

# Curriculum Vitae: PABLO LAGUNA

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## Personal:

Birthday: May 14, 1960  
Birthplace: Ciudad Valles, San Luis Potosi, México  
Citizenship: United States  
Languages: English and Spanish (native)

## Experience:

2013 – present Chair, School of Physics  
Georgia Institute of Technology

2008 – present Professor, School of Physics  
Georgia Institute of Technology

2008 – present Adjunct Professor, School of Computational Science and Engineering  
Georgia Institute of Technology

2008 – 2013 Director, Center for Relativistic Astrophysics  
Georgia Institute of Technology

2001 – 2008 Associate Director, Center for Gravitational Wave Physics  
Pennsylvania State University

2001 – 2006 Associate Director, Institute for Gravitational Physics & Geometry  
Pennsylvania State University

2000 – 2008 Professor of Astronomy & Astrophysics and Physics  
Pennsylvania State University

1992 – 2001 Consultant, Theoretical Astrophysics Group  
Los Alamos National Laboratory

1998 – 2000 Associate Professor of Astronomy & Astrophysics  
Pennsylvania State University

1992 – 1998 Assistant Professor of Astronomy & Astrophysics  
Pennsylvania State University

1990 – 1992 Post Doctoral Fellow, Theoretical Astrophysics Group  
Los Alamos National Laboratory

1989 – 1990 Visiting Assistant Professor of Physics  
Drexel University, Philadelphia

1987 – 1989 Post Doctoral Fellow, Center for Relativity  
University of Texas at Austin

## Education:

Degree: Ph.D. in Physics, 1982–1987  
Institution: The University of Texas at Austin  
Supervisor: Richard A. Matzner  
Dissertation: *Cosmological Applications of Singular Hypersurfaces in General Relativity*

Degree: B.Sc. in Physics, 1977–1981  
Institution: Universidad Autónoma Metropolitana, Iztapalapa, México  
Honors: President’s Honors List

## Honors and Awards

2017 Ralph and Jewel Gretzinger Moving Forward School Award, Georgia Institute of Technology  
2016 Gender Equity Champion Award, Georgia Institute of Technology  
2016 Distinguished Alumnus Medal, Universidad Autónoma Metropolitana, México  
2016 Edward A. Bouchet Award, American Physical Society  
2008 American Physical Society Fellow  
2007 Elected to the Mexican Academy of Sciences  
1993 National Science Foundation Young Investigator Award  
1984 CONACyT Fellowship, México  
1983 Organization of American States Fellowship  
1982 University of Texas Ex-students Association Fellowship  
1981 Undergraduate Studies Mexican Presidential Award

## Memberships

2016 – present Editorial Board, European Physical Journal Plus  
2016 – 2016 Bouchet Award Committee (Chair), American Physical Society  
2014 – 2016 Einstein Prize Committee (Chair), American Physical Society  
2015 – present Sigma Pi Sigma Physics Honor Society  
2014 – present Southern Light Rail / Southern Crossroad Board, Georgia Institute of Technology  
2013 – present Editorial Board, General Relativity and Gravitation  
2008 – 2010 Bouchet Award Committee (Chair), American Physical Society  
2007 – 2009 Committee of Minorities, American Physical Society  
2007 – 2009 Editorial Board, Research Letters in Physics  
2004 – 2005 Editorial Board, International Journal of Modern Physics A  
2004 – 2005 Editorial Board, Modern Physics Letters A  
1999 – 2005 Allocations Board, National Partnership for Advanced Computational Infrastructure  
1998 – 2006 Editorial Board, International Journal of Modern Physics D  
1995 – 2008 Institute for High Performance Computing Applications, Penn State University  
1995 – present American Physical Society  
1992 – present American Astronomical Society

## Publications under Review

- [1] E. Addison, P. Laguna, and S. Larson, “Busting Up Binaries: Encounters Between Compact Binaries and a Supermassive Black Hole,” *ArXiv e-prints* (2015) , [arXiv:1501.07856](https://arxiv.org/abs/1501.07856) [astro-ph.HE].

## Publications in Journals

- [1] J. Calderón Bustillo, J. A. Clark, P. Laguna, and D. Shoemaker, “Tracking black hole kicks from gravitational wave observations,” *ArXiv e-prints* (2018) , [arXiv:1806.11160 \[gr-qc\]](#).
- [2] J. Healy, J. Lange, R. O’Shaughnessy, C. O. Lousto, M. Campanelli, A. R. Williamson, Y. Zlochower, J. Calderón Bustillo, J. A. Clark, C. Evans, D. Ferguson, S. Ghonge, K. Jani, B. Khamesra, P. Laguna, D. M. Shoemaker, M. Boyle, A. García, D. A. Hemberger, L. E. Kidder, P. Kumar, G. Lovelace, H. P. Pfeiffer, M. A. Scheel, and S. A. Teukolsky, “Targeted numerical simulations of binary black holes for GW170104,” *Phys. Rev. D.* **97** (2018) no. 6, 064027, [arXiv:1712.05836 \[gr-qc\]](#).
- [3] J. Lange, R. O’Shaughnessy, M. Boyle, J. Calderón Bustillo, M. Campanelli, T. Chu, J. A. Clark, N. Demos, H. Fong, J. Healy, D. A. Hemberger, I. Hinder, K. Jani, B. Khamesra, L. E. Kidder, P. Kumar, P. Laguna, C. O. Lousto, G. Lovelace, S. Ossokine, H. Pfeiffer, M. A. Scheel, D. M. Shoemaker, B. Szilagyi, S. Teukolsky, and Y. Zlochower, “Parameter estimation method that directly compares gravitational wave observations to numerical relativity,” *Phys. Rev. D.* **96** (2017) no. 10, 104041, [arXiv:1705.09833 \[gr-qc\]](#).
- [4] J. Caldern Bustillo, P. Laguna, and D. Shoemaker, “Detectability of gravitational waves from binary black holes: Impact of precession and higher modes,” *Phys. Rev.* **D95** (2017) no. 10, 104038, [arXiv:1612.02340 \[gr-qc\]](#).
- [5] A. Maselli, K. Kokkotas, and P. Laguna, “Observing binary black hole ringdowns by advanced gravitational wave detectors,” *Phys. Rev.* **D95** (2017) no. 10, 104026, [arXiv:1702.01110 \[gr-qc\]](#).
- [6] M. Clark and P. Laguna, “Bowen-York-type initial data for binaries with neutron stars,” *Phys. Rev. D.* **94** (2016) no. 6, 064058, [arXiv:1606.04881 \[gr-qc\]](#).
- [7] K. Jani, J. Healy, J. A. Clark, L. London, P. Laguna, and D. Shoemaker, “Georgia Tech Catalog of Gravitational Waveforms,” *Class. Quant. Grav.* **33** (2016) no. 20, 204001, [arXiv:1605.03204 \[gr-qc\]](#).
- [8] B. P. Abbott *et al.*, “Directly comparing GW150914 with numerical solutions of Einstein’s equations for binary black hole coalescence,” *Phys. Rev.* **D94** (2016) 064035, [arXiv:1606.01262 \[gr-qc\]](#).
- [9] A. Maselli, K. Kokkotas, and P. Laguna, “Relativistic tidal effects in nonstandard Kerr spacetime,” *Phys. Rev. D.* **93** (2016) no. 6, 064075, [arXiv:1602.01031 \[gr-qc\]](#).
- [10] B. P. Abbott, R. Abbott, T. D. Abbott, M. R. Abernathy, F. Acernese, K. Ackley, C. Adams, T. Adams, P. Addesso, R. X. Adhikari, and et al., “Properties of the Binary Black Hole Merger GW150914,” *Physical Review Letters* **116** (2016) no. 24, 241102, [arXiv:1602.03840 \[gr-qc\]](#).
- [11] E. Berti, E. Barausse, V. Cardoso, L. Gualtieri, P. Pani, U. Sperhake, L. C. Stein, N. Wex, K. Yagi, T. Baker, C. P. Burgess, F. S. Coelho, D. Doneva, A. De Felice, P. G. Ferreira, P. C. C. Freire, J. Healy, C. Herdeiro, M. Horbatsch, B. Kleihaus, A. Klein, K. Kokkotas, J. Kunz, P. Laguna, R. N. Lang, T. G. F. Li, T. Littenberg, A. Matas, S. Mirshekari, H. Okawa, E. Radu, R. O’Shaughnessy, B. S. Sathyaprakash, C. Van Den Broeck, H. A. Winther, H. Witek, M. Emad Aghili, J. Alsing, B. Bolen, L. Bombelli, S. Caudill, L. Chen, J. C. Degollado, R. Fujita, C. Gao, D. Gerosa, S. Kamali, H. O. Silva, J. G. Rosa,

- L. Sadeghian, M. Sampaio, H. Sotani, and M. Zilhao, “Testing general relativity with present and future astrophysical observations,” *Classical and Quantum Gravity* **32** (2015) no. 24, 243001, [arXiv:1501.07274 \[gr-qc\]](#).
- [12] C. Evans, P. Laguna, and M. Eracleous, “Ultra-close Encounters of Stars with Massive Black Holes: Tidal Disruption Events with Prompt Hyperaccretion,” *Astrophys. J. Lett.* **805** (2015) L19, [arXiv:1502.05740](#).
- [13] J. Healy, P. Laguna, and D. Shoemaker, “Decoding the final state in binary black hole mergers,” *Classical and Quantum Gravity* **31** (2014) no. 21, 212001, [arXiv:1407.5989 \[gr-qc\]](#).
- [14] J. Healy and P. Laguna, “Critical collapse of scalar fields beyond axisymmetry,” *General Relativity and Gravitation* **46** (2014) 1722, [arXiv:1310.1955 \[gr-qc\]](#).
- [15] J. Aasi *et al.*, “The NINJA-2 project: Detecting and characterizing gravitational waveforms modelled using numerical binary black hole simulations,” *Class.Quant.Grav.* **31** (2014) 115004, [arXiv:1401.0939 \[gr-qc\]](#).
- [16] H. Sotani, K. D. Kokkotas, P. Laguna, and C. F. Sopuerta, “Electromagnetic waves from neutron stars and black holes driven by polar gravitational perturbations,” *General Relativity and Gravitation* **46** (2014) 1675, [arXiv:1402.0251 \[astro-ph.HE\]](#).
- [17] I. Hinder, A. Buonanno, M. Boyle, Z. B. Etienne, J. Healy, N. K. Johnson-McDaniel, A. Nagar, H. Nakano, Y. Pan, H. P. Pfeiffer, M. Pürrer, C. Reisswig, M. A. Scheel, E. Schnetter, U. Sperhake, B. Szilágyi, W. Tichy, B. Wardell, A. Zenginoglu, D. Alic, S. Bernuzzi, T. Bode, B. Brügmann, L. T. Buchman, M. Campanelli, T. Chu, T. Damour, J. D. Grigsby, M. Hannam, R. Haas, D. A. Hemberger, S. Husa, L. E. Kidder, P. Laguna, L. London, G. Lovelace, C. O. Lousto, P. Marronetti, R. A. Matzner, P. Mösta, A. Mroué, D. Müller, B. C. Mundim, A. Nerozzi, V. Paschalidis, D. Pollney, G. Reifenberger, L. Rezzolla, S. L. Shapiro, D. Shoemaker, A. Taracchini, N. W. Taylor, S. A. Teukolsky, M. Thierfelder, H. Witek, and Y. Zlochower, “Error-analysis and comparison to analytical models of numerical waveforms produced by the NRAR Collaboration,” *Classical and Quantum Gravity* **31** (2013) no. 2, 025012, [arXiv:1307.5307 \[gr-qc\]](#).
- [18] J. Healy, P. Laguna, L. Pekowsky, and D. Shoemaker, “Template mode hierarchies for binary black hole mergers,” *Phys. Rev. D.* **88** (2013) no. 2, 024034, [arXiv:1302.6953 \[gr-qc\]](#).
- [19] N. Andersson, J. Baker, K. Belczynski, S. Bernuzzi, E. Berti, L. Cadonati, P. Cerdá-Durán, J. Clark, M. Favata, L. S. Finn, C. Fryer, B. Giacomazzo, J. A. González, M. Hendry, I. S. Heng, S. Hild, N. Johnson-McDaniel, P. Kalmus, S. Klimentenko, S. Kobayashi, K. Kokkotas, P. Laguna, L. Lehner, J. Levin, S. Liebling, A. MacFadyen, I. Mandel, S. Marka, Z. Marka, D. Neilsen, P. O’Brien, R. Perna, J. Read, C. Reisswig, C. Rodriguez, M. Ruffert, E. Schnetter, A. Searle, P. Shawhan, D. Shoemaker, A. Soderberg, U. Sperhake, P. Sutton, N. Tanvir, M. Was, and S. Whitcomb, “The transient gravitational-wave sky,” *Classical and Quantum Gravity* **30** (2013) no. 19, 193002, [arXiv:1305.0816 \[gr-qc\]](#).
- [20] R. V. Shcherbakov, A. Pe’er, C. S. Reynolds, R. Haas, T. Bode, and P. Laguna, “Grb060218 as a tidal disruption of a white dwarf by an intermediate-mass black hole,” *The Astrophysical Journal* **769** (2013) no. 2, 85.

- [21] H. Sotani, K. D. Kokkotas, P. Laguna, and C. F. Sopuerta, “Gravitationally driven electromagnetic perturbations of neutron stars and black holes,” *Phys. Rev. D.* **87** (2013) no. 8, 084018, [arXiv:1303.5641](#) [[astro-ph.HE](#)].
- [22] L. Pekowsky, J. Healy, D. Shoemaker, and P. Laguna, “Impact of higher-order modes on the detection of binary black hole coalescences,” *Phys. Rev. D.* **87** (2013) no. 8, 084008, [arXiv:1210.1891](#) [[gr-qc](#)].
- [23] J. Healy, T. Bode, R. Haas, E. Pazos, P. Laguna, D. M. Shoemaker, and N. Yunes, “Late inspiral and merger of binary black holes in scalartensor theories of gravity,” *Classical and Quantum Gravity* **29** (2012) no. 23, 232002.
- [24] F. Löffler, J. Faber, E. Bentivegna, T. Bode, P. Diener, R. Haas, I. Hinder, B. C. Mundim, C. D. Ott, E. Schnetter, G. Allen, M. Campanelli, and P. Laguna, “The Einstein Toolkit: a community computational infrastructure for relativistic astrophysics,” *Classical and Quantum Gravity* **29** (2012) no. 11, 115001, [arXiv:1111.3344](#) [[gr-qc](#)].
- [25] R. Haas, R. V. Shcherbakov, T. Bode, and P. Laguna, “Tidal Disruptions of White Dwarfs from Ultra-close Encounters with Intermediate-mass Spinning Black Holes,” *Astrophys. J.* **749** (2012) 117, [arXiv:1201.4389](#) [[astro-ph.HE](#)].
- [26] P. Ajith, M. Boyle, D. A. Brown, B. Brügmann, L. T. Buchman, L. Cadonati, M. Campanelli, T. Chu, Z. B. Etienne, S. Fairhurst, M. Hannam, J. Healy, I. Hinder, S. Husa, L. E. Kidder, B. Krishnan, P. Laguna, Y. T. Liu, L. London, C. O. Lousto, G. Lovelace, I. MacDonald, P. Marronetti, S. Mohapatra, P. Mösta, D. Müller, B. C. Mundim, H. Nakano, F. Ohme, V. Paschalidis, L. Pekowsky, D. Pollney, H. P. Pfeiffer, M. Ponce, M. Pürrer, G. Reifenberger, C. Reisswig, L. Santamaría, M. A. Scheel, S. L. Shapiro, D. Shoemaker, C. F. Sopuerta, U. Sperhake, B. Szilágyi, N. W. Taylor, W. Tichy, P. Tsatsin, and Y. Zlochower, “The NINJA-2 catalog of hybrid post-Newtonian/numerical-relativity waveforms for non-precessing black-hole binaries,” *Classical and Quantum Gravity* **29** (2012) no. 12, 124001, [arXiv:1201.5319](#) [[gr-qc](#)].
- [27] T. Bode, T. Bogdanović, R. Haas, J. Healy, P. Laguna, and D. Shoemaker, “Mergers of Supermassive Black Holes in Astrophysical Environments,” *Astrophys. J.* **744** (2012) 45, [arXiv:1101.4684](#) [[gr-qc](#)].
- [28] T. Bode, P. Laguna, and R. Matzner, “Superextremal spinning black holes via accretion,” *Phys. Rev. D* **84** (2011) 064044.
- [29] T. Bogdanović, T. Bode, R. Haas, P. Laguna, and D. Shoemaker, “Properties of accretion flows around coalescing supermassive black holes,” *Classical and Quantum Gravity* **28** (2011) no. 9, 094020–+, [arXiv:1010.2496](#) [[astro-ph.CO](#)].
- [30] I. Hinder, F. Herrmann, P. Laguna, and D. Shoemaker, “Comparisons of eccentric binary black hole simulations with post-newtonian models,” *Phys. Rev. D* **82** (2010) no. 2, 024033.
- [31] T. Bode, R. Haas, T. Bogdanović, P. Laguna, and D. Shoemaker, “Relativistic Mergers of Supermassive Black Holes and Their Electromagnetic Signatures,” *Astrophys. J.* **715** (2010) 1117–1131, [arXiv:0912.0087](#).
- [32] P. Laguna, S. L. Larson, D. Spergel, and N. Yunes, “Integrated Sachs-Wolfe Effect for Gravitational Radiation,” *Astrophys. J. Lett.* **715** (2010) L12–L15, [arXiv:0905.1908](#).

- [33] J. Healy, P. Laguna, R. A. Matzner, and D. M. Shoemaker, “Final mass and maximum spin of merged black holes and the golden black hole,” *Phys. Rev. D* **81** (2010) no. 8, 081501–+, [arXiv:0905.3914](#).
- [34] B. Aylott, J. G. Baker, W. D. Boggs, M. Boyle, P. R. Brady, D. A. Brown, B. Brügmann, L. T. Buchman, A. Buonanno, L. Cadonati, J. Camp, M. Campanelli, J. Centrella, S. Chatterji, N. Christensen, T. Chu, P. Diener, N. Dorband, Z. B. Etienne, J. Faber, S. Fairhurst, B. Farr, S. Fischetti, G. Guidi, L. M. Goggin, M. Hannam, F. Herrmann, I. Hinder, S. Husa, V. Kalogera, D. Keppel, L. E. Kidder, B. J. Kelly, B. Krishnan, P. Laguna, C. O. Lousto, I. Mandel, P. Marronetti, R. Matzner, S. T. McWilliams, K. D. Matthews, R. A. Mercer, S. R. P. Mohapatra, A. H. Mroué, H. Nakano, E. Ochsner, Y. Pan, L. Pekowsky, H. a. P. Pfeiffer, D. Pollney, F. Pretorius, V. Raymond, C. Reisswig, L. Rezzolla, O. Rinne, C. Robinson, C. Röver, L. Santamaría, B. Sathyaprakash, M. A. Scheel, E. Schnetter, J. Seiler, S. L. Shapiro, D. Shoemaker, U. Sperhake, A. Stroeer, R. Sturani, W. Tichy, Y. T. Liu, M. van der Sluys, J. R. van Meter, R. Vaulin, A. Vecchio, J. Veitch, A. Viceré, J. T. Whelan, and Y. Zlochower, “Testing gravitational-wave searches with numerical relativity waveforms: results from the first Numerical INJection Analysis (NINJA) project,” *Classical and Quantum Gravity* **26** (2009) no. 16, 165008–+, [arXiv:0901.4399](#).
- [35] T. Bode, P. Laguna, D. M. Shoemaker, I. Hinder, F. Herrmann, and B. Vaishnav, “Binary black hole evolutions of approximate puncture initial data,” *Phys. Rev. D* **80** (2009) no. 2, 024008–+, [arXiv:0902.1127 \[gr-qc\]](#).
- [36] L. Cadonati, B. Aylott, J. G. Baker, W. D. Boggs, M. Boyle, P. R. Brady, D. A. Brown, B. Brügmann, L. T. Buchman, A. Buonanno, J. Camp, M. Campanelli, J. Centrella, S. Chatterji, N. Christensen, T. Chu, P. Diener, N. Dorband, Z. B. Etienne, J. Faber, S. Fairhurst, B. Farr, S. Fischetti, G. Guidi, L. M. Goggin, M. Hannam, F. Herrmann, I. Hinder, S. Husa, V. Kalogera, D. Keppel, L. E. Kidder, B. J. Kelly, B. Krishnan, P. Laguna, C. O. Lousto, I. Mandel, P. Marronetti, R. Matzner, S. T. McWilliams, K. D. Matthews, R. A. Mercer, S. R. P. Mohapatra, A. H. Mroué, H. Nakano, E. Ochsner, Y. Pan, L. Pekowsky, H. P. Pfeiffer, D. Pollney, F. Pretorius, V. Raymond, C. Reisswig, L. Rezzolla, O. Rinne, C. Robinson, C. Röver, L. Santamaría, B. Sathyaprakash, M. A. Scheel, E. Schnetter, J. Seiler, S. L. Shapiro, D. Shoemaker, U. Sperhake, A. Stroeer, R. Sturani, W. Tichy, Y. T. Liu, M. van der Sluys, J. R. van Meter, R. Vaulin, A. Vecchio, J. Veitch, A. Viceré, J. T. Whelan, and Y. Zlochower, “Status of NINJA: the Numerical INJection Analysis project,” *Classical and Quantum Gravity* **26** (2009) no. 11, 114008–+, [arXiv:0905.4227 \[gr-qc\]](#).
- [37] M. Hannam, S. Husa, J. G. Baker, M. Boyle, B. Brügmann, T. Chu, N. Dorband, F. Herrmann, I. Hinder, B. J. Kelly, L. E. Kidder, P. Laguna, K. D. Matthews, J. R. van Meter, H. P. Pfeiffer, D. Pollney, C. Reisswig, M. A. Scheel, and D. Shoemaker, “Samurai project: Verifying the consistency of black-hole-binary waveforms for gravitational-wave detection,” *Phys. Rev. D* **79** (2009) no. 8, 084025–+, [arXiv:0901.2437 \[gr-qc\]](#).
- [38] J. Healy, F. Herrmann, I. Hinder, D. M. Shoemaker, P. Laguna, and R. A. Matzner, “Superkicks in Hyperbolic Encounters of Binary Black Holes,” *Physical Review Letters* **102** (2009) no. 4, 041101–+, [arXiv:0807.3292 \[gr-qc\]](#).
- [39] M. C. Washik, J. Healy, F. Herrmann, I. Hinder, D. M. Shoemaker, P. Laguna, and R. A. Matzner, “Binary-Black-Hole Encounters, Gravitational Bursts, and Maximum Final Spin,” *Physical Review Letters* **101** (2008) no. 6, 061102–+, [arXiv:0802.2520 \[gr-qc\]](#).

- [40] I. Hinder, B. Vaishnav, F. Herrmann, D. Shoemaker, and P. Laguna, “Universality and Final Spin in Eccentric Binary Black Hole Inspirals,” *Phys. Rev.* **D77** (2008) 081502, [arXiv:0710.5167 \[gr-qc\]](#).
- [41] F. Herrmann, I. Hinder, D. Shoemaker, and P. Laguna, “Unequal mass binary black hole plunges and gravitational recoil,” *Classical and Quantum Gravity* **24** (2007) 33–+, [arXiv:gr-qc/0601026](#).
- [42] F. Herrmann, I. Hinder, D. M. Shoemaker, P. Laguna, and R. A. Matzner, “Binary Black Holes: Spin Dynamics and Gravitational Recoil,” *Phys. Rev.* **D76** (2007) 084032, [arXiv:0706.2541 \[gr-qc\]](#).
- [43] E. Rantsiou, S. Kobayashi, P. Laguna, and F. Rasio, “Mergers of Black Hole – Neutron Star binaries. I. Methods and First Results,” *Astrophys. J.* **680** (2008) 1326–1349, [arXiv:astro-ph/0703599](#).
- [44] F. Herrmann, I. Hinder, D. Shoemaker, P. Laguna, and R. A. Matzner, “Gravitational recoil from spinning binary black hole mergers,” *Astrophys. J.* **661** (2007) 430–436, [arXiv:gr-qc/0701143](#).
- [45] C. F. Sopuerta, N. Yunes, and P. Laguna, “Gravitational recoil velocities from eccentric binary black hole mergers,” *Astrophys. J.* **656** (2007) L9–L12, [arXiv:astro-ph/0611110](#).
- [46] P. Laguna, “Numerical Analysis of the Big Bounce in Loop Quantum Cosmology,” *Phys. Rev.* **D75** (2007) 024033, [arXiv:gr-qc/0608117](#).
- [47] C. F. Sopuerta, N. Yunes, and P. Laguna, “Gravitational recoil from binary black hole mergers: The close-limit approximation,” *Phys. Rev.* **D74** (2006) 124010, [arXiv:astro-ph/0608600](#).
- [48] C. F. Sopuerta, U. Sperhake, and P. Laguna, “Hydro-without-hydro framework for simulations of black hole - neutron star binaries,” *Class. Quant. Grav.* **23** (2006) S579–S598, [arXiv:gr-qc/0605018](#).
- [49] P. Laguna, V. Natchu, R. A. Matzner, and T. Vachaspati, “Intercommutation of Semilocal Strings and Skyrmions,” *Phys. Rev. Lett.* **98** (2007) 041602, [arXiv:hep-th/0604177](#).
- [50] C. F. Sopuerta and P. Laguna, “A finite element computation of the gravitational radiation emitted by a point-like object orbiting a non-rotating black hole,” *Phys. Rev.* **D73** (2006) 044028, [arXiv:gr-qc/0512028](#).
- [51] C. F. Sopuerta, P. Sun, P. Laguna, and J. Xu, “A toy model for testing finite element methods to simulate extreme-mass-ratio binary systems,” *Class. Quant. Grav.* **23** (2006) 251–286, [arXiv:gr-qc/0507112](#).
- [52] U. Sperhake, B. J. Kelly, P. Laguna, K. L. Smith, and E. Schnetter, “Black hole head-on collisions and gravitational waves with fixed mesh-refinement and dynamic singularity excision,” *Phys. Rev.* **D71** (2005) 124042, [arXiv:gr-qc/0503071](#).
- [53] T. Bogdanovic, M. Eracleous, S. Mahadevan, S. Sigurdsson, and P. Laguna, “Tidal Disruption of a Star By a Black Hole : Observational Signature,” *Astrophys. J.* **610** (2004) 707–721, [arXiv:astro-ph/0404256](#).

- [54] A. P. Gentle, D. E. Holz, A. Kheifets, P. Laguna, W. A. Miller, and D. M. Shoemaker, “Constant crunch coordinates for black hole simulations,” *Phys. Rev.* **D63** (2001) 064024–+, [arXiv:gr-qc/0005113](#).
- [55] S. Kobayashi, P. Laguna, E. S. Phinney, and P. Meszaros, “Gravitational wave and X-ray signals from stellar disruption by a massive black hole,” *Astrophys. J.* **615** (2004) 855–865, [arXiv:astro-ph/0404173](#).
- [56] P. Laguna, “Conformal-thin-sandwich initial data for a single boosted or spinning black hole puncture,” *Phys. Rev.* **D69** (2004) 104020, [arXiv:gr-qc/0310073](#).
- [57] U. Sperhake, K. L. Smith, B. J. Kelly, P. Laguna, and D. Shoemaker, “Impact of densitized lapse slicings on evolutions of a wobbling black hole,” *Phys. Rev.* **D69** (2004) 024012, [arXiv:gr-qc/0307015](#).
- [58] W. Tichy, B. Bruegmann, and P. Laguna, “Gauge conditions for binary black hole puncture data based on an approximate helical Killing vector,” *Phys. Rev.* **D68** (2003) 064008, [arXiv:gr-qc/0306020](#).
- [59] D. Shoemaker, K. Smith, U. Sperhake, P. Laguna, E. Schnetter, and D. Fiske, “Moving black holes via singularity excision,” *Classical and Quantum Gravity* **20** (2003) 3729–3743, [arXiv:gr-qc/0301111](#).
- [60] P. Laguna and D. Shoemaker, “Numerical stability of a new conformal-traceless 3+1 formulation of the Einstein equation,” *Class. Quant. Grav.* **19** (2002) 3679–3686, [arXiv:gr-qc/0202105](#).
- [61] B. Kelly, P. Laguna, K. Lockitch, J. Pullin, E. Schnetter, D. Shoemaker, and M. Tiglio, “Cure for unstable numerical evolutions of single black holes: Adjusting the standard ADM equations in the spherically symmetric case,” *Phys. Rev. D* **64** (2001) no. 8, 084013–+, [arXiv:gr-qc/0103099](#).
- [62] M. Campanelli, G. Khanna, P. Laguna, J. Pullin, and M. P. Ryan, “Perturbations of the Kerr spacetime in horizon penetrating coordinates,” *Class. Quant. Grav.* **18** (2001) 1543–1554, [arXiv:gr-qc/0010034](#).
- [63] S. Brandt, R. Correll, R. Gómez, M. Huq, P. Laguna, L. Lehner, P. Marronetti, R. A. Matzner, D. Neilsen, J. Pullin, E. Schnetter, D. Shoemaker, and J. Winicour, “Grazing Collisions of Black Holes via the Excision of Singularities,” *Physical Review Letters* **85** (2000) 5496–5499, [arXiv:gr-qc/0009047](#).
- [64] J. Ruoff, P. Laguna, and J. Pullin, “Excitation of neutron star oscillations by an orbiting particle,” *Phys. Rev.* **D63** (2001) 064019, [arXiv:gr-qc/0005002](#).
- [65] H. K. Nordquist, R. J. Klinger, P. Laguna, and J. C. Charlton, “Distortion of globular clusters by galactic bulges,” *M.N.R.A.S.* **304** (1999) 288–296, [arXiv:astro-ph/9812019](#).
- [66] P. Marronetti, M. Huq, P. Laguna, L. Lehner, R. A. Matzner, and D. Shoemaker, “Approximate analytical solutions to the initial data problem of black hole binary systems,” *Phys. Rev. D* **62** (2000) no. 2, 024017–+, [arXiv:gr-qc/0001077](#).
- [67] P. Laguna, “A Linear-Nonlinear Formulation of Einstein Equations for the Two-Body Problem in General Relativity,” *Phys. Rev.* **D60** (1999) 084012, [arXiv:gr-qc/9907005](#).



- [68] J. Dziarmaga, P. Laguna, and W. H. Zurek, “Symmetry Breaking with a Slant: Topological Defects after an Inhomogeneous Quench,” *Physical Review Letters* **82** (1999) 4749–4752, [arXiv:cond-mat/9810396](#).
- [69] G. Khanna, J. Baker, R. J. Gleiser, P. Laguna, C. O. Nicasio, H. Nollert, R. Price, and J. Pullin, “Inspiring Black Holes: The Close Limit,” *Physical Review Letters* **83** (1999) 3581–3584, [arXiv:gr-qc/9905081](#).
- [70] N. Andersson, K. D. Kokkotas, P. Laguna, P. Papadopoulos, and M. S. Sypior, “Construction of astrophysical initial data for perturbations of relativistic stars,” *Phys. Rev.* **D60** (1999) 124004, [arXiv:gr-qc/9904059](#).
- [71] G. D. Allen, N. Andersson, K. D. Kokkotas, P. Laguna, J. A. Pullin, and J. Ruoff, “Close-limit approximation to neutron star collisions,” *Phys. Rev. D* **60** (1999) no. 10, 104021–+, [arXiv:gr-qc/9903100](#).
- [72] N. Andersson, P. Laguna, and P. Papadopoulos, “Dynamics of scalar fields in the background of rotating black holes. II: A note on superradiance,” *Phys. Rev.* **D58** (1998) 087503, [arXiv:gr-qc/9802059](#).
- [73] R. Gómez, L. Lehner, R. L. Marsa, J. Winicour, A. M. Abrahams, A. Anderson, P. Anninos, T. W. Baumgarte, N. T. Bishop, S. R. Brandt, J. C. Browne, K. Camarda, M. W. Choptuik, G. B. Cook, R. Correll, C. R. Evans, L. S. Finn, G. C. Fox, T. Haupt, M. F. Huq, L. E. Kidder, S. A. Klasky, P. Laguna, W. Landry, J. Lenaghan, J. Masso, R. A. Matzner, S. Mitra, P. Papadopoulos, M. Parashar, L. Rezzolla, M. E. Rupright, F. Saied, P. E. Saylor, M. A. Scheel, E. Seidel, S. L. Shapiro, D. Shoemaker, L. Smarr, B. Szilágyi, S. A. Teukolsky, M. H. van Putten, P. Walker, and J. W. York, “Stable Characteristic Evolution of Generic Three-Dimensional Single-Black-Hole Spacetimes,” *Physical Review Letters* **80** (1998) 3915–3918, [arXiv:gr-qc/9801069](#).
- [74] G. B. Cook, M. F. Huq, S. A. Klasky, M. A. Scheel, A. M. Abrahams, A. Anderson, P. Anninos, T. W. Baumgarte, N. T. Bishop, S. R. Brandt, J. C. Browne, K. Camarda, M. W. Choptuik, R. R. Correll, C. R. Evans, L. S. Finn, G. C. Fox, R. Gómez, T. Haupt, L. E. Kidder, P. Laguna, W. Landry, L. Lehner, J. Lenaghan, R. L. Marsa, J. Masso, R. A. Matzner, S. Mitra, P. Papadopoulos, M. Parashar, L. Rezzolla, M. E. Rupright, F. Saied, P. E. Saylor, E. Seidel, S. L. Shapiro, D. Shoemaker, L. Smarr, W. M. Suen, B. Szilágyi, S. A. Teukolsky, M. H. van Putten, P. Walker, J. Winicour, and J. W. York, “Boosted Three-Dimensional Black-Hole Evolutions with Singularity Excision,” *Physical Review Letters* **80** (1998) 2512–2516, [arXiv:gr-qc/9711078](#).
- [75] P. Laguna and W. H. Zurek, “Critical dynamics of symmetry breaking: Quenches, dissipation and cosmology,” *Phys. Rev.* **D58** (1998) 085021, [arXiv:hep-ph/9711411](#).
- [76] A. M. Abrahams, L. Rezzolla, M. E. Rupright, A. Anderson, P. Anninos, T. W. Baumgarte, N. T. Bishop, S. R. Brandt, J. C. Browne, K. Camarda, M. W. Choptuik, G. B. Cook, R. R. Correll, C. R. Evans, L. S. Finn, G. C. Fox, R. Gómez, T. Haupt, M. F. Huq, L. E. Kidder, S. A. Klasky, P. Laguna, W. Landry, L. Lehner, J. Lenaghan, R. L. Marsa, J. Masso, R. A. Matzner, S. Mitra, P. Papadopoulos, M. Parashar, F. Saied, P. E. Saylor, M. A. Scheel, E. Seidel, S. L. Shapiro, D. Shoemaker, L. Smarr, B. Szilágyi, S. A. Teukolsky, M. H. van Putten, P. Walker, J. Winicour, and J. W. York, “Gravitational Wave Extraction and Outer Boundary Conditions by Perturbative Matching,” *Physical Review Letters* **80** (1998) 1812–1815, [arXiv:gr-qc/9709082](#).

- [77] P. Laguna and A. Wolszczan, “Pulse Arrival Times from Binary Pulsars with Rotating Black Hole Companions,” *Astrophys. J. Lett.* **486** (1997) L27+, [arXiv:astro-ph/9705054](#).
- [78] W. Krivan, P. Laguna, P. Papadopoulos, and N. Andersson, “Dynamics of perturbations of rotating black holes,” *Phys. Rev.* **D56** (1997) 3395–3404, [arXiv:gr-qc/9702048](#).
- [79] L. Wen, A. Panaitescu, and P. Laguna, “A Shock-patching Code for Ultrarelativistic Fluid Flows,” *Astrophys. J.* **486** (1997) 919–+, [arXiv:astro-ph/9612045](#).
- [80] L. M. A. Bettencourt, P. Laguna, and R. A. Matzner, “Non-intercommuting cosmic strings,” *Phys. Rev. Lett.* **78** (1997) 2066–2069, [arXiv:hep-ph/9612350](#).
- [81] P. R. Brady, C. M. Chambers, W. Krivan, and P. Laguna, “Telling tails in the presence of a cosmological constant,” *Phys. Rev.* **D55** (1997) 7538–7545, [arXiv:gr-qc/9611056](#).
- [82] P. Papadopoulos and P. Laguna, “Cauchy-characteristic evolution of Einstein-Klein-Gordon systems: The black hole regime,” *Phys. Rev.* **D55** (1997) 2038–2043, [arXiv:gr-qc/9610076](#).
- [83] A. Panaitescu, L. Wen, P. Laguna, and P. Meszaros, “Impact of Relativistic Fireballs on External Matter : Numerical Models of Cosmological Gamma-Ray Bursts,” *Astrophys. J.* **482** (1997) 942–951, [arXiv:astro-ph/9610064](#).
- [84] P. Laguna and W. H. Zurek, “Density of kinks after a quench: When symmetry breaks, how big are the pieces?,” *Phys. Rev. Lett.* **78** (1997) 2519–2522, [arXiv:gr-qc/9607041](#).
- [85] W. Krivan, P. Laguna, and P. Papadopoulos, “Dynamics of scalar fields in the background of rotating black holes,” *Phys. Rev.* **D54** (1996) 4728–4734, [arXiv:gr-qc/9606003](#).
- [86] R. Gomez, P. Laguna, P. Papadopoulos, and J. Winicour, “Cauchy-characteristic Evolution of Einstein-Klein-Gordon Systems,” *Phys. Rev.* **D54** (1996) 4719–4727, [arXiv:gr-qc/9603060](#).
- [87] M. Laguna and P. Laguna, “Applying Tabu Search to the Two-Dimensional Ising Spin Glass,” *International Journal of Modern Physics C* **6** (1995) 11–23.
- [88] R. Tuluie, P. Laguna, and P. Anninos, “Cosmic Microwave Background Anisotropies from the Rees- Sciama Effect in  $\Omega_0 \leq 1$  Universes,” *Astrophys. J.* **463** (1996) 15, [arXiv:astro-ph/9510019](#).
- [89] R. Tuluie and P. Laguna, “The imprint of proper motion of nonlinear structures on the cosmic microwave background,” *Astrophys. J.* **445** (1995) L73–L76, [arXiv:astro-ph/9501059](#).
- [90] J. C. Charlton and P. Laguna, “Competition of supermassive black holes and galactic spheroids in the destruction of globular clusters,” *Astrophys. J.* **444** (1995) 193–199, [arXiv:astro-ph/9411012](#).
- [91] P. Laguna, “Smoothed particle interpolation,” *Astrophys. J.* **439** (1995) 814–821, [arXiv:astro-ph/9402062](#).
- [92] H. Kurki-Suonio, P. Laguna, and R. A. Matzner, “Inhomogeneous inflation: Numerical evolution,” *Phys. Rev.* **D48** (1993) 3611–3624, [arXiv:astro-ph/9306009](#).

- [93] P. Meszaros, P. Laguna, and M. J. Rees, “Gas dynamics of relativistically expanding gamma-ray burst sources: Kinematics, energetics, magnetic fields and efficiency,” *Astrophys. J.* **415** (1993) 181–190, [arXiv:astro-ph/9301007](#).
- [94] P. Laguna, W. A. Miller, W. H. Zurek, and M. B. Davies, “Tidal disruptions by supermassive black holes - Hydrodynamic evolution of stars on a Schwarzschild background,” *Astrophys. J. Lett.* **410** (1993) L83–L86.
- [95] P. Laguna, W. A. Miller, and W. H. Zurek, “Smoothed particle hydrodynamics near a black hole,” *Astrophys. J.* **404** (1993) 678–685.
- [96] P. Laguna, H. Kurki-Suonio, and R. A. Matzner, “Inhomogeneous inflation: The Initial value problem,” *Phys. Rev.* **D44** (1991) 3077–3086.
- [97] P. Laguna and R. A. Matzner, “Numerical simulation of bosonic superconducting string interactions,” *Phys. Rev.* **D41** (1990) 1751–1763.
- [98] P. Laguna and D. Garfinkle, “Spacetime of supermassive U(1)-gauge cosmic strings,” *Phys. Rev.* **D40** (1989) 1011–1016.
- [99] D. Garfinkle and P. Laguna, “Contribution of Gravitational Self-Interaction to  $\delta\phi$  and  $\mu$  for a Cosmic String,” *Phys. Rev.* **D39** (1989) 1552–1557.
- [100] P. Laguna and R. A. Matzner, “Peeling U(1) gauge Cosmic Strings,” *Phys. Rev. Lett.* **62** (1989) 1948–1951.
- [101] P. Amsterdamski and P. Laguna-Castillo, “Internal Structure and the Space-Time of Superconducting Bosonic Strings,” *Phys. Rev.* **D37** (1988) 877–884.
- [102] P. Laguna-Castillo and R. A. Matzner, “Coupled Field Solutions for U(1) Gauge Cosmic Strings,” *Phys. Rev.* **D36** (1987) 3663–3673.
- [103] P. Laguna-Castillo and R. A. Matzner, “Discontinuity Cylinder Model of Gravitating U(1) Cosmic String,” *Phys. Rev.* **D35** (1987) 2933–2939.
- [104] P. Laguna-Castillo and R. A. Matzner, “Surfaces of Discontinuity in 5-dimensional Kaluza-Klein Cosmologies,” *Nucl. Phys.* **B282** (1987) 542–554.
- [105] P. Laguna-Castillo and R. A. Matzner, “Inflation and Bubbles in General Relativity,” *Phys. Rev.* **D34** (1986) 2913–2925.

## Publications in Parts of Books

- [1] R. V. Shcherbakov, A. Pe’er, C. S. Reynolds, R. Haas, T. Bode, and P. Laguna, “Prompt emission from tidal disruptions of white dwarfs by intermediate mass black holes,” in *European Physical Journal Web of Conferences*, vol. 39 of *European Physical Journal Web of Conferences*, p. 2007. Dec., 2012. [arXiv:1212.5267 \[astro-ph.HE\]](#).
- [2] P. Laguna, R. Haas, R. V. Shcherbakov, and T. Bode, “Tidal disruption of white dwarfs by intermediate mass black holes,” in *European Physical Journal Web of Conferences*, vol. 39 of *European Physical Journal Web of Conferences*, p. 7002. Dec., 2012.

- [3] E. Bentivegna, P. Laguna, and D. Shoemaker, “The effect of gauge conditions on waveforms from binary black hole coalescence,” in *Laser Interferometer Space Antenna: 6th International LISA Symposium*, S. M. Merkowitz & J. C. Livas, ed., vol. 873 of *American Institute of Physics Conference Series*, pp. 94–98. Nov., 2006.
- [4] F. Herrmann, I. Hinder, D. Shoemaker, and P. Laguna, “Binary Black Holes and Recoil Velocities,” in *Laser Interferometer Space Antenna: 6th International LISA Symposium*, S. M. Merkowitz & J. C. Livas, ed., vol. 873 of *American Institute of Physics Conference Series*, pp. 89–93. Nov., 2006.
- [5] D. Shoemaker, H. Pfeiffer, L. Kidder, P. Laguna, L. Lindblom, M. Scheel, and S. Teukolsky, “Mining for Observables: A New Challenge in Numerical Relativity,” in *Recent Advances in Astronomy and Astrophysics*, N. Solomos, ed., vol. 848 of *American Institute of Physics Conference Series*, pp. 669–676. Aug., 2006.
- [6] F. Rasio, J. Faber, S. Kobayashi, and P. Laguna, “Relativistic SPH Calculations of Compact Binary Mergers,” in *in proceedings of JGRG14 (Yukawa Institute for Theoretical Physics, Kyoto, Japan, Nov 29 - Dec 3, 2004)*, p. 12. 2005. [arXiv:astro-ph/0503007](#).
- [7] P. Laguna and D. M. Shoemaker, “Computational Black Hole Dynamics,” in *The Physics of the Early Universe*, K. Tamvakis, ed., vol. 653 of *Lecture Notes in Physics, Berlin Springer Verlag*, pp. 277–+. 2005.
- [8] P. Laguna, “Probing space-time through numerical simulations,” in *100 years of relativity*, Ashtekar, A., ed., pp. 152–174. Nov., 2005.
- [9] T. Bogdanovic, M. Eracleous, S. Sigurdsson, P. Laguna, and S. Mahadevan, “Observational Signature of Tidal Disruption of a Star by a Massive Black Hole,” in *in Proceedings of 22nd Texas Symposium on Relativistic Astrophysics, Dec 13-17, 2004*, eds. P. Chen and G. Madejski, ed., pp. 23–29. 2004. [arXiv:astro-ph/0505303](#).
- [10] T. Bogdanovic, M. Eracleous, S. Mahadevan, S. Sigurdsson, and P. Laguna, “Observational signature of tidal disruption of a star by a massive black hole,” in *The Interplay Among Black Holes, Stars and ISM in Galactic Nuclei*, T. Storchi-Bergmann, L. C. Ho, & H. R. Schmitt, ed., vol. 222 of *IAU Symposium*, pp. 81–82. Nov., 2004.
- [11] P. Laguna, “Langevin equation: Symmetry breaking phase transitions,” in *The PDE Coffee Table Book*, eds. K. Embree and N. Trefethen, eds. 2001.
- [12] C. M. Chambers, P. R. Brady, W. Krivan, and P. Laguna, “Some Cosmological Tails of Collapse,” in *Recent Developments in Theoretical and Experimental General Relativity, Gravitation, and Relativistic Field Theories*, T. Piran & R. Ruffini, ed., pp. 676–+. 1999.
- [13] P. Laguna, “The fate of stars in the vicinity of supermassive black holes.,” in *Relativistic Astrophysics*, pp. 173–180. 1998.
- [14] P. Laguna, “Black Hole Collisions: A Computational Grand Challenge,” in *Second Edoardo Amaldi Conference on Gravitational Wave Experiments*, E. Coccia, G. Veneziano, & G. Pizzella, ed., pp. 61–+. 1998.
- [15] W. Krivan, “Dynamics of Spin-2 Fields in Kerr Background Geometries,” in *Eighteenth Texas Symposium on Relativistic Astrophysics*, A. V. Olinto, J. A. Frieman, & D. N. Schramm, ed., pp. 607–+. 1998.

- [16] P. Laguna, “Stellar disruptions by massive black holes: Fluid flows in curved space-times,” in *in Relativistic Astrophysics*, H.-P. N. eds. H. Riffert, H. Ruder and F. Hehl, eds., pp. 173–178. 1998.
- [17] P. Laguna and W. H. Zurek, “Density of topological defects after a quench,” in *in Proceedings of the 2nd Mexical School in Gravitation and Mathematical Physics*, eds. A. Garcia, ed. 1997. [arXiv:cond-mat/9705141](#).
- [18] P. Laguna, “Black Hole Collisions: A Computational Grand Challenge,” in *Gravitational Waves: Sources and Detectors*, I. Ciufolini & F. Fiducaro, ed., pp. 61–+. 1997.
- [19] P. Laguna, “Alternatives to finite difference methods in numerical relativity.,” in *Relativity and Scientific Computing. Computer Algebra, Numerics, Visualization*, pp. 88–110. 1996.
- [20] P. Laguna, “The grand challenge in computational gravitation: Collisions of black holes,” in *in Proceedings 6th Conference on Theoretical Physics: General Relativity and Gravitation, Bistrita, Rumania*, D. Vulcanov and I. Cotaescu, eds., pp. 7–13. 1996.
- [21] R. Tuluie and P. Laguna, “Chasing CMB Photons through the Nonlinear Universe.,” in *Seventeenth Texas Symposium on Relativistic Astrophysics and Cosmology*, H. Böhringer, G. E. Morfill, & J. E. Trümper, ed., vol. 759 of *New York Academy Sciences Annals*, pp. 692–+. 1995.
- [22] P. Laguna, W. A. Miller, and W. H. Zurek, “Sph simulations of tidal compression of stars by black holes,” in *in Proceedings of the OAT-SISSA International Workshop SPH in Astrophysics*, eds. G. Bono and J. Miller, eds., vol. 65 of *Mem.S.A.It.* 1993.
- [23] P. Laguna and R. Tuluie, “The Effect of Large Scale Structures on the Cosmic Microwave Background Radiation,” in *Inhomogeneous Cosmological Models*, A. Molina & J. M. M. Senovilla, ed., pp. 121–+. 1995.
- [24] P. Laguna, W. A. Miller, and W. H. Zurek, “Tidal disruption of a star by a supermassive blackhole,” in *American Institute of Physics Conference Series*, S. S. Holt, S. G. Neff, & C. M. Urry, ed., vol. 254 of *American Institute of Physics Conference Series*, pp. 48–51. May, 1992.
- [25] P. Laguna, H. Kurki-Suonio, and R. A. Matzner, “Three-dimensional numerical study of inhomogeneous chaotic inflation.,” in *Marcel Grossmann Meeting on General Relativity*, T. N. eds. H. Sato and R. Ruffini, eds., pp. 1343–1345. 1992.
- [26] P. Laguna, W. A. Miller, and W. H. Zurek, “Tidal disruption of a star by a supermassive black hole,” in *in Proceedings 254 AIP Conference Testing the AGN Paradigm*, M. U. eds. S. Holt, F. Olin S. Neff, ed., pp. 48–55. 1992.
- [27] R. A. Matzner and P. Laguna, “Current status of cosmic string interactions,” in *in Proceedings of the Third Regional Conference in Mathematical Physics, Islamabad 1989*, eds. F. Hussain and A. Qadir, eds., pp. 440–467. 1989.
- [28] P. Laguna, “Do Bosonic Spuerconducting Strings Intercommutate?,” in *Cosmic Strings: The Current Status*, eds. F.S.Accetta and L. Krauss, eds., pp. 42–53. 1988.

## Post-Doctoral Fellows Supervised:

### Georgia Tech:

2017 – present	Miguel Gracia
2016 – present	Juan Calderon Bustillo
2015 – 2015	Andrea Maselli
2014 – 2015	James Clark
2011 – 2013	Raphael Aranha
2010 – 2013	James Healy
2009 – 2013	Tanja Bode
2008 – 2011	Roland Haas

### Penn State:

2005 – 2008	Ian Hinder
2005 – 2008	Frank Herrmann
2003 – 2006	Carlos Sopena
2002 – 2005	Ulrich Sperhake
2001 – 2002	Claudia Moreno
2000 – 2001	Manuel Tiglio
1999 – 2002	Deirdre Shoemaker
1998 – 2000	Mijan Huq
1998 – 1999	Steve Brandt
1997 – 1999	Karen Camarda
1995 – 1996	Hans-Peter Nollert
1995 – 1996	Philip Papadopoulos
1994 – 1995	Robin Tuluie

## Ph.D. Students Supervised:

### Georgia Tech:

2016 – present Chris Evans  
2016 – present Bhavesh Khamesra  
2013 – present Stavropoulos Athanasios  
2014 – 2015 Miguel Gracia (home institution University of Morelia, México)  
2012 – 2016 Michael Clark  
2011 – 2016 Matt Kinsey  
2010 – 2012 James Waters (co-advised with H. Kim)

### Penn State:

2007 – 2009 James Healy  
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2006 – 2008 Manodeep Sinha (co-advised with K. Holley-Bockelmann)  
2004 – 2008 Emily Alicea-Muñoz (co-advised with C. Miller)  
2005 – 2006 Eloisa Bentivegna (co-advised with D. Shoemaker)  
2004 – 2007 Abraham Harte  
2004 – 2005 Cristian Saez (co-advised with G. Chartas)  
2000 – 2004 Kenneth Smith  
2000 – 2004 Bernard Kelly  
1999 – 2002 David Garrison (co-advised with J. Pullin)  
1999 – 2003 Erik Schnetter (home institution University of Tübingen, Germany)  
1997 – 2000 Ramon Lopez-Aleman (co-advised with J. Pullin)  
1997 – 1999 Mike Sipior (co-advised with M. Eracleous)  
1997 – 1999 Johannes Ruoff (home institution University of Tübingen, Germany)  
1995 – 1996 William Krivan (home institution University of Tübingen, Germany)

## M.S. Students Supervised:

### Georgia Tech:

2015 – 2016 Katharine Tallaksen

### Penn State:

2005 – 2006 Nick Harrison  
2005 – 2008 Andrew Knapp  
2002 – 2003 Symeon Konstantinidis  
1996 – 1997 Donald Driscoll  
1995 – 1996 Jurgen Zimmermann  
1994 – 1996 Mark Shepherd  
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## Undergraduate Students Supervised:

### Georgia Tech:

2016 – 2017 John A. Gangemi  
2015 – 2015 Luiz dos Santos Bispo  
2013 – 2015 Christopher Evans  
2013 – 2014 Elwin Martin  
2012 – 2013 Andrew Vu  
2010 – 2011 Azeem Bande-Ali  
2009 – 2010 Aaron Weaver

### Penn State:

2007 – 2008 Jason Hwang  
2007 – 2007 Matt Washik  
2004 – 2007 Racheal Peet  
2005 – 2006 Padraic Finnerty  
2004 – 2005 Edward Cazalas  
2003 – 2005 Tyler Landis  
2002 – 2003 Praj Kulkarni (Honors Thesis)  
2000 – 2003 Steve Segal (Honors Thesis)  
2000 – 2003 Sean McWilliams (Honors Thesis)  
1998 – 2000 Patrick Allison (Honors Thesis)  
1995 – 1997 Holly Nordquist  
1994 – 1996 Josh Bish (Honors Thesis)  
1994 – 1995 Deirdre Shoemaker (Honors Thesis)  
1993 Damien Easson  
1993 Art Freeman



## Research Grants

### Active:

- 2016 – 2020 “SI2-SSI: Collaborative Research: Einstein Toolkit Community Integration and Data Exploration,” National Science Foundation, \$462,000/4 year (PI).  
2015 – 2018 “Compact Object and Gravitational Radiation,”  
National Science Foundation, \$600,000/3 year (Co-I).

### Completed:

- 2013 – 2016 “Collaborative Research: The multi-scale physics of massive black hole formation, fueling and feedback, National Science Foundation, \$ 571,378 /3year (PI).  
2012 – 2015 “Collaborative Research: The Einstein Toolkit an open source general relativistic multi-physics infrastructure for relativistic astrophysics,”  
National Science Foundation, \$126,366/3 year (PI).  
2012 – 2015 “Gravitational Wave Studies of Compact Object Binaries,”  
National Science Foundation, \$360,000/3 year (PI).  
2009 – 2014 “Compact Object Binaries and Gravitational Radiation,”  
National Science Foundation, \$410,000/3 year (PI).  
2012 – 2013 “Einstein Toolkit Beginner User Workshop to be held April 4-6, 2012 at Georgia Tech,” National Science Foundation, \$10,000/1 year (PI).  
2012 – 2013 “Travel Support Workshop on Gravitational Wave Bursts at Tobermory, Scotland,” National Science Foundation, \$10,000/1 year (PI).  
2009 – 2013 “CDI-Type I: Collaborative Research: Observational Data as Central Engine of Binary Black Hole Simulations,” National Science Foundation, \$465,000/3 year (PI).  
2009 – 2013 “Collaborative Research: Community Infrastructure for General Relativistic MHD (CIGR),” National Science Foundation, \$300,000/3 year (PI).  
2009 – 2010 “Travel Support Gravitational Wave Bursts: Astrophysics, Data Analysis and Numerical Relativity meeting; Chichen-Itza, Mexico; December 2009,”  
National Science Foundation, \$10,000/1 year (PI).  
2007 – 2010 “Collaborative Research: XiRel, a Next Generation Infrastructure for Numerical Relativity,” National Science Foundation, \$110,000/3 years (PI).  
2006 – 2009 “Compact Object Binaries and Gravitational Radiation,”  
National Science Foundation, \$331,453/3 years (PI).  
2001 – 2008 “Center for Gravitational Wave Physics,”  
National Science Foundation, \$6,300,000/7 years (Co-PI).  
2003 – 2006 “Black Hole Binaries,”  
National Science Foundation, \$345,000/3 years (PI).  
2003 “Travel Support for the Conference Gravitation: A Decennial Perspective,”  
National Science Foundation, \$5,000/6 months (Co-PI).  
2002 – 2005 “ITR: Numerical and Computational Tools for Binary Black Hole Simulations,”  
National Science Foundation, \$250,000/3 years (PI).  
1998 – 2003 “Gravitational Radiation from Collision and Accretion of Compact Objects,”  
National Science Foundation, \$548,723 (PI).  
1998 – 2001 “Black Hole Collisions,”  
National Science Foundation, \$250,000 (PI).  
1997 – 2001 “U.S.-Mexico Cooperative Research: Quantum Gravity, Supersymmetry and Black Holes.” National Science Foundation, \$26,723 (Co-PI).

- 1996 – 1999 “Numerical Studies of Inhomogeneous Cosmological Space-Times,” National Science Foundation, \$55,276 (PI).
- 1996 – 1998 “Collaborative Research Grant: Perturbations of Neutron Stars,” NATO, \$6,000 (Co-PI).
- 1995 – 1998 “Multi-processor Computing Facility for Nonlinear Mathematical Field Problems,” National Science Foundation, \$303,899 (Co-PI).
- 1994 – 1999 “Black Hole Binaries: Coalescence and Gravitational Radiation,” National Science Foundation, \$205,000 (Co-PI).
- 1993 – 1999 “Young Investigator Award,” National Science Foundation, \$125,000 (PI).
- 1993 – 1996 “Numerical Studies in Gravitation, Cosmology and Astrophysics,” National Science Foundation, \$71,000 (PI).
- 1993 – 1995 “Scalable Hierarchical Particle Algorithms for Galaxy Formation and Accretion Astrophysics,” NASA (Los Alamos subcontract) \$50,000 (PI).
- 1992 “Smoothed Particle Magnetohydrodynamics on Highly Parallel Supercomputers,” Air Force, \$45,000 (Co-PI).

### Invited Talks:

1. “Cosmological Applications of Singular Layers in General Relativity,” Astrophysics Center, Fermilab, Batavia, IL, February 23, 1987.
2. “Cosmic String Interactions,” Physics Department, University of Florida at Gainesville, Gainesville, FL, November 18, 1988.
3. “Cosmic String Interactions,” Applied Physics and Geophysics Department, Shell Development Company, Houston, TX, February 27, 1989.
4. “Cosmic String Interactions,” Astrophysics Center, Fermilab, Batavia, IL, March 3, 1989.
5. “Cosmic String Interactions,” Computer Science Laboratory, Schlumberger, Austin, TX, May 11, 1990.
6. “Black Hole Accretion: Smoothed Particle Hydrodynamic Approach,” Physics Department, Waseda University, Tokyo, Japan, June 21, 1991.
7. “Numerical Study of 3D Inhomogeneous Cosmologies: Chaotic Inflation,” Physics Department, The University of Tokyo, Tokyo, Japan, July 1, 1991.
8. “Tidal Stellar Disruptions by Supermassive Black Holes,” Department of Physics, The University of Texas at Austin, Austin, TX, April 7, 1992.
9. “Tidal Stellar Disruptions by Supermassive Black Holes,” Department of Astronomy, New Mexico State University, Las Cruces, NM, April 24, 1992.
10. “Tidal Detonation of Stars by Massive Black Holes,” Department of Physics, Drexel University, Philadelphia, PA, June 10, 1993.
11. “Tidal Compression of Stars by Massive Black Holes,” Observatory of Paris-Meudon, Paris, France, July 2, 1993.
12. “SPH without H,” Workshop on Advances in SPH, Los Alamos National Laboratory, Los Alamos, NM, September 23, 1993.
13. “Stellar Detonation by Supermassive Black Holes,” Center for Radiophysics and Space Research, Cornell University, Ithaca, NY, March 30, 1994.
14. “Tidal Stellar Disruptions by Supermassive Black Holes,” Institute of Theoretical Astrophysics, University of Tübingen, Tübingen, Germany, September 25, 1995.
15. “Numerical Methods: Two Black-Holes Collision,” International Conference on Gravitational Waves, Sources and Detectors, Cascina, Italy, March 20, 1996.

16. "Black Hole Collisions: A Computational Grand Challenge," University of Timisoara, Timisoara, Rumania, May 26, 1996.
17. "The Imprint of Large-Scale Structures on the Cosmic Microwave Background," Observatory of Paris-Meudon, Paris, France, June 7, 1996.
18. "The Imprint of Large-Scale Structures on the Cosmic Microwave Background," Imperial College, London, England, June 10, 1996.
19. "Black Hole Collisions: A Computational Grand Challenge," Universidad Autónoma Metropolitana-Iztapalapa, México City, México, August 5, 1996
20. "Tidal Stellar Disruptions by Supermassive Black Holes," Universidad Autónoma Metropolitana-Iztapalapa, México City, México, August 6, 1996
21. "The Imprint of Large-Scale Structures on the Cosmic Microwave Background," Universidad Autónoma Metropolitana-Iztapalapa, México City, México, August 7, 1996
22. "Black Hole Collisions: Outer Boundary Conditions," Institute of Theoretical Astrophysics, University of Tübingen, Tübingen, Germany, August 16, 1996.
23. "Density of Kinks After a Quench: When Symmetry Breaks, How Big Are the Pieces?" Mexican School of Physics, Tlaxcala, México, December 4, 1996.
24. "Density of Kinks After a Quench: When Symmetry Breaks, How Big Are the Pieces?" Center for Relativity, University of Texas, Austin, TX, February 6, 1997.
25. "Density of Kinks After a Quench: When Symmetry Breaks, How Big Are the Pieces?" Harvard-MIT-Tufts Cosmology Seminar, Boston MA, March 25, 1997.
26. "Dynamics of Perturbations of Rotating Black Holes," Theoretical Astrophysics Group, Los Alamos National Laboratory, July 14, 1997.
27. "Dynamics in the Neighborhood of Rotating Black Holes," Mexican Meeting on Gauge Theories of Gravity, Mexico City, October 8, 1997.
28. "Black Hole Collisions," Physics Colloquium, Indiana University of Pennsylvania, Indiana, PA, November 24, 1997.
29. "Critical Density of Symmetry Breaking: Quenches, Dissipation and Cosmology," Physics Department, University of Milwaukee, Milwaukee, WI, April 10, 1998.
30. "Critical Density of Symmetry Breaking: Quenches, Dissipation and Cosmology," Astronomy Department, University of Thessaloniki, Thessaloniki, Greece, June 30, 1998.
31. "Collisions of Black Holes without Black Holes," Second Mexican School of Gravitation and Mathematical Physics, Mazatlán, México, November 19, 1998.
32. "Astrophysics in the Vicinity of Black Holes," Department of Physics, University of Tübingen, Tübingen, Germany, January 15, 1999.
33. "Astrophysics in the Vicinity of Black Holes," Department of Physics Colloquium, University of Texas, Austin, TX, February 22, 1999.
34. "Future Directions of Numerical Relativity," Conference on Strong Gravitational Physics, University of California at Santa Barbara, Santa Barbara, CA, June 26, 1999
35. "Two Lectures on Cosmological Phase Transitions," Mexican School in Numerical Relativity, Mexico City, August 10-12, 1999.
36. "3+1 Formulation of Einstein Equations and Numerical Relativity," Universidad Autónoma Metropolitana-Iztapalapa, México City, México, November 11, 1999
37. "Iterated Crank-Nicholson Method in Numerical Relativity," Universidad Autónoma Metropolitana-Iztapalapa, México City, México, November 12, 1999
38. "Numerical Simulations of Black Holes without Black Holes," Universidad Autónoma Metropolitana-Iztapalapa, México City, México, November 12, 1999
39. "Black Hole Collisions: The Agave Project," CIAR Cosmology and Gravitation Programme meeting, Banff, Alberta, Canada, February 22, 2000

40. "Black Hole Collisions," Department of Physics, University of Florida, Gainesville, FL, September 29, 2000
41. "Black Hole Collisions," Department of Physics, University of Cordoba, Cordoba, Argentina, October 9, 2000
42. "Black Hole Collisions," Department of Physics, Case Western Reserve University, Cleveland, OH, November 10, 2000
43. "Grazing Collisions of Black Holes," Department of Physics, Oakland University, Detroit, Michigan, February 16, 2001
44. "Influence of Gauge Conditions on the Stability of Numerical Simulations of Black Hole," Department of Physics, Oakland University, Detroit, Michigan, February 17, 2001
45. "Challenges in Simulating Black Hole Collisions," Department of Applied Mathematics, University of Southampton, Southampton, United Kingdom, October 18, 2001
46. "A Dancing Black Hole," Department of Physics, University of Illinois, Urbana-Champaign, March 13, 2002
47. "Black Holes: Science Fiction or Reality," Universidad de Oviedo, Gijon, Spain, May 3, 2002
48. "Numerical stability of a new conformal-traceless 3+1 formulation of the Einstein equation," Caltech, Pasadena, June 6, 2002
49. "The State of the Art in Numerical Relativity," Numerical Relativity Workshop, Institute for Mathematics and its Applications, University of Minneapolis, Minneapolis, MN, June 26, 2002
50. "General Relativity on the Computer," Fall Meeting of the New York Section of the American Physical Society, Syracuse University, Syracuse, NY, October 11, 2002
51. "Black Hole Simulations in Happy Valley," Gravitational Interaction of Compact Objects Program, Kavli Institute for Theoretical Astrophysics, University of California, Santa Barbara, CA, July 3, 2003
52. "Dirty Black Hole Evolutions," Conference on Gravitational Waves, SISSA, Trieste, Italy, September 23, 2003
53. "Computational Black Hole Dynamics," Second Aegean Summer School on the Early Universe. Ermoupoli, Syros, Greece, September 29 and 30, 2003
54. "Computational Approach to Black Hole Dynamics," Center for Advanced Studies, University of New Mexico, Albuquerque, New Mexico, December 4, 2003
55. "Numerical simulations of Extreme-mass-ratio binaries," Capra 7 Meeting, Center for Gravitational Wave Astronomy, the University of Texas at Brownsville, Brownsville, Texas, May 30, 2004
56. "Gravitational Waves from Stellar Disruptions of Stars by Supermassive Black Holes," 7th Eastern Gravity Meeting, Bowdoin College, Brunswick, Maine, June 11, 2004
57. "Low-carb Numerical Relativity Problems," Department of Physics, University of Florida, Gainesville, FL, October 1, 2004
58. "4 Lectures in Numerical Relativity," Second Chilean School of Astrophysics, Cosmology and Gravitation, University of Concepcion, Concepcion, Chile, October 19-22, 2004
59. "When Black Holes Collide," Department of Physics and Astronomy Colloquium, Northwestern University, February 25, 2005
60. "When Black Holes Collide," Keynote Speaker at the Central Pennsylvania Section of the American Association of Physics Teachers Meeting, York, PA, March 4, 2005
61. "Numerical relativity: Astrophysical and Cosmological Applications," One Hundred Years of Relativity, University of Puerto Rico, San Juan, Puerto Rico, March 30, 2005
62. "When Black Holes Collide," 7th Astronomy Conference of the Hellenic Astronomical Society, Lixourion, Kefallinia, Greece September 10, 2005

63. "Black Hole Simulations: A Tool in a Multi-messenger Astronomy," Department of Physics Colloquium, Florida Atlantic University, Boca Raton, FL, October 21, 2005
64. "When Black Holes Collide," Department of Physics, University of Guanajuato, Leon, México, May 8, 2006
65. "Binary Black Hole Simulations: Past, Present and Future," Gravity Group Lunch Talk, Department of Physics, University of California at Santa Barbara, Santa Barbara, CA, June 9, 2006
66. "Binary Black Hole Simulations: Are we there yet?," Kavli Institute for Theoretical Astrophysics, University of California at Santa Barbara, Santa Barbara, CA, June 9, 2006
67. "How black holes get their kicks," National Conference of the Society for Advancement of Chicanos and Native Americans in Science, Tampa, FL, October 27, 2006
68. "Two and Three Body Encounters: Astrophysics and the Role of Numerical Relativity," VII Mexican School on Gravitation and Mathematical Physics, Relativistic Astrophysics and Numerical Relativity, Playa del Carmen, México, November 27, 2006
69. "Binary Black Hole Simulations and the Hunt for Gravitational Waves," Special Session on Numerical Relativity at the American Mathematical Society Joint Meetings, New Orleans, January 7, 2007
70. "Binary black holes and their echoes in the Universe," Physics Colloquium, Case Western Reserve University, March 29, 2007
71. "Binary black holes and their echoes in the Universe," April 2007 Meeting of the American Physical Society, April 14, 2007
72. "Simulation and Modeling at the Exascale for Numerical Relativity," Exascale Town Hall Meeting, Oak Ridge national Laboratory, May 17, 2007
73. "Binary black hole simulations as tools to open a new window to the Universe," School of Physics Colloquium, Georgia Tech, Atlanta, GA, October 10, 2007
74. "Binary Black Holes, Gravitational Bursts and the Issue of the Final Spin," Astronomy Colloquium, Case Western Reserve University, March 20, 2008
75. "Binary Black Holes: Extreme Gravitational Physics Simulations," Recent Developments in Gravity, Thessaloniki, Greece, June 4, 2008
76. "The issue of the final spin in hyperbolic black hole mergers," 7th International LISA Symposium, Barcelona, Spain, June 18, 2008
77. "Binary Black Holes: Formulations & Gauge Conditions," Frontiers in Numerical Gravitational Astrophysics, Erice, Italy, July 1, 2008
78. "Binary Black Holes: Inspirals, Post-Newtonian comparisons & Data Analysis," Frontiers in Numerical Gravitational Astrophysics, Erice, Italy, July 1, 2008
79. "General Relativity: Einstein Equations," Summer School Astrophysics and Gravitation, Crete, Greece, July 7, 2008
80. "General Relativity: Black Holes," Summer School Astrophysics and Gravitation, Crete, Greece, July 8, 2008
81. "Computing Gravity's Strongest Grip: Black Holes and Numerical Relativity," Summer School Astrophysics and Gravitation, Crete, Greece, July 8, 2008
82. "Black Hole and Neutron Star Simulations: Computing Gravity's Strongest Grip," 2008 Fall Creek Falls Conference: Delivering Science on Petascale Computers, September 10, 2009
83. "Simulations of Compact Object Binaries: Imagining the Future of Numerical Relativity," Kavli Futures Symposium, Costa Rica, January 12, 2009
84. "Binary Black Hole Simulations: Mission Accomplished(?)" Department of Physics, University of Florida, Gainesville, February 13, 2009

85. "Numerical Relativity Beignets: Kerr Limit, Golden Black Holes and Wet Black Hole Binaries," Department of Applied Mathematics, University of Southampton, UK, July 7, 2009
86. "Numerical Relativity Preludes: Kerr Limit, Golden Black Holes and Wet Black Hole Binaries," Center for Gravitational Wave Physics, Penn State, University Park, PA, October 2, 2009
87. "Numerical Relativity Preludes: Kerr Limit, Golden Black Holes and Wet Black Hole Binaries," Department of Astronomy, University of Maryland, College Park, MD, October 2, 2009
88. "Numerical Relativity Preludes: Kerr Limit, Golden Black Holes and Wet Black Hole Binaries," Department of Physics, Florida Atlantic University, Boca Raton, FL November 5, 2009
89. "Numerical Simulations of Wet Black Hole Binaries and their Electromagnetic Signatures," 76th Annual Meeting of the Southeastern Section of APS, Atlanta, GA, November 12, 2009
90. "Relativistic Mergers of Supermassive Black Holes: Binary and Gas Dynamics," 2010 Winter Conference in Astrophysics: Formation and Evolution of Black Holes, Aspen, CO, February 19, 2010
91. "Light Shows from Supermassive Binary Black Hole Mergers," Canadian Institute of Theoretical Astrophysics, Toronto, Waterloo, Ontario, Canada, April 7, 2010
92. "Light Shows from Supermassive Binary Black Hole Mergers," Perimeter Institute, Waterloo, Ontario, Canada, April 8, 2010
93. "Light Shows from Supermassive Binary Black Hole Mergers," 19th International Conference on General Relativity and Gravitation, Mexico City, July 8, 2010.
94. "Black Holes: Their Birth and Violent Interactions," Department of Physics and Astronomy, College of Charleston, SC, September 30, 2010.
95. "Multi-messenger signatures of supermassive binary black hole mergers," Gravitational Waves 2010, University of Minnesota, October 17, 2010.
96. "General Relativistic Disruptions of White Dwarfs by Intermediate Mass Black Holes," The Ins and Outs of Black Holes, Annapolis, Maryland, November 17, 2010.
97. "Light Shows from Supermassive Binary Black Hole Mergers," The Future of AstroComputing, San Diego Supercomputer Center, San Diego, CA, December 17, 2010.
98. "Light Shows from Supermassive Binary Black Hole Mergers," Advances and Challenges in Computational General Relativity, Brown University, Providence, RI, May, 2011.
99. "Synergistic Electromagnetic-Gravitational Signatures of BBH Mergers," Theoretical Astrophysics Group, University of Tuebingen, Tuebingen, Germany, July 20, 2011.
100. "General relativistic mergers of SMBH in astrophysical environments," Single and Double Black Holes in Galaxies Conference, University of Michigan, Ann Arbor, MI, August 25, 2011.
101. "When Black Holes Collide: The Computational Challenge," Conference in Computational Physics, Gatlinburg, Tennessee, November 3, 2011.
102. "Numerical Relativity and Black Hole Binaries: The historical path to present simulations," American Physical Society Meeting, Atlanta, Georgia, April 1, 2012
103. "Binary Black Holes in Astrophysical Environments," Recent Developments in Gravity Conference, Chania, Crete, June 22, 2012
104. "Matter in BBH Simulations," in Rattle and Shine: Gravitational Waves and Electromagnetic Studies of Compact Binary Mergers, KITP, Santa Barbara, CA, August 1, 2012
105. "Black holes and gravitational waves: Was Einstein right?," Colloquium Department of Physics, Emory University, Atlanta, GA, October 5, 2012
106. "Black holes and gravitational waves: Was Einstein right?," Colloquium Department of Physics, Wake Forest University, North Carolina, October 24, 2012

107. "Lectures on Relativistic Astrophysics," XXXI Curso Centroamericano y del Caribe de Fisica, Ciudad de Guatemala, November 14-16, 2012.
108. "Black Holes", Science Unwrapped, Utah State University, November 2, 2012
109. "Binary Black Holes in Astrophysical Environments," 3rd Iberian Gravitational-Wave Meeting 2013, Valencia Spain, March 20, 2013
110. "Tidal Disruptions by Massive Black Holes: The Relativistic Regime," Gravitational Waves Program, Yukawa Institute of Theoretical Physics, Kyoto Japan, June 4, 2013
111. "Black Hole Curiosities," Physics Colloquium, Universidad Autonoma Metropolitana-Iztapalapa, Mexico City, September 6, 2013
112. "Fireworks from Massive Black Hole Binary Mergers," Garcia-Colin Symposium, Mexico City, September 9, 2013
113. "Black Hole Curiosities," Physics Colloquium, Department of Physics and Astronomy, Louisiana State University, November 14, 2013
114. "Overview of the Transient Gravitational Wave Sky," American Physical Society Meeting, Savannah, Georgia, April 7, 2014
115. "Prompt Accretion in Tidal Stellar Disruptions by Massive Black Holes," Department of Physics Colloquium, Florida Atlantic University, Boca Raton, FL, November 7, 2014
116. "Learning about the final state in binary black hole mergers from the gravitational wave peak luminosity," Recent Developments in Gravity, NEB16, Mykonos, Greece, September 17, 2014.
117. "Gravitational Waves from Binary Systems," Eighth Aegean Summer School. Gravitational Waves: From Theory to Observations, Rathymno, Crete, July 1, 2015
118. "Tidal Disruption Events and their Multi-Messenger Signature," Compact Stars and Black Holes Workshop, Tübingen, Germany, July 7, 2015
119. "Stellar Disruptions for Dummies," Astro-GR 2015, Sao Paulo, Brazil, August 14, 2015
120. "Einstein's Relativity and the Hunt for Gravitational Waves," Building the Future of the Science Workshop, Mexican Academy of Sciences, Mérida, México, November 20, 2015
121. "When Black Holes Collide: The Birth of Gravitational Wave Astronomy," Sigma Pi Sigma Distinguished Lecture, Department of Physics, University of North Carolina Wilmington, April 7, 2016.
122. "The role of numerical relativity in the hunt for gravitational waves," Colloquium Department of Physics, University of North Carolina Wilmington, April 8, 2016.
123. "Relativistic Tidal Disruption Events," American Physical Society Meeting, Salt Lake City, Utah, April 17, 2016
124. "Merger of binary black holes in scalar-tensor theories of gravity," Gravitational Waves in Modified Gravity Theories Workshop, Athens, Greece, September 15, 2016
125. "Relativistic Tidal Disruption Events," Recent Developments in Gravity, NEB17, Mykonos, Greece, September 19, 2016
126. "When Black Holes Collide: The Birth of Gravitational Wave Astronomy," Colloquium Department of Physics, National Taiwan University, Taipei, Taiwan, October 11, 2016.
127. "When Black Holes Collide: The Birth of Gravitational Wave Astronomy," Seminar School of Engineering Sciences, Wuhan National Laboratory for Optoelectronics, Wuhan, China, October 17, 2016.
128. "Relativistic Tidal Disruption Events," Gravitation & Cosmology Group, Institute of Physics - Department of Theoretical Physics, Rio de Janeiro State University, Rio de Janeiro, RJ, Brazil, November 4, 2016
129. "High Performance Computing and the Coalescence of Compact Objects," 4th Conference of Computational Interdisciplinary Science, Sao Jose dos Campos, Brazil, November 10, 2016

130. “Relativistic Tidal Disruption Events,” Instituto Mexicano de Ciencias Nucleares, Universidad Autónoma México, Mexico City, Mexico, December 2, 2016
131. “Introduction to General Relativity,” lectures for the 2nd Fudan Winter School on Astrophysical Black Holes, Fudan University, Shanghai, China, January 9-14, 2017
132. “Binary Black Hole Simulations: The Making of a Gravitational Wave,” colloquium, National Technological University of Athens, Athens, Greece, March 20, 2017
133. “The Kicking of Black Holes,” Stephen Hawking 75th Birthday Conference, Cambridge, United Kingdom, July 4, 2017
134. “The Role of Numerical Relativity in the Detection of Gravitational Wave,” The Promises of Gravitational Wave Astronomy Meeting, The Royal Society, London, England, September 11, 2017
135. “General Relativistic Tidal Disruption Events,” TDE17: Piercing the Sphere of Influence Conference, Institute of Astronomy, Cambridge University, England, September 12, 2017
136. “Ed at NCSA part I; The Binary Black Hole Grand Challenge Years,” Black Holes, Red Square, and Blue Waters: A Symposium in Honor of Ed Seidel’s 60th Birthday, Mallorca, Spain, October 14th, 2017
137. “Ultra-Close Tidal Disruption Events,” Colloquium, Department of Astronomy and Astrophysics, Penn State University, November 15, 20017
138. “25 Years of Binary Black Hole Simulations,” Institute of Gravitation and the Cosmos, Penn State University, November 17, 2017

### **Conferences Contributed Talks:**

1. “Intercommutation of Cosmic Strings,” Computing Cosmologies Workshop, Canadian Institute for Theoretical Astrophysics, Toronto, Canada, April 28, 1989.
2. “Electromagnetic Charge and Current Density Distribution Resulting from Superconducting String Collisions,” 12th International Conference on General Relativity and Gravitation, University of Colorado at Boulder, Boulder, CO, July 5, 1989.
3. “General Relativistic Three Dimensional Inhomogeneous Inflation,” 1990 Spring Meeting of the American Physical Society, Washington, DC, April 16, 1990.
4. “Applying Tabu Search to Statistical Physics,” Computer Science and Operations Research Conference, Williamsburg, VA, January 8, 1992.
5. “Tidal Stellar Disruptions by Supermassive Black Holes,” 179th Meeting of the American Astronomical Society, Atlanta, GA, January 16, 1992.
6. “SPH Simulations of Tidal Compression of Stars by Black Holes,” SPH in Astrophysics International Workshop, SISSA, Trieste, Italy, July 7, 1993.
7. “Inhomogeneous Cosmologies: Evolution of Large Scale Structures,” Spanish Relativity Meeting, Menorca, Spain, September 13, 1994.
8. “The Imprint of Proper Motion of Structures on the Cosmic Microwave Background,” III Great Lakes Cosmology Workshop, Case Western Reserve University, Cleveland, OH, May 6, 1995.
9. “Computational Cosmology at Horizon Scales,” 14th International Conference on General Relativity and Gravitation, Florence, Italy, August 11, 1995
10. “Numerical Solution of Mixed Initial Value Problems: Investigation in Spherical Symmetry,” 14th International Conference on General Relativity and Gravitation, Florence, Italy, August 11, 1995
11. “Computational Cosmology at Horizon Scales,” 7th Gregynog Relativity Workshop, Wales, England, August 22, 1995.



12. "Arrival-Times from Binary Pulsars with Rotating Black Hole Companions" 17th Texas Symposium on Relativistic Astrophysics, Chicago, IL, December 17, 1996.
13. "A Note on Superradiance," Nickel and Dime Gravity Meeting, Syracuse, NY, March 28, 1998
14. "Critical Density of Symmetry Breaking: Quenches, Dissipation and Cosmology," American Physical Society Meeting, Columbus, OH, April 19, 1998
15. "Non-conformally Flat Initial Data for Binary Black Holes," American Physical Society Meeting, Atlanta, GA, March 23, 1999
16. "Neutron Star Collisions: The Close-Limit," American Physical Society Meeting, Atlanta, GA, March 23, 1999
17. "Numerical Relativity," Session Chair, The Ninth Marcel Grossmann Meeting, Rome, July 2–8, 2000
18. "Numerical Relativity and Black Hole Collisions," Session Chair, 20th Texas Symposium on Relativistic Astrophysics, Austin, Texas, December 10–15, 2000
19. "Numerical evolution of constant mean curvature foliations of single black hole spacetimes," American Physical Society Meeting, Washington, DC, April 28, 2001
20. "Numerical Relativity at Penn State," LIGO Scientific Collaboration Meeting, Livingston, Louisiana, March 20, 2002
21. "Numerical stability of a new conformal-traceless 3+1 formulation of the Einstein equation," American Physical Society Meeting, Albuquerque, NM, April 20, 2002
22. "Dirty Black Hole Evolutions," American Physical Society Meeting, Philadelphia, PA, April 7, 2003
23. "Simulations of Extreme-mass-ratio Binaries," 17th International Conference on General Relativity and Gravitation, Dublin, Ireland, July 20, 2004
24. "Neutron Star - Black Hole Mergers: Gravitational waves and implications for short GRBs," American Physical Society Meeting, Dallas, TX, April 23, 2006
25. "The Shallow Waters of the Big Bang," Quantum Gravity in the Americas III, Penn State, PA, August 24, 2006
26. "Cosmic String Collisions a la Richard," RAMfest, University of Texas at Austin, Austin, TX June 9, 2007
27. "Binary Black Holes: Spins, Kicks and Eccentricities," 18th International Conference on General Relativity and Gravitation, Sydney, Australia, July 7, 2007
28. "The final spin in unbound black hole mergers," American Physical Society Meeting, Saint Louis, MO, April 13, 2008
29. "Gravitational Wave Propagation in Perturbed FRW Cosmologies: The Gravitational Integrated Sachs-Wolfe Effect," American Physical Society Meeting, Denver, CO, May 3, 2009
30. "The Final Merged Black Hole: Spin, Mass, Hidden Symmetries and Dimensional Reduction," 12th Marcel Grossmann Meeting, Paris, France, July 16, 2009
31. "Multi-messenger Signatures from Tidal Disruptions of White Dwarfs by Massive Black Holes," LISA Astro-GRParis, Paris, France, September 15, 2010
32. "Super-Extremal Spinning Black Holes via Accretion," American Physical Society Meeting, Anaheim, CA, May 2, 2011
33. "Tidal Disruptions of White Dwarfs by Intermediate Mass Black Holes," in Tidal Disruption Events and AGN Outbursts Workshop, Madrid, Spain, June 27, 2012
34. "Binary Black Holes in Astrophysical Environments," in the 13th Marcell Grossmann Meeting, Stockholm, Sweden, July 6, 2012

35. “Merger of binary black holes in scalar-tensor theories of gravity,” Testing General Relativity with Astrophysical Observations Workshop, University of Mississippi, Oxford, MS, January 10, 2014
36. “Precursor Flares and Gravitational Waves from Tidal Stellar Disruptions by Massive Black Holes,” Sant Cugat Forum on Astrophysics, Session on Gravitational Wave Astrophysics, San Cugat, Spain, April 23, 2014
37. “New Method to Construct Initial Data for Compact Object Binaries,” American Physical Society Meeting, Baltimore, Maryland, April 14, 2015
38. “Multi-messenger Astronomy of Tidal Disruption Events,” 11 Edoardo Amaldi Conference on Gravitational Waves, Gwangju, South Korea, June 23, 2015

### University Contributed Talks:

1. “Discontinuity Cylinder Model of Gravitating U(1) Cosmic Strings,” Center for Relativity, Department of Physics, The University of Texas at Austin, Austin, TX, November 11, 1986.
2. “Introduction to Cosmic Strings,” Center for Relativity, The University of Texas at Austin, Austin, TX, October 8, 1987.
3. “Cosmic Strings,” Department of Astronomy, The University of Texas at Austin, Austin, TX, February 12, 1988.
4. “Peeling Cosmic Strings,” Center for Relativity, The University of Texas at Austin, Austin, TX, February 7, 1989.
5. “Cosmic String Collisions,” Department of Physics, Drexel University, Philadelphia, PA, November 2, 1989.
6. “Inhomogeneous Inflation: The Initial Value Problem,” Three-dimensional Numerical Relativity Workshop, The University of Texas at Austin, Austin, TX, November 15, 1990.
7. “Inhomogeneous Inflation,” Astrophysics Seminar, Los Alamos National Laboratory, Los Alamos, NM, February 14, 1991.
8. “Solutions of Almost Symmetric Matrix Problems,” Second Texas Workshop on Three-dimensional Numerical Relativity, The University of Texas at Austin, Austin, TX, October 31, 1991.
9. “Stellar Disruption by a Supermassive Black Hole,” Astrophysics Seminar, Los Alamos National Laboratory, Los Alamos, NM, December 11, 1991.
10. “Inhomogeneous Cosmologies: Chaotic Inflation,” Black Hole Binaries Workshop, Syracuse University, Syracuse, NY, October 7, 1992.
11. “Numerical Relativity at Penn State,” Black Hole Binaries Workshop, University of Pittsburgh, May 4, 1994.
12. “Evolution of a Single Black Hole in Novikov Coordinates,” Black Hole Binaries Workshop, University of Illinois, November 7, 1994.
13. “The Cauchy-Characteristic Matching Problem,” Black Hole Binaries Workshop, Cornell University, May 11, 1995.
14. “Arrival-Times from Binary Pulsars with Rotating Black Hole Companions” Los Alamos National Laboratory, Los Alamos, NM, January 31, 1997.
15. “Non-conformally Flat Initial Data for Multiple Black Hole Spacetimes,” Los Alamos National Laboratory, Los Alamos, NM, October 14, 1997.
16. “Initial Data Sets,” Black Hole Binaries Workshop, University of Texas, Austin, TX, November 6, 1998.
17. “A New Conformal-Transverse-Traceless Formulation of the Einstein Equations,” Center for Gravitational Physics and Geometry, Penn State University, January 14, 2002

18. "Reconciling Conformal-Traceless and Thin Sandwich Binary Black Holes Initial Data," Center for Gravitational Physics and Geometry, Penn State University, March 17, 2003
19. "Extreme Mass Ratio Binaries: An overview and future directions," Center for Gravitational Physics and Geometry, Penn State University, January 12, 2004

### **In-house and Outreach Talks**

1. "Tidal Stellar Disruptions by Supermassive Black Holes," Department of Astronomy & Astrophysics, Penn State University, March 6, 1992.
2. "Tidal Compression of Stars by Massive Black Holes," Center for Gravitational Physics and Geometry, Penn State University, November 15, 1993.
3. "Black Holes: Theory to Reality," Sigma Xi Society, Penn State University, February 15, 1994.
4. "Colliding Black Holes," Summer Seminar Series, Penn State University, June 16, 1994.
5. "Black Holes Collisions and Supercomputers," Alumni College Homecoming Lecture Series, Penn State University, November 19, 1994.
6. "Supercomputers as Black Hole Colliders," Eberly College of Science Student Council Penn State University, March 28, 1995
7. "Colliding Black Holes and Supercomputers," Board of Directors, Eberly College of Science Alumni Society, Penn State University, April 8, 1995.
8. "Black Holes and the Structure of the Universe," Astronomy & Astrophysics Board of Visitors, Penn State University, October 8, 1995
9. "Computational Cosmology," Cosmic Pizza Undergraduate Lecture Series, Department of Astronomy & Astrophysics, Penn State University, October, 26 1995.
10. "Black Hole Collisions," Aerospace Engineering Department, Penn State University, February 5, 1996.
11. "Ray-Tracing the Cosmic Microwave Sky," Department of Physics Colloquium, Penn State University, March 20, 1997.
12. "Supercomputers, Star Clusters and Black Holes," Alumni Vacation College, June 15, 1998. Penn State University,
13. "Ten Open Questions in the Simulation of Black Hole Collisions," Center for Gravitational Physics and Geometry, Penn State University, September 3, 1998.
14. "Linear-nonlinear Formulation of Einstein Equations for the Two-body Problem in General Relativity," Center for Gravitational Physics and Geometry, Penn State University, September 27, 1999.
15. "Black Hole Collisions," Department of Physics Colloquium, Penn State University, January 18, 2001
16. "When Black Holes Collide," Department of Astronomy & Astrophysics Open House, Penn State University, September 29, 2001
17. "When Black Holes Collide," Friedman Lecture Series, Penn State University, November 11, 2001
18. "When Black Holes Collide," RUE-seminar, Physics Department, Penn State University, June 12, 2002
19. "Computational Black Hole Dynamics," Center for Applied Mathematics, Mathematics Department, Penn State University, October 24, 2003
20. "In Search of Black Hole Collisions," University of Bio Bio, Concepcion, Chile, October 20, 2004
21. "When Black Holes Collide," Frontiers of Science Lecture Series, Penn State University, February 12, 2005

22. "Collisions of Black Holes and Neutron Stars," Computational Science Invited Seminars, Penn State University, February 13, 2006
23. "Star Clusters, Black Holes and Super Computers," Franklin Institute, Philadelphia, PA, March 25, 2006
24. "When black holes collide: Their echoes in the universe," Research Unplugged at Penn State, Penn State University, April 11, 2007
25. "Black Holes: Their birth and violent interactions," Frontiers of Astronomy, Cleveland Museum of Natural History, March 20, 2008.
26. "Computations of Extreme Gravitational Physics," Computational Science and Engineering Division, Georgia Institute of Technology, November 14, 2008
27. "Binary Black Hole Simulations: Mission Accomplished(?)," School of Mathematics, Georgia Institute of Technology, February 2, 2009
28. "Black Holes: Their birth and violent interactions," Public Lecture, Ole Miss, Oxford, MS, October 9, 2009.
29. "The Bright Side of Black Holes, Dark Matter and Dark Energy," Game Changers from the Labs and the Drawing Boards, UBS Financial Services Inc, Atlanta, GA, March 14, 2012
30. "When Black Holes Collide and the Hunt for Gravitational Waves," webtalk in celebration of Einstein's birthday, Centro Criollo de Ciencia y Tecnologia del Caribe Caguas, Puerto Rico, March 14, 2016
31. "When Black Holes Collide: The Birth of Gravitational Wave Astronomy," Gwinnett School of Mathematics, Atlanta, Georgia, February 17, 2017

### **Reviewer for Journals:**

Astronomy and Astrophysics  
 Astrophysical Journal  
 Classical and Quantum Gravity  
 European Physical Journal Plus  
 General Relativity and Gravitation  
 International Journal of Modern Physics A  
 International Journal of Modern Physics D  
 Modern Physics Letters A  
 Physical Review D  
 Physical Review Letters

### **Reviewer for Funding Agencies:**

Alberta Ingenuity Fund  
 Australian Research Council  
 Teragrid-Xsede  
 Marie Curie Fellowships  
 National Aeronautics and Space Administration  
 National Science Foundation  
 Research Corporation

### **Conferences and Symposia Organized**

1. "Black Hole Collision Meeting," Los Alamos National Laboratory, March 6-7, 1991.
2. "Black Hole Binaries Meeting," Penn State University, October 7-8, 1993.
3. "Black Hole Binaries Meeting," Penn State University, April 10-11, 1997.

4. "Mexican School in Numerical Relativity," México City, August 3-13, 1999.
5. "Gravity and Society on the Dawn of the New Millennium," México City, June 20-22, 2000.
6. "Binary Black Holes Initial Data," Center for Gravitational Wave Physics, Penn State University, March 29-30, 2002
7. "Numerical Relativity," Institute for Mathematics and its Applications and Center for Gravitational Wave Physics, University of Minnesota, June 24-29, 2002
8. "Lazarus Workshop," Center for Gravitational Wave Physics, Penn State University, September 9-11, 2002
9. "Source Simulation and Gravitational Wave Data Analysis," Center for Gravitational Wave Physics, Penn State University, October 28-30, 2002
10. "Graduate Summer School on General Relativistic Hydrodynamics," Center for Gravitational Wave Physics and University of British Columbia, Vancouver, Canada, July 21 - August 1, 2003
11. "Evolutions in Numerical Relativity," Center for Gravitational Wave Physics and Florida Atlantic University, Boca Raton, Florida, March 18-20, 2004
12. "Numerical Relativity 2005: Compact Binaries," Center for Gravitational Wave Physics and NASA's Goddard Space Flight Center, Greenbelt, Maryland, November 2 - 4, 2005
13. "Astrophysical Applications of Numerical Relativity," Guanajuato, Mexico, May 6 - 11, 2006
14. "RAMFest: Numerical Relativity Relativistic astrophysics and cosmology meetings In celebration of Richard Matzner's 65th birthday," University of Texas at Austin, Austin, TX, June 8 - 9, 2007
15. "Multi-Messenger Relativistic Astrophysics 2009," Center for Relativistic Astrophysics Inaugural conference, Atlanta, GA, May 19-21, 2009
16. "Gravitational Wave Bursts: Astrophysics, Data Analysis and Numerical Relativity," Chichen-Itza, México, December 9-11, 2009
17. "Einstein Toolkit Workshop," Georgia Tech, April 3-6, 2012
18. "Gravitational Wave Bursts: Astrophysics, Data Analysis and Numerical Relativity," Tobermory, Scotland, May 28-30, 2012
19. Eighth Aegean Summer School. Gravitational Waves: From Theory to Observations, Rathymno, Crete, June 29 - July 4, 2015

#### **Membership in Scientific Organizing Committees:**

1. "American Physical Society Department Chair Meeting," College Park, Maryland, June 5-7, 2015
2. "Gravitational Wave Astrophysics," 3rd Session of the Sant Cugat Forum on Astrophysics, Barcelona, Spain, April 22-25, 2014
3. "PN meets Numerical Relativity," University of Jena, Germany, June 12-14, 2008
4. NSF Committee for Travel Support to Attend the 17th International Conference on General Relativity and Gravitation, Dublin 2004
5. "The Astrophysics of Gravitational Wave Sources," University of Maryland, April 24-26, 2003
6. "Gravitation: A Decennial Perspective," Center for Gravitational Physics and Geometry, Penn State University, June 8-12, 2003
7. "Second Gravitational Wave Phenomenology Workshop," Center for Gravitational Wave Physics, Penn State University, November 6-8, 2003
8. NSF/NASA Report on Computational Effort in Gravitational Wave Science," Saul Teukoslky (Chair), March 2002

## Courses Taught

### Georgia Tech:

Spring 13	PHYS-7125	<i>Gravity</i>
Fall 12	PHYS-6103	<i>Electromagnetism I</i>
Spring 12	PHYS-8803	<i>Computational Physics</i>
Fall 11	PHYS-8803	<i>Computational Physics</i>
Spring 11	PHYS-2211	<i>Physics I</i>
Fall 10	PHYS-7125	<i>Gravity</i>
Spring 10	PHYS-8803	<i>Computational Physics</i>
Fall 09	PHYS-7125	<i>Gravity</i>
Spring 09	PHYS-8803	<i>Computational Physics</i>

### Penn State:

Spring 93	Astro 1	<i>Astronomical Universe</i>
Fall 93	Astro 1	<i>Astronomical Universe</i>
Spring 94	Astro 497B	<i>Computational Astrophysics</i>
Spring 94	Astro 496H	<i>Independent Studies</i>
Fall 94	Astro 1	<i>Astronomical Universe</i>
Fall 94	Astro 596	<i>Individual Studies</i>
Fall 94	Astro 496H	<i>Independent Studies</i>
Spring 95	Astro 497A	<i>Computational Astrophysics</i>
Spring 95	Astro 496H	<i>Independent Studies</i>
Fall 95	Astro 502	<i>Fundamental Astrophysics</i>
Fall 95	Astro 596	<i>Individual Studies</i>
Fall 95	Astro 496H	<i>Independent Studies</i>
Spring 96	Astro 1	<i>Astronomical Universe</i>
Spring 96	Astro 496H	<i>Independent Studies</i>
Summer 96	Astro 496H	<i>Independent Studies</i>
Summer 96	Astro 596	<i>Individual Studies</i>
Fall 96	Astro 496H	<i>Independent Studies</i>
Fall 96	Astro 596	<i>Individual Studies</i>
Fall 96	Astro 502	<i>Fundamental Astrophysics</i>
Spring 97	Astro 410	<i>Computational Astrophysics</i>
Spring 97	Astro 496H	<i>Independent Studies</i>
Spring 97	Astro 596	<i>Individual Studies</i>
Fall 97	Astro 502	<i>Fundamental Astrophysics</i>
Spring 98	Astro 440	<i>Introduction to Astrophysics</i>
Fall 98	Astro 410	<i>Computational Astrophysics</i>
Spring 99	Astro 1	<i>Astronomical Universe</i>
Fall 99	Astro 502	<i>Fundamental Astrophysics</i>
Spring 00	Astro 410	<i>Computational Astrophysics</i>
Fall 00	Astro 502	<i>Fundamental Astrophysics</i>
Spring 01	Astro 597	<i>Computational Astrophysics</i>
Fall 01	Astro 410	<i>Computational Astrophysics</i>
Spring 02	Phys 597	<i>Special Topics in Gravitation</i>
Spring 03	Astro 410	<i>Computational Astrophysics</i>
Spring 03	Astro 597	<i>Computational Astrophysics</i>
Spring 04	Astro 1	<i>Astronomical Universe</i>
Spring 05	Astro 410	<i>Computational Astrophysics</i>
Spring 06	Astro 1	<i>Astronomical Universe</i>
Spring 07	Astro 410	<i>Computational Astrophysics</i>
Fall 07	Astro 10	<i>Introductory Astronomy</i>

## University Committees:

### Georgia Tech:

2017	Professional Development for Graduate Students Committee
2017	College of Sciences Excellence Through Diversity in Faculty Hiring Committee
2015	HPCC Interdisciplinary Research Neighborhoods Committee
2015	Chair, School of Mathematics Chair Search Committee
2014 – present	Southern Light Rail, Board of Directors
2014 – present	Institute for Materials Cabinet
2012	Denning Faculty Award
2011 – present	Goizueta STEM Initiative Faculty Advisory Board
2011	Astrophysics Faculty Search
2011 – 2013	Physics, Faculty Advisory
2011 – 2013	Physics, Reappointment, Promotion & Tenure
2011 – 2012	Comprehensive Exam
2010 – 2011	Physics, Candidacy Exam
2010 –	Institute for Data and HPC Advisory Board
2009 –	HPC Governance Committee
2009 – 2010	Physics, Chair Search
2009 – 2011	Physics, Faculty Search (chair)
2009 – 2013	Physics, Computer Committee (chair)

### Penn State:

1992 – 1993	Dep't of Astronomy & Astrophysics, Library
1992 – 1996	Dep't of Astronomy & Astrophysics, Graduate Curriculum
1993 – 1995	Physical Sciences Computer Laboratory
1993 – 1996	Dep't of Astronomy & Astrophysics, CES Campuses
1993 – 1998	Dep't of Astronomy & Astrophysics, Social
1995 – 2004	Dep't of Astronomy & Astrophysics, Colloquium
1996 – 1998	Dep't of Astronomy & Astrophysics, Graduate Curriculum
1996	Dep't of Astronomy & Astrophysics, Faculty Search
1998	Dep't of Astronomy & Astrophysics, Faculty Search
1998	Dep't of Physics, Faculty Search
1998 – 2008	Eberly College of Science, Frontiers of Science Lectures
1999 – 2002	Dep't of Astronomy & Astrophysics, Graduate Admissions
1999 – 2005	Dep't of Astronomy & Astrophysics, Computer Committee
2000	Dep't of Astronomy & Astrophysics, Faculty Search
2000	Dep't of Astronomy & Astrophysics, Space Allocation
2000 – 2003	Dep't of Astronomy & Astrophysics, Teaching Evaluation
2000 – 2004	Faculty Senate
2001	Dep't of Astronomy & Astrophysics, Faculty Search
2001	Dep't of Physics, Faculty Search
2002 – 2003	Dep't of Astronomy & Astrophysics, Marker Lectures
2002 – 2003	Eberly College of Science, Packard Selection
2002 – 2004	Dep't of Astronomy & Astrophysics, Tenure and Promotion
2002 – 2004	Eberly College of Science, Tenure and Promotion
2004	Dep't of Physics, Faculty Search
2005 – 2007	Dep't of Astronomy & Astrophysics, Social
2005 – 2006	Dep't of Astronomy & Astrophysics, Faculty Search
2005 – 2007	Dep't of Astronomy & Astrophysics, Tenure and Promotion
2006 – 2007	Dep't of Astronomy & Astrophysics, Space
2005 – 2008	Dep't of Astronomy & Astrophysics, Climate & Diversity
2005 – 2008	Eberly College of Science, Climate & Diversity
2007 – 2008	Dep't of Astronomy & Astrophysics, Teaching Evaluation
2007 – 2008	Dep't of Astronomy & Astrophysics, Candidacy Examination