. Aylott, K. Blackburn, N. Christensen, M. Coughlin, W. Del Pozzo, F. Feroz, J. Gair, C.J. Haster, V. Kalogera, T. Littenberg, I. Mandel, R. O'Shaughnessy, M. Pitkin, C. L. Rodriguez, C. Röver, T. Sidery, R. Smith, M. Van Der Sluys, A. Vecchio, W. Vousden, L. Wade; Phys. Rev. D, 91, 4, 042003</i>	PRD 2015
Comparison of Gravitational Wave Detector Network Sky Localization Approximations <i>K. Grover, S. Fairhurst, B. Farr, I. Mandel, C. L. Rodriguez, T. Sidery, A. Vecchio; Phys. Rev. D, 89, 4, 042004</i>	PRD 2014
Estimating parameters of coalescing compact binaries with proposed advanced detector networks <i>J. Veitch, I. Mandel, B. Aylott, B. Farr, V. Raymond, C. L. Rodriguez, M. van der Sluys, V. Kalogera, A. Vecchio; Phys. Rev. D 85, 104045</i>	PRD 2012
Mock data challenge for the Einstein Gravitational-Wave Telescope <i>T. Regimbau, T. Dent, W. Del Pozzo, S. Giampanis, T.G.F. Li, C. Robinson, C. Van Den Broeck, D. Meacher, C. L. Rodriguez, B.S. Sathyaprakash, K. Wójcik; Phys. Rev. D 86, 122001</i>	PRD 2012
Lateral alignment of InGaAs quantum dots as function of spacer thickness <i>Z. Wang, C. L. Rodriguez, S. Seydmohamadi, Y. I. Mazur, G. Salamo; Appl. Phys. Lett. 94, 083107</i>	APL 2009
Controlling fluorescence intermittency of a single colloidal CdSe/ZnS quantum dot in a half cavity <i>Y. Zhang, V. Komarala, C. L. Rodriguez, M. Xiao; Phys. Rev. B 78, 241301(R)</i>	PRB 2008

Collaboration Papers

Coauthor on 23 Collaboration Papers as a Member of the LIGO Scientific Collaboration
Click Here for Full List of Citations 2011-2015

Invited Talks/Seminars

UIUC Astronomy Colloquium **Colloquium**
Urbana-Champaign, IL (Scheduled, Dec.) 2018

Perimeter Institute Strong Gravity Seminar <i>Waterloo, Canada</i>	Seminar 2018
Stanford KIPAC Cosmology Seminar <i>Palo Alto, CA</i>	Seminar 2018
University of Cambridge IoA Galaxy Discussion <i>Cambridge, UK</i>	Seminar 2018
University of Surrey Astrophysics Seminar <i>Guildford, UK</i>	Seminar 2018
Harvard CfA Galaxy and Cosmology Seminar <i>Cambridge, MA</i>	Seminar 2018
CalTech Astronomy Colloquium <i>Pasadena, CA</i>	Colloquium 2018
Harvard Particle Theory Seminar <i>Cambridge, MA</i>	Seminar 2018
Columbia Astrophysics Colloquium <i>New York, NY</i>	Colloquium 2017
Harvard ITC Lunch Seminar <i>Cambridge, MA</i> (Link)	Seminar 2017
Strong Gravity and Binary Dynamics with Gravitational Wave Observations <i>Oxford, MS</i>	Invited Talk 2017
UCSC Flash Seminar <i>Santa Cruz, CA</i>	Seminar 2017
April APS Meeting <i>Washington, DC</i>	Invited Talk 2017
JSI Fall Workshop: Astrophysics in the Era of Grav. Wave Observations <i>Annapolis, MD</i>	Invited Talk 2016
KITP Rapid Response Workshop on Gravitational Waves <i>Santa Barbara, CA</i>	Invited Talk 2016
Compton Lecture Series <i>Chicago, IL</i> (Link)	Guest Seminar 2016
Stellar N-body Conference <i>Sexten, Italy</i>	Invited Talk 2014
Georgia Tech Center for Relativistic Astrophysics <i>Atlanta, GA</i>	Seminar 2011

Contributed Talks/Posters

Triple Evolution and Dynamics Trendy-2 <i>Leiden, Netherlands</i>	Talk 2018
Aspen Center for Physics: Dawning Era of Gravitational-Wave Astrophysics <i>Aspen, CO</i>	Talk 2017
APS Meeting <i>Salt Lake City, UT</i>	Talk 2016
Midwest Relativity Meeting <i>Evanston, IL</i>	Talk 2015

April APS Meeting <i>Baltimore, MD</i>	Talk 2015
IAU Meeting <i>Beijing, China</i>	Talk 2014
AAS Head Meeting <i>Chicago, IL</i>	Poster 2014
LIGO Scientific Collaboration Meeting <i>Bethesda, MD</i>	Talk 2013
Midwest Relativity Meeting <i>Chicago, IL</i>	Talk 2012
Gravitational-Wave Physics and Astronomy Workshop <i>Hannover, Germany</i> - 3rd place award for best poster	Poster 2012
Gravitational-Wave Burst Workshop <i>Tobermory, Scotland</i>	Talk 2012
Midwest Relativity Meeting <i>Urbana, IL</i>	Talk 2011
Gravitational-Wave Physics and Astronomy Workshop <i>Milwaukee, WI</i>	Talk 2011

Public Lectures

MIT Independent Activities Period <i>The era of Gravitational-wave Astronomy; Cambridge, MA</i>	Public Talk 2017, 2018
Compton Lecture Series <i>Dense Star Clusters as Binary Black Hole Factories (Link)</i> Chicago, IL	Guest Seminar 2016
TEDxNorthwesternU <i>Listening to Einstein's Final Symphony (Link)</i> Evanston, IL	TEDx Talk 2016
Conversations with an Astronomer Series of Public Lectures at Adler Planetarium Chicago, IL	Lecture Series 2011–2016
Film Submission: Jackson Hole Science Media Festival <i>Black Holes and Globular Clusters (Link)</i>	Short Film 2014
Perseid Meteor Shower Illinois Science Council in coordination with Chicago Parks Department Chicago, IL	Public Talk 2013
Public Lecture at North Central Purdue University <i>Catching Gravitational Waves with LIGO</i> Westville, IN	Public talk 2011

Teaching/Education Activities

General Relativity <i>Guest Lecturer and TA; Northwestern University, Evanston, IL</i>	Lecture/TA 2015
GK12 Fellowship <i>Reach for the Stars; Highland Park, IL</i> Co-taught weekly in math department of Highland Park High School Developed mathematics lessons, visualizations, and applets for high-school students (Link)	Teaching 2013–2014

Mentoring Telescope Interns Teaching High School Summer Interns at Adler Planetarium; Chicago, IL	Mentoring 2013
Einstein and the 20th Century <i>Guest Lecturer and TA</i> ; Northwestern University, Evanston, IL	Lecture/TA 2013
Science Club Mentor Weekly after-school science program at Boys and Girls Club; Chicago, IL	Mentoring 2012–2013
Visualization Creation Produced for Adler Planetarium Space Visualization Lab and; Chicago, IL Black Hole Dynamics in Core of Globular Cluster N-Body Simulation (Link) Binary Black Holes Emitting Gravitational Waves (Link)	Visualizations 2011–2016

Student Mentored and Co-Mentored

Caitlin Fischer Spinning Black Hole Triples; MIT Undergraduate Research Opportunities Program Primary Mentor	Undergraduate 2017–2018
Michael Zevin Binary-Binary Scatterings in Globular Clusters; KSPI Summer Program Co-mentored	Grad Student 2017–2018
Joshua Fuhrman Merging Binary Black Holes in Open Clusters; Northwestern REU Co-mentored	Undergraduate 2016

Service Work

Peer Reviewer for: - - Physical Review Letters - Physical Review D - Astrophysical Journal Letters - Astrophysical Journal - Monthly Notices of the Royal Astronomical Society	2015–Present
IAP Co-Organizer MIT Independent Activities Period; Cambridge, MA	Organizer 2017
Co-Organizer Astronomy On Tap – Boston; Cambridge, MA	Organizer 2016–Present