Prayush Kumar

Curriculum Vitæ

604 Space Sciences Building
Cornell University
Ithaca, NY 14853
☎ *+1 (571) 572 9243*
✉ *prayush.kumar@gmail.com*
prayush

Employment

2017– present **Research Associate**,
Cornell Center for Astrophysics & Planetary Science
Cornell University, Ithaca NY.

2014– 2017 **CITA Postdoctoral Fellow**,
Canadian Institute for Theoretical Astrophysics
University of Toronto, Toronto ON.

June – Aug 2016 **Visitor in Physics**,
International Center for Theoretical Sciences, Bangalore, India.

Dec 2015 **Visiting Scholar**,
Max Planck Institute for Gravitational Physics, Potsdam, Germany.

Nov – Dec 2014 **Visiting Scholar**,
Max Planck Institute for Gravitational Physics, Potsdam, Germany.

2010–2014 **Research Assistant**,
LIGO Scientific Collaboration Group
Syracuse University, Syracuse NY.

Oct 2012 **Visitor in Physics**,
LIGO Lab and Theoretical Astrophysics and Relativity Group
California Institute of Technology, Pasadena, CA.

2009–2010 **Teaching Assistant**,
Syracuse University, Syracuse NY.

Jul –Dec 2008 **Visiting Scholar**,
Max Planck Institute for Gravitational Physics, Potsdam, Germany
Undergraduate thesis (Supervisors: Dr. Badri Krishnan and Dr. Edward Porter).

Apr –Aug 2007 **Research Intern**,
Center for Ultrafast Laser Applications
Indian Institute of Science, Bangalore, India.

Education

2009–2014 **Doctor of Philosophy**,
Department of Physics, Syracuse University, Syracuse, NY,
Thesis: *Topics in Gravitational-wave Astrophysics*
Supervisor: Prof. Duncan A. Brown.

2005–2009 **Bachelor of Engineering (Hons.)**,
Electrical & Electronics Engineering, With Distinction
Birla Institute of Technology & Science (BITS), Pilani, India,
Thesis: *Search for higher-order post Newtonian coefficients for energy flux through gravitational waves from black-hole binaries using LISA* [arXiv:1206.0915]
Supervisor: Dr. Badri Krishnan (AEI-Potsdam).

Awards

2017 **Princess of Asturias Award for Scientific and Technical Research (shared with LIGO Scientific Collaboration)**, *Fundación Príncipe de Asturias, Spain.*

2016 **Gruber Cosmology Prize (shared with LIGO Scientific Collaboration)**, *Gruber Foundation.*

2016 **Special Breakthrough Prize in Fundamental Physics (shared with LIGO Scientific Collaboration)**,
The Breakthrough Prize in Life Sciences.

2014 **CITA Fellowship**, *Canadian Institute for Theoretical Astrophysics*, Toronto, ON.

2014 **Honorable Mention, GWIC and Braccini Thesis Prizes for a doctoral thesis on gravitational waves**, *Gravitational Wave International Committee (GWIC)*.

2013 **APS & DAP Travel Award**, *April Meeting*, Denver, CO.

2012 **Honorable Mention for APS sponsored best student talk**, *15th East Coast Gravity Meeting*, Syracuse University, Syracuse, NY.
Title: Model waveform templates to use to search for gravitational waves in Advanced LIGO era.

2005 **Merit Scholarship**, *BITS-Pilani*, Pilani, India.
Awarded in recognition of academic merit to 1% of students.

2004 **Ranked 2nd (state-wide) in Regional Mathematics Olympiad (U.P.)**, *National Board for Higher Mathematics*, India.

2003 **Singapore Airlines Youth Scholarship**, *Ministry of Education*, Singapore.
The scholarship was declined

2003 **Awarded 2nd position in TECHNEX (All-India engineering model exhibition)**, *Indian Institute of Technology*, Varanasi, India.
Project- Copper (I) Oxide Solar Cell.

2003 **Kishore Vaigyanik Protsahana Yojana scholarship (Young Scientist Award)**, *Indian Institute of Science, Bangalore & Department of Science & Technology*, India.
Awarded to 40 students selected nationally from India.

2003 **National Talent Search scholarship**, *National Council for Educational Research and Training (NCERT)*, India.
National award in recognition of academic merit

Grants & Proposals

2017-18 **ComputeCanada Resource Allocation Competition Award**, *(Award value:* $446.3k*; Proposal rated Outstanding; co-authored with Prof. Harald Pfeiffer & members of the SXS Collaboration).*

2016-17 **ComputeCanada Research Platforms and Portals Competition Awards**, *(Award value:* $173.5k*; Proposal on 'Gravitational-wave Astrophysics on the Open Science Grid', rated Very Strong; co-authored with Prof. Harald Pfeiffer).*

2016-17 **ComputeCanada Resource Allocation Competition Award**, *(Award value:* $731.7k*; Proposal rated Outstanding; co-authored with Prof. Harald Pfeiffer & members of the SXS Collaboration).*

2016-17 **CITA-LSC Annual Research Proposal**, *(co-authored with Prof. Harald Pfeiffer & Heather Fong).*

2015-16 **ComputeCanada Resource Allocation Competition Award**, *(Award value:* $1.40M*; Proposal rated Outstanding; co-authored with Prof. Harald Pfeiffer & members of the SXS Collaboration).*

2015-16 **Formal collaborator on an NSF Research in Undergraduate Institutions (RUI) grant, awarded to Prof. Geoffrey Lovelace at California State University, Fullerton**, *(Award value:* $126k*;).*

2015-16 **CITA-LSC Annual Research Proposal**, *(co-authored with Dr. Kipp Cannon & Prof. Harald Pfeiffer).*

2014-15 **ComputeCanada Resource Allocation Competition Award**, *(Award value* $0.91M*; Proposal rated Outstanding; co-authored with Prof. Harald Pfeiffer & members of the SXS Collaboration).*

2014-15 **CITA-LSC Annual Research Proposal**, *(co-authored with Dr. Kipp Cannon & Prof. Harald Pfeiffer).*

Publications

[$h_{\rm HEP}-$index: **42**]

Articles in preparation

2020 *Observation of eccentric binary black hole mergers with second and third generation gravitational wave detector networks*
Zhuo Chen, E. A. Huerta, Roland Haas, Joseph Adamo, **Prayush Kumar**, Chris Moore

2018 *Binary black hole mergers in harmonic coordinates*
Prayush Kumar, Harald P. Pfeiffer

Articles in review

2020 *GW190425: Observation of a Compact Binary Coalescence with Total Mass* $\sim 3.4 M_{\odot}$, arXiv:2001.01761
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *Open data from the first and second observing runs of Advanced LIGO and Advanced Virgo*, arXiv:1912.11716
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *A guide to LIGO-Virgo detector noise and extraction of transient gravitational-wave signals*, arXiv:1908.11170
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *A gravitational-wave measurement of the Hubble constant following the second observing run of Advanced LIGO and Virgo*, arXiv:1908.06060
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *An Optically Targeted Search for Gravitational Waves emitted by Core-Collapse Supernovae during the First and Second Observing Runs of Advanced LIGO and Advanced Virgo*, arXiv:1908.03584
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *Model comparison from LIGO-Virgo data on GW170817's binary components and consequences for the merger remnant*, arXiv:1908.01012
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *Searches for Continuous Gravitational Waves from Fifteen Supernova Remnants and Fomalhaut b with Advanced LIGO*, arXiv:1812.11656
the LIGO Scientific Collaboration, the Virgo Collaboration

Refereed Publications (including LIGO Scientific Collaboration papers to which Kumar has made a significant contribution)

[Citation count for articles are shown in sq. brackets adjacent to publication year]

2019 *On the properties of the massive binary black hole merger GW170729*, Phys. Rev. D 100, 104015
Katerina Chatziioannou, Roberto Cotesta, Sudarshan Ghonge, Jacob Lange, Ken K.-Y. Ng, Juan Calderon Bustillo, James Clark, Carl-Johan Haster, Sebastian Khan, Michael Puerrer, Vivien Raymond, Salvatore Vitale, Nousha Afshari, Stanislav Babak, Kevin Barkett, Jonathan Blackman, Alejandro Bohe, Michael Boyle, Alessandra Buonanno, Manuela Campanelli, Gregorio Carullo, Tony Chu, Eric Flynn, Heather Fong, Alyssa Garcia, Matthew Giesler, Maria Haney, Mark Hannam, Ian Harry, James Healy, Daniel Hemberger, Ian Hinder, Karan Jani, Bhavesh Khamersa, Lawrence E. Kidder, **Prayush Kumar**, Pablo Laguna, Carlos O. Lousto, Geoffrey Lovelace, Tyson B. Littenberg, Lionel London, Margaret Millhouse, Laura K. Nuttall, Frank Ohme, Richard O'Shaughnessy, Serguei Ossokine, Francesco Pannarale, Patricia Schmidt, Harald P. Pfeiffer, Mark A. Scheel, Lijing Shao, Deirdre Shoemaker, Bela Szilagyi, Andrea Taracchini, Saul A. Teukolsky, Yosef Zlochower

2019 [559] *GWTC-1: A Gravitational-Wave Transient Catalog of Compact Binary Mergers Observed by LIGO and Virgo during the First and Second Observing Runs*, Phys. Rev. X 9, 031040
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 [83] *Tests of General Relativity with GW170817*, Phys. Rev. Lett. 123, 011102
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 [255] *Properties of the binary neutron star merger GW170817*, Phys. Rev. X 9, 011001
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 [57] *Matter imprints in waveform models for neutron star binaries: tidal and self-spin effects*, Phys. Rev. D 99, 0240295
Tim Dietrich, Sebastian Khan, Reetika Dudi, Shasvath J. Kapadia, **Prayush Kumar**, Alessandro Nagar, Frank Ohme, Francesco Pannarale, Anuradha Samajdar, Sebastiano Bernuzzi, Gregorio Carullo, Walter Del Pozzo, Maria Haney, Charalampos Markakis, Michael Pürrer, Gunnar Riemenschneider, Yoshinta Eka Setyawati, Ka Wa Tsang, and Chris Van Den Broeck

2019 [14] *The SXS Collaboration catalog of binary black hole simulations*, Class. Quantum Grav. 36, 195006
Michael Boyle, Daniel Hemberger, Dante A.B. Iozzo, Geoffrey Lovelace, Serguei Ossokine, Harald P. Pfeiffer, Mark A. Scheel, Leo C. Stein, Charles J. Woodford, Aaron B. Zimmerman, Nousha Afshari, Kevin Barkett, Jonathan Blackman, Katerina Chatziioannou, Tony Chu, Nicholas Demos, Nils Deppe, Scott E. Field, Nils L. Fischer, Evan Foley, Heather Fong, Alyssa Garcia, Matthew Giesler, Francois Hebert, Ian Hinder, Reza Katebi, Haroon Khan, Lawrence E. Kidder, **Prayush Kumar**, Kevin Kuper, Halston Lim, Maria Okounkova, Teresita Ramirez, Samuel Rodriguez, Hannes R. Rüter, Patricia Schmidt, Bela Szilagyi, Saul A. Teukolsky, Vijay Varma, Marissa Walker

2018 [387] *GW170817: Measurements of neutron star radii and equation of state*, Phys. Rev. Lett. 121, 161101
the LIGO Scientific Collaboration, the Virgo Collaboration

2018 [14] *Constraining the parameters of GW150914 & GW170104 with numerical relativity surrogates*, Phys. Rev. D 99, 124005
Prayush Kumar, Jonathan Blackman, Scott E. Field, Mark Scheel, Chad R. Galley, Michael Boyle, Lawrence E. Kidder, Harald P. Pfeiffer, Bela Szilagyi and Saul A. Teukolsky

2018 [4] *Detection and characterization of spin-orbit resonances in the advanced gravitational wave detectors era*, Phys. Rev. D 98, 083014
Chaitanya Afle, Anuradha Gupta, Bhooshan Gadre, **Prayush Kumar**, Nick Demos, Geoffrey Lovelace, Han Gil Choi, Hyung Mok Lee, Sanjit Mitra, Michael Boyle, Daniel A. Hemberger, Lawrence E. Kidder, Harald P. Pfeiffer, Mark A. Scheel, Bela Szilagyi

2018 [40] *Eccentric, nonspinning, inspiral, Gaussian-process merger approximant for the detection and characterization of eccentric binary black hole mergers*, Phys. Rev. D 97, 024031
E. A. Huerta, C. J. Moore, **Prayush Kumar**, Daniel George, Alvin J. K. Chua, Roland Haas, Erik Wessel, Daniel Johnson, Derek Glennon, Adam Rebei, A. Miguel Holgado, Jonathan R. Gair, Harald P. Pfeiffer

2017 [14] *Systematic challenges for future gravitational wave measurements of precessing binary black holes*, Phys. Rev. D 96, 124041
A. R. Williamson, J. Lange, R. O'Shaughnessy, J. A. Clark, **P. Kumar**, J. Calderón Bustillo, J. Veitch

2017 [620] *GW170608: Observation of a 19-solar-mass Binary Black Hole Coalescence*, Astrophys.J. 851, L35
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 [26] *A Parameter Estimation Method that Directly Compares Gravitational Wave Observations to Numerical Relativity*, Phys. Rev. D 96, 104041
Jacob Lange, Richard O'Shaughnessy, Michael Boyle, Juan Calderón Bustillo, Manuela Campanelli, Tony Chu, James A. Clark, Nicholas Demos, Heather Fong, James Healy, Daniel Hemberger, Ian Hinder, Karan Jani, Bhavesh Khamesra, Lawrence E. Kidder, **Prayush Kumar**, Pablo Laguna, Carlos O. Lousto, Geoffrey Lovelace, Serguei Ossokine, Harald Pfeiffer, Mark A. Scheel, Deirdre Shoemaker, Bela Szilagyi, Saul Teukolsky, Yosef Zlochower

2017 [996] *Gravitational Waves and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A*, Astrophys.J. 848, L13
The LIGO Scientific Collaboration and The Virgo Collaboration, The 1M2H Collaboration, The Dark Energy Camera GW-EM Collaboration and the DES Collaboration, The DLT40 Collaboration, The Las Cumbres Observatory Collaboration, The VINROUGE Collaboration & The MASTER Collaboration

2017 [335] *A gravitational-wave standard siren measurement of the Hubble constant*, Nature 551 no.7678, 85-88
The LIGO Scientific Collaboration and The Virgo Collaboration, The 1M2H Collaboration, The Dark Energy Camera GW-EM Collaboration and the DES Collaboration, The DLT40 Collaboration, The Las Cumbres Observatory Collaboration, The VINROUGE Collaboration & The MASTER Collaboration

2017 [2652] *GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral*, Phys. Rev. Lett. 119 161101
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 [1047] *GW170814: A Three-Detector Observation of Gravitational Waves from a Binary Black Hole Coalescence*, Phys. Rev. Lett. 119 14, 141101
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 [1391] *GW170104: Observation of a 50-Solar-Mass Binary Black Hole Coalescence at Redshift 0.2*, Phys. Rev. Lett. 118 22, 221101
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 [152] *An improved effective-one-body model of spinning, nonprecessing binary black holes for the era of gravitational-wave astrophysics with advanced detectors*, Phys. Rev. D 95, 044028
A. Bohe, L. Shao, A. Taracchini, A. Buonanno, S. Babak, I. W. Harry, I. Hinder, S. Ossokine, M. Pürrer, V. Raymond, T. Chu, H. Fong, **P. Kumar**, H. P. Pfeiffer, M. Boyle, D. A. Hemberger, L. E. Kidder, G. Lovelace, M. A. Scheel, B. Szilágyi

2017 [73] *Effects of waveform model systematics on the interpretation of GW150914*, Class. Quantum Grav. 34 104002
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 [50] *Complete waveform model for compact binaries on eccentric orbits*, Phys. Rev. D 95, 024038
E. A. Huerta, **Prayush Kumar**, Bhanu Agarwal, Daniel George, Hsi-Yu Schive, Harald P. Pfeiffer, Tony Chu, Michael Boyle, Daniel A. Hemberger, Lawrence E. Kidder, Mark A. Scheel, Bela Szilágyi

2016 [11] *Measuring neutron star tidal deformability with Advanced LIGO: a Bayesian analysis of neutron star - black hole binary observations*, Phys. Rev. D 95, 044039
Prayush Kumar, Michael Pürrer, Harald P. Pfeiffer

2016 [94] *Improved analysis of GW150914 using a fully spin-precessing waveform Model*, Phys.Rev.X 6, 041014
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 [73] *Directly comparing GW150914 with numerical solutions of Einstein's equations for binary black hole coalescence*, Phys.Rev. D94 064035
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 [1981] *GW151226: Observation of Gravitational Waves from a 22-Solar-Mass Binary Black Hole Coalescence*, Phys.Rev.Lett. 116 24, 241103
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 [55] *On the accuracy and precision of numerical waveforms: Effect of waveform extraction methodology*, Class.Quant.Grav. 33 no.16, 165001
Tony Chu, Heather Fong, **Prayush Kumar**, Harald P. Pfeiffer, Michael Boyle, Daniel A. Hemberger, Lawrence E. Kidder, Mark A. Scheel, Bela Szilágyi

2016 [221] *GW150914: First results from the search for binary black hole coalescence with Advanced LIGO*, Phys. Rev. D 93, 122003
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 [457] *Properties of the binary black hole merger GW150914*, Phys. Rev. Lett. 116 24, 241102
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 [719] *Tests of general relativity with GW150914*, Phys. Rev. Lett. 116 22, 221101
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 [28] *Accuracy of binary black hole waveform models for aligned-spin binaries*, Phys. Rev. D 93,104050
Prayush Kumar, Tony Chu, Heather Fong, Harald P. Pfeiffer, Michael Boyle, Daniel A. Hemberger, Lawrence E. Kidder, Mark A. Scheel, Bela Szilágyi

2016 [4463] *Observation of Gravitational Waves from a Binary Black Hole Merger*, Phys. Rev. Lett. 116 6, 061102
the LIGO Scientific Collaboration, the Virgo Collaboration

2015 [31] *Accuracy and precision of gravitational-wave models of inspiraling neutron star – black hole binaries with spin: comparison with numerical relativity in the low-frequency regime*, Phys. Rev. D 92, 102001
Prayush Kumar, Kevin Barkett, Swetha Bhagwat, Nousha Afshari, Duncan A. Brown, Geoffrey Lovelace, Mark A. Scheel, Béla Szilágyi

2014 [49] *Accurate and efficient waveforms for compact binaries on eccentric orbits*, Phys. Rev. D 90, 084016
E. A. Huerta, **Prayush Kumar**, Sean T. McWilliams, Richard O'Shaughnessy, and Nicolás Yunes

2014 [5] *Self-forced evolutions of an implicit rotating source: a natural framework to model comparable and intermediate mass-ratio systems from inspiral through ringdown*, Phys. Rev. D 90, 024024
E. A. Huerta, **Prayush Kumar**, Jonathan R. Gair, Sean T. McWilliams

2014 [50] *The NINJA-2 project: detecting and characterizing gravitational waveforms modelled using numerical binary black hole simulations*, Class. Quantum Grav. 31 115004,
NINJA-2 and LIGO-Virgo Collaborations

2013 [12] *Template Banks for Binary black hole searches with Numerical Relativity waveforms*, Phys. Rev. D 89, 042002
Prayush Kumar, Ilana MacDonald, Duncan A Brown, Harald P Pfeiffer, Kipp Cannon, Michael Boyle, Lawrence E Kidder, Abdul H Mroue, Mark A Scheel, Bela Szilágyi, Anil Zenginoglu

2013 [41] *Template banks to search for low-mass binary black holes in advanced gravitational-wave detectors*, Phys. Rev. D 87, 082004
Duncan A. Brown, **Prayush Kumar**, and Alexander H. Nitz

2012 [11] *Accurate modeling of intermediate-mass-ratio inspirals: exploring the form of the self-force in the intermediate-mass-ratio regime*, Phys. Rev. D 86, 024024.
E.A. Huerta, **Prayush Kumar** and Duncan A. Brown

2012 [114] *Search for gravitational waves associated with gamma-ray bursts during LIGO science run 6 and Virgo science runs 2 and 3*, Astrophys J 760 12.
Abadie, J., *et al.*

Other LIGO Scientific Collaboration Publications where Kumar is an author

2019 *Search for gravitational-wave signals associated with gamma-ray bursts during the second observing run of Advanced LIGO and Advanced Virgo*, Astrophysical Journal 886 75
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *Search for gravitational waves from Scorpius X-1 in the second Advanced LIGO observing run with an improved hidden Markov model*, Phys. Rev. D 100, 122002
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *All-sky search for short gravitational-wave bursts in the second Advanced LIGO and Advanced Virgo run*, Phys. Rev. D 100, 024017
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *Tests of General Relativity with the Binary Black Hole Signals from the LIGO-Virgo Catalog GWTC-1*, Phys. Rev. D 100, 104036
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *Search for sub-solar mass ultracompact binaries in Advanced LIGO's second observing run*, Phys. Rev. Lett. 123, 161102
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *All-sky search for long-duration gravitational-wave transients in the second Advanced LIGO observing run*, Phys. Rev. D 99, 104033
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *Directional limits on persistent gravitational waves using data from Advanced LIGO's first two observing runs*, Phys. Rev. D 100, 062001
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *Search for the isotropic stochastic background using data from Advanced LIGO's second observing run*, Phys. Rev. D 100, 061101
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *All-sky search for continuous gravitational waves from isolated neutron stars using Advanced LIGO O2 data*, Phys. Rev. D 100, 024004
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *Searches for Gravitational Waves from Known Pulsars at Two Harmonics in 2015-2017 LIGO Data*, Astrophysical Journal 879 10
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *Narrow-band search for gravitational waves from known pulsars using the second LIGO observing run*, Phys. Rev. D 99, 122002
the LIGO Scientific Collaboration, the Virgo Collaboration

2019 *Search for gravitational waves from a long-lived remnant of the binary neutron star merger GW170817*, Astrophysical Journal 875:160
the LIGO Scientific Collaboration, the Virgo Collaboration

2018 *A Search for Tensor, Vector, and Scalar Polarizations in the Stochastic Gravitational-Wave Background*, Phys. Rev. Lett. 120, 201102
the LIGO Scientific Collaboration, the Virgo Collaboration

2018 *Full Band All-sky Search for Periodic Gravitational Waves in the O1 LIGO Data*, Phys. Rev. D 97, 102003
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Constraints on cosmic strings using data from the first Advanced LIGO observing run*, Phys. Rev. D 97, 102002
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *All-sky search for long-duration gravitational wave transients in the first Advanced LIGO observing run*, Class.Quant.Grav. 35, 065009
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Targeted numerical simulations of binary black holes for GW170104*, Phys.Rev. D97, 064027
James Healy, Jacob Lange, Richard O'Shaughnessy, Carlos O. Lousto, Manuela Campanelli, Andrew Williamson, Yosef Zlochower, Juan Calderón Bustillo, James A. Clark, Christopher Evans, D. Ferguson, Sudarshan Ghonge, Karan Jani, Bhavesh Khamesra, Pablo Laguna, Deirdre M. Shoemaker, Alyssa Garcia, Michael Boyle, Daniel Hemberger, Lawrence E. Kidder, **Prayush Kumar**, Geoffrey Lovelace, Harald Pfeiffer, Mark A. Scheel, Saul Teukolsky

2017 *Search for post-merger gravitational waves from the remnant of the binary neutron star merger GW170817*, Astrophys.J. 851, L16
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Effects of Data Quality Vetoes on a Search for Compact Binary Coalescences in Advanced LIGO's First Observing Run*, Class.Quant.Grav. 35, 065010
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Search for High-energy Neutrinos from Binary Neutron Star Merger GW170817 with ANTARES, IceCube, and the Pierre Auger Observatory*, Astrophys.J. 850, L35
ANTARES, IceCube, Pierre Auger, LIGO Scientific, Virgo Collaborations

2017 *GW170817: Implications for the Stochastic Gravitational-Wave Background from Compact Binary Coalescences*, Phys. Rev. Lett. 120, 091101
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Estimating the Contribution of Dynamical Ejecta in the Kilonova Associated with GW170817*, Astrophys.J. 850, L39
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *First narrow-band search for continuous gravitational waves from known pulsars in advanced detector data*, Phys. Rev. D 96, 122006
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *First search for nontensorial gravitational waves from known pulsars*, Phys. Rev. Lett. 120, 031104
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *First low-frequency Einstein@Home all-sky search for continuous gravitational waves in Advanced LIGO data*, Phys. Rev. D 96, 122004
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *Search for Gravitational Waves Associated with Gamma-Ray Bursts During the First Advanced LIGO Observing Run and Implications for the Origin of GRB 150906B*, arXiv:1611.07947 / LIGO-P1600298
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *Exploring the Sensitivity of Next Generation Gravitational Wave Detectors*, arXiv:1607.08697 / LIGO-P1600143
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *All-sky search for short gravitational-wave bursts in the first Advanced LIGO run*, Phys. Rev. D 95, 042003
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Upper Limits on the Stochastic Gravitational-Wave Background from Advanced LIGO's First Observing Run*, Phys. Rev. Lett. 118, 121101
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *On the Progenitor of Binary Neutron Star Merger GW170817*, Astrophys J. L.
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *All-sky Search for Periodic Gravitational Waves in the O1 LIGO Data*, Phys. Rev. D 96, 062002
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Upper Limits on Gravitational Waves from Scorpius X-1 from a Model-Based Cross-Correlation Search in Advanced LIGO Data*, Astrophys. J.
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Search for intermediate mass black hole binaries in the first observing run of Advanced LIGO*, Phys. Rev. D 96, 022001
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Search for gravitational waves from Scorpius X-1 in the first Advanced LIGO observing run with a hidden Markov model*, Phys. Rev. D 95, 122003
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Search for High-energy Neutrinos from Gravitational Wave Event GW151226 and Candidate LVT151012 with ANTARES and IceCube*, Phys. Rev. D 96, 022005
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *First search for gravitational waves from known pulsars with Advanced LIGO*, Astrophys. J.
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Directional limits on persistent gravitational waves from Advanced LIGO's first observing run*, Phys. Rev. Lett. 118, 121102
the LIGO Scientific Collaboration, the Virgo Collaboration

2017 *Calibration of the Advanced LIGO detectors for the discovery of the binary black-hole merger GW150914*, Phys. Rev. D 95, 062003
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *Results of the deepest all-sky survey for continuous gravitational waves on LIGO S6 data running on the Einstein@Home volunteer distributed computing project*, Phys. Rev. D 94, 102002
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *The Rate of Binary Black Hole Mergers Inferred from Advanced LIGO Observations Surrounding GW150914*, Astrophys. J.L. 833 1, L1
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *The basic physics of the binary black hole merger GW150914*, Annalen der Physik. (2016)
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *Upper limits on the rates of binary neutron star and neutron-star–black-hole mergers from Advanced LIGO's first observing run*, Astrophys.J.L. 832, 2
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *Binary Black Hole Mergers in the first Advanced LIGO Observing Run*, Phys. Rev. X 6, 041015
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *GW150914: Implications for the stochastic gravitational wave background from binary black holes*, Phys.Rev.Lett. 116 13, 131102
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *High-energy Neutrino follow-up search of Gravitational Wave Event GW150914 with ANTARES and IceCube*, Phys.Rev. D93 12, 122010
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *Localization and broadband follow-up of the gravitational-wave transient GW150914*, Astrophys.J. 826 1, L13
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *Sensitivity of the Advanced LIGO detectors at the beginning of gravitational wave astronomy*, Phys.Rev. D93 11, 112004
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *Characterization of transient noise in Advanced LIGO relevant to gravitational wave signal GW150914*, Class.Quant.Grav. 33 13, 134001
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *Observing gravitational-wave transient GW150914 with minimal assumptions*, Phys. Rev. D 93, 122004
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *Astrophysical Implications of the Binary Black-Hole Merger GW150914*, Astrophys JL, 818, L22
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *Prospects for Observing and Localizing Gravitational-Wave Transients with Advanced LIGO and Advanced Virgo*, Living Reviews in Relativity 19, 1
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *GW150914: The Advanced LIGO Detectors in the Era of First Discoveries*, Phys. Rev. Lett. 116, 131103
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *All-sky search for long-duration gravitational wave transients with initial LIGO*, Phys. Rev. D 93, 042005
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *First low frequency all-sky search for continuous gravitational wave signals*, Phys. Rev. D 93, 042007
the LIGO Scientific Collaboration, the Virgo Collaboration

2016 *A search of the Orion spur for continuous gravitational waves using a "loosely coherent" algorithm on data from LIGO interferometers*, Phys. Rev. D 93, 042006
the LIGO Scientific Collaboration, the Virgo Collaboration

2015 *A directed search for gravitational waves from Scorpius X-1 with initial LIGO*, Phys. Rev. D 91, 062008
the LIGO Scientific Collaboration, the Virgo Collaboration

2015 *Searching for stochastic gravitational waves using data from the two co-located LIGO Hanford detectors*, Phys. Rev. D 91, 022003
the LIGO Scientific Collaboration, the Virgo Collaboration

2015 *Advanced LIGO*, Class.Quant.Grav. 32 074001
the LIGO Scientific Collaboration

2015 *Characterization of the LIGO detectors during their sixth science run*, Class.Quant.Grav. 32 no.11, 115012
the LIGO Scientific Collaboration, the Virgo Collaboration

2015 *Searching for stochastic gravitational waves using data from the two co-located LIGO Hanford detectors*, Phys. Rev. D 91:022003
the LIGO Scientific Collaboration, the Virgo Collaboration

2014 *Improved Upper Limits on the Stochastic Gravitational-Wave Background from 2009-2010 LIGO and Virgo Data*, Phys. Rev. Lett. 113, 231101
the LIGO Scientific Collaboration, the Virgo Collaboration

2014 *First all-sky search for continuous gravitational waves from unknown sources in binary systems*, Phys. Rev. D 90:062010
the LIGO Scientific Collaboration, the Virgo Collaboration

2014 *Search for gravitational radiation from intermediate mass black hole binaries in data from the second LIGO-Virgo joint science run*, Phys. Rev. D 89:122003
the LIGO Scientific Collaboration, the Virgo Collaboration

2014 *Search for gravitational waves associated with gamma-ray bursts detected by the InterPlanetary Network*, Phys. Rev. Lett. 113:011102
the LIGO Scientific Collaboration, the Virgo Collaboration

2014 *Search for gravitational wave ringdowns from perturbed intermediate mass black holes in LIGO-Virgo data from 2005-2010*, Phys. Rev. D 89:102006
the LIGO Scientific Collaboration, the Virgo Collaboration

2014 *Implementation of an FF-statistic all-sky search for continuous gravitational waves in Virgo VSR1 data*, Class.Quant.Grav. 31 165014
the LIGO Scientific Collaboration, the Virgo Collaboration

2014 *Constraints on Cosmic Strings from the LIGO-Virgo Gravitational-Wave Detectors*, Phys. Rev. Lett. 112, 131101
the LIGO Scientific Collaboration, the Virgo Collaboration

2014 *Application of a Hough search for continuous gravitational waves on data from the fifth LIGO science run*, Class.Quant.Grav. 31 085014
the LIGO Scientific Collaboration, the Virgo Collaboration

2014 *First Searches for Optical Counterparts to Gravitational-wave Candidate Events*, Astrophys JS 211 7
the LIGO Scientific Collaboration, the Virgo Collaboration

2013 *Search for long-lived gravitational-wave transients coincident with long gamma-ray bursts*, Phys. Rev. D 88, 122004
the LIGO Scientific Collaboration, the Virgo Collaboration

2013 *Directed search for continuous gravitational waves from the Galactic center*, Phys. Rev. D 88, 102002
the LIGO Scientific Collaboration, the Virgo Collaboration

2013 *Parameter estimation for compact binary coalescence signals with the first generation gravitational-wave detector network*, Phys. Rev. D.88:062001
the LIGO Scientific Collaboration, the Virgo Collaboration

2013 *Search for Gravitational Waves from Binary Black Hole Inspiral, Merger and Ringdown in LIGO-Virgo Data from 2009-2010*, Phys. Rev. D.87:022002
Aasi, J, *et al.*

2013 *Einstein@Home all-sky search for periodic gravitational waves in LIGO S5 data* , Phys. Rev. D.87:042001
the LIGO Scientific Collaboration, the Virgo Collaboration

2013 *A first search for coincident gravitational waves and high energy neutrinos using LIGO, Virgo and ANTARES data from 2007*, JCAP 06 008
Adrian-Martinez, S., *et al.*

2012 *The characterization of Virgo data and its impact on gravitational-wave searches*, Class.Quant.Grav. 29 155002
Aasi, J, *et al.*

2012 *Swift follow-up observations of candidate gravitational-wave transient events* , Astrophys JS, 203, 28
Evans, P.A., *et al.*

Conference Publications

2009 *Hardware Implementation of Dlighting Module for using it in a Digital Camera Chip*, 13th IEEE / VSI VLSI Design and Test Symposium
Gaurav Agarwal, Amit Singhal, Anu Gupta and **Prayush Kumar**

Invited Presentations

Aug 2019 **Binary black hole source modeling using numerical relativity: Status & Challenges**, *Future of Gravitational-wave Astronomy*, International Center for Theoretical Sciences (ICTS), Bangalore, India.

Sep 2018 **Measuring the neutron star tidal deformability with equation-of-state-independent relations and gravitational waves**, *Astrophysics Lunch*, Cornell Center for Astrophysics and Planetary Science, Cornell University, Ithaca, NY.

Oct 2018 **Numerical simulations of binary black holes and Gravitational Wave Science**, *Fundamental Theory Seminar*, Department of Physics, Pennsylvania State University, College Park, PA.

Sep 2018 **Measuring the neutron star tidal deformability with equation-of-state-independent relations and gravitational waves**, *Astrophysics Lunch*, Cornell Center for Astrophysics and Planetary Science, Cornell University, Ithaca, NY.

Jun 2018 **Numerical simulations of binary black holes & Advanced LIGO science**, *Invited Colloquium*, International Center for Theoretical Astrophysics, Bangalore, India.

May 2018 **Numerical simulations of binary black holes & Advanced LIGO science**, *Invited Colloquium*, Inter-University Center for Astronomy & Astrophysics, Pune, India.

Apr 2018 **On direct applications of Numerical Relativity to gravitational-wave astrophysics**, *Astrophysics Lunch*, Cornell Center for Astrophysics and Planetary Science, Cornell University, Ithaca, NY.

Mar 2018 **Lessons learned from Advanced LIGO: a quick primer**, *Invited Presentation*, Instituto de Física Teórica, International Center for Theoretical Physics, Sao Paulo, Brazil.

Jan 2018 **Waveform modeling for LIGO parameter estimation: status & challenges for LISA**, *Invited Presentation, The Architecture of LISA Science Analysis: Imagining the Future*, Keck Institute for Space Studies, California Institute of Technology, Pasadena, CA.

Oct 2017 **Neutron stars merge with a burst: GW170817**, *Astrophysics Lunch*, Cornell Center for Astrophysics and Planetary Science, Cornell University, Ithaca, NY.

Jul 2016 **PyCBC: Hands On**, *Invited Seminar, Summer School On Gravitational-Wave Astronomy*, International Center for Theoretical Sciences (ICTS), Bangalore, India.

Jul 2016 **Binary Black Hole Simulations and Advanced LIGO**, *Invited Seminar*, International Center for Theoretical Sciences (ICTS), Bangalore, India.

Jun 2016 **Numerical Relativity and Advanced LIGO**, *Astrophysics Panel Discussion*, Compute Canada's High Performance Computing Symposium (HPCS), Edmonton, Alberta.

Jun 2016 **Binary Black Hole Simulations and Advanced LIGO**, *Invited Presentation in Astrophysics Panel*, Compute Canada's High Performance Computing Symposium (HPCS), Edmonton, Alberta.

Feb 2016 **Gravitational-wave searches for compact binaries with Advanced LIGO & the role of Numerical Relativity**, *Invited Seminar*, Georgia Institute of Technology, Atlanta, GA.

Conference Presentations

Apr 2018 **Harmonic coordinates in binary black hole spacetimes**, *April Meeting, American Physical Society*, Columbus, OH.

Oct 2016 **Measuring the tidal deformability of neutron stars from GW observations of disruptive neutron star - black hole binaries**, *Midwest Relativity Meeting*, Perimeter Institute for Theoretical Physics, Waterloo, ON.

Jul 2016 **Measuring the tidal deformability of neutron stars from GW observations of disruptive neutron star - black hole binaries**, *Seminar*, International Center for Theoretical Sciences (ICTS), Bangalore, India.

Jun 2016 **Binary Black Hole Mergers In The First Advanced LIGO Observing Run**, CITA, University of Toronto, Toronto, Ontario.

May 2016 **Gravitational wave observation from a binary black hole merger with Advanced LIGO**, *Annual Meeting, Canadian Astronomical Society*, Winnipeg, MB.

Apr 2016 **Gravitational-wave searches for compact binaries with Advanced LIGO & the role of Numerical Relativity**, *April Meeting, American Physical Society*, Salt Lake City, UT.

Dec 2015 **Binary black hole waveform models accuracy for Advanced LIGO**, *International Conference on Gravitation and Cosmology*, Indian Institute of Science Education & Research, Mohali, India.

May 2015 **Accuracy of Binary-Black-hole waveforms for Advanced LIGO**, *Eastern Gravity Meeting*, Rochester Institute of Technology, Rochester, NY.

Apr 2015 **Accuracy of Neutron-Star Black-hole waveforms for Advanced LIGO**, *April Meeting, American Physical Society*, Baltimore, MD.

Aug 2014 **Accuracy of gravitational-wave models for spinning non-precessing Neutron-Star Black-Hole Binaries**, *Numerical and Analytical Relativity and Data Analysis (NARDA) Meeting*, California State University, Fullerton, CA.
Poster presentation

Dec 2013 **Numerical Relativity waveforms in Advanced LIGO searches for Binary Black Holes**, *XXVII Texas Symposium on Relativistic Astrophysics*, Dallas, TX.
Poster presentation

Sep 2013 **Binary black hole template banks with Numerical Relativity waveforms**, *Numerical Relativity-Data Analysis (NRDA) Meeting*, Universitat de les Illes Balears, Mallorca, Spain.

Jul 2013 **Constructing Numerical Relativity template banks for binary BBH searches in Advanced LIGO era**, *16th Eastern Gravity Meeting, University of Toronto*, Toronto, ON.

Apr 2013 **Constructing binary black hole template banks using numerical relativity waveforms**, *April Meeting, American Physical Society*, Denver, CO.

Aug 2012 **Searching for Gravitational Waves from Non-Spinning Stellar-Mass Binary-Black-Holes using EOBNR and Taylor F2 Waveforms in the Advanced Detector Era**, *Rattle and Shine: Gravitational Wave and Electromagnetic Studies of Compact Binary Mergers*, Kavli Institute for Theoretical Physics, University of California-Santa Barbara, CA.
Poster presentation.

Apr 2012 **Model waveform templates to use to search for gravitational waves in Advanced LIGO era.**, *15th East Coast Gravity Meeting*, Syracuse University, Syracuse, NY.

Mar 2012 **Development of search templates for non-spinning black hole binaries of mass ratio 1:10**, *LSC-Virgo Meeting*, Massachusetts Institute of Technology, Boston, MA.
Poster presentation.

Mar 2012 **Searching for Binary-Black-Holes using EOB and SPA waveforms in the advanced detector era**, *LSC-Virgo Meeting*, Massachusetts Institute of Technology, Boston, MA.
Poster presentation.

Service

2019 **Proprosal referee for Astrophysics Theory Program (ATP)**, *National Aeronautics and Space Administration (NASA).*

2019–present **Scientific referee for European Physical Journal C**, *Springer Nature*, [IF: 4.48].

2018–present **Scientific referee for Physical Review Letters**, *American Physical Society*, [IF: 9.23].

2018–present **Scientific referee for Physical Review D**, *American Physical Society*, [IF: 4.37].

2017–present **Proprosal referee for Physical Review D**, *Swiss National Science Foundation (SNF).*

2012–present **Internal publication referee**, *LIGO Scientific Collaboration (LSC).*

Affiliations

2014–present **Simulating eXtreme Spacetimes Collaboration**.

2015–2017 **Canadian Astronomical Society**.

2011–present **Numerical INJection Analysis Collaboration**.

2011–present **Numerical Relativity - Analytical Relativity Collaboration**.

2011–present **American Physical Society**.

2010–present **LIGO Scientific Collaboration**,
Compact Binary Coalescence Group.

Programming skills

Numerical **Extensive experience in: C/C++, Python, MATLAB**.

Analytical **Mathematica**.

Other **80x86 Assembly language, LabView**.

Operating Systems **Linux, Mac OS**.

Student Supervision

Graduate

2018–present **Gabriel Bonilla, graduate student, Cornell University**.

2017–present **Eamonn O'Shea, graduate student, Cornell University**.

2014–present **Heather Fong, graduate student, CITA, University of Toronto**,
One article published in Phys. Rev. D, another published in Class. & Quant. Gravity.
co-supervised with Prof. Harald P. Pfeiffer

2014–2015 **Swetha Bhagwat, graduate student, Syracuse University**,
One article published in Phys. Rev. D.
co-supervised with Prof. Duncan A. Brown

Undergraduate

2017–present **Jaykumar Patel, Summer Undergraduate Research Fellow, CITA, University of Toronto**,
Article in preparation..

2016–2017 **Aliya Babul, Summer Undergraduate Research Fellow, CITA, University of Toronto**.

Outreach

Oct 2017 **Published interview: Discovery of binary neutron stars & the role of Cornell**,
Cornell Sun, Ithaca, NY.

Sep 2016 **CITA Jamboree**, *Talk: Detecting gravitational waves with LIGO: role of Numerical Relativity.*

Jun 2016 **Published interview: Discovery of Gravitational Waves & the role of CITA**,
Hindustan Times, Lucknow, India.

Feb 2016 **Published interview: Discovery of Gravitational Waves & its implications**,
Scholars' Avenue, Indian Institute of Technology, Kharagpur, India.

Feb 2016 **Published/Broadcast interview: Discovery of Gravitational Waves and the role of CITA**,
Canadian Broadcasting Corporation, Toronto, ON.

Sep 2015 **CITA Jamboree**, *Talk: Gravitational-waves & Binary black holes: Advanced LIGO.*

Sep 2014 **CITA Jamboree**, *Talk: Gravitational-waves & Advanced LIGO.*

2012 **Undergraduate Research Day, Syracuse University**,
Volunteered to organize an important graduate recruitment event. Led groups of students through tours of laboratories in the Physics department.

2005–2007 **NIRMAAN - Education initiative, Pilani, Rajasthan, India**,
Taught basic Sciences to under-privileged children, at the secondary and senior-secondary level, in the rural neighborhood of Pilani.

2009, 2011 **Social initiative. Hardoi, Uttar Pradesh, India**,
Worked with the ASHA Ashram foundation to investigate undue irrigation tax collection (2009) and misappropriation of rations (2011) in 10 villages. An appeal was made to the State government, and corrective action taken.

Languages

Proficient **English, Hindi**.

Basic **Sanskrit**.

References

[**Available on request**].