Daniel John D'Orazio

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Education

Columbia University in the City of New York — 2010 – 2016
Ph.D. Astronomy, June 2016
MPhil Astronomy, 2013
M.A. Astronomy, 2012
Thesis Advisors: Zoltan Haiman, Janna Levin

University of Zürich Institute for Theoretical Physics — 2009 – 2010
Fulbright Fellow
Advisor: Prasenjit Saha

Juniata College — 2005 – 2009
B.Sc. Summa cum Laude, with distinction in physics and in mathematics
Advisor: James D. White

Professional Experience

NASA Einstein+ITC Fellow
Harvard University Astronomy Department — Fall 2016 - Present

NSF Graduate Research Fellow
Columbia University Astronomy Department — 2010 – 2016

Fulbright Fellow University of Zürich — 2009 – 2010

Selected Honors

ITC Fellow, Harvard University — 2019 – 2020

Pauli Center Junior Visiting Fellow, ETH/University of Zürich — May-June 2019

NASA Einstein Postdoctoral Fellowship, Harvard University — 2016 – 2019

ProQuest Distinguished Dissertation Award
Columbia University Candidate — 2016

National Science Foundation Graduate Research Fellowship — 2011 – 2016

APPLAUSE award
Best public outreach talk of the year (Columbia University Astronomy) — 2012

Fulbright - Swiss Government Fellowship — 2009 – 2010

Successful Observing Proposals

(**PI**) Chandra Cycle 21: X-Ray Observations of a Peculiar Flaring AGN Observed by Kepler: A Supermassive Black Hole Hypothesis — 2020

(**PI**) Swift Cycle 15: First X-ray Observations Of a Peculiar Flaring AGN Observed by Kepler: A Supermassive Black Hole Binary Hypothesis — 2019

(**PI**) Chandra Cycle 20: Periodic self-lensing from accreting supermassive black hole binaries — 2018

Chandra Cycle 20: Tidal disruption events unveiled: Directly probing the accretion disks through late-time Chandra observations — 2018

Chandra Cycle 18: Surveying the X-Ray Properties of Candidate Subparsec Scale SMBH Binaries 2016

Teaching and Advising

Advising Columbia undergrad./Harvard grad. Betty Hu	2018 - present
Advising high school Student Romy Aran	2017 - 2019
Co-Advising NSF-REU student Tenley Hutchinson-Smith	Summer 2018
Advising Columbia undergraduate Ganesh Ravichandran	Spring 2015
Teaching Assistant, Electricity and Magnetism; Barnard College	Spring 2012
Teaching Assistant, General Relativity; Columbia College	Fall 2011
Teaching Assistant, Astronomy Lab; Columbia College	2009 - 2010
Teaching Assistant, Modern Physics Lab; Juniata College	Fall 2008
Teaching Assistant, Intro Physics Lab; Juniata College	2006 - 2009

Service

Member, ITC Fellowship Selection Committee	Fall 2018, 2019
Member, ITC Colloquium Committee	2017 - 2019
Referee for: APJ, APJL, MNRAS, MNRASL, PRD, PRL, Radio Science, Cambridge University Press	2015-Present
Member, Columbia Astronomy Graduate Admissions Committee	Spring 2014
Mentor, Columbia astronomy graduate student mentoring program	2013 - 2016
Member, Juniata College Curriculum Committee	2007 - 2009
President/Vice President, Juniata College Society of Physics Students	2006 - 2009

Outreach

Volunteer, Rooftop Variables 2010 - 2016
Partner with local high school teacher to run hands-on activities and observing sessions

Volunteer, Sidewalk Astronomy 2010 – 2016
Take telescopes out to nearby Harlem, engage passersby

Volunteer, Columbia Outreach Program 2010 - 2016
Carry out bi-weekly public lecture series/observing nights at Columbia University

Volunteer, Ask a Scientist at the Intrepid Museum 2015, 2016
Engage with parents and children at Kids Week at the Intrepid Museum in NYC

Location Organizer, Astronomy on Tap 2013 - 2014
Set up events for outreach program featuring talks in unusual locations

Lecturer, Astronomy on Tap June 2013
"Black Hole Batteries"

Lecturer, Columbia Astronomy Outreach Program
"A History and Future of Black Holes" May 2016
"Post movie screening lecture on 'Primer': Time Travel in General Relativity" July 2012
"The Truth About Black Holes" November 2011
Received "APPLAUSE" award for best public outreach talk of the year.

Selected Presentations

Invited Talk: "Binary Self-Lensing: A Black Hole Binary Hunter"
Theoretical Astrophysics Seminar; University of Florida — November 2019

Lecture Series: Gravitational Wave Astrophysics
University of Zurich/ETH — May - June 2019

Invited member: Black Hole Mergers in AGN Disks workshop
CCA Flatiron Institute; New York, NY — March 2019

Contributed Talk: "In Search of a Final-Parsec Telescope"
AAS Winter Meeting; Seattle, WA — January 2019

Invited member: CIERA Clusters Workshop
Northwestern University, IL — December 2018

Invited Talk: "In Search of a Final-Parsec Telescope"
TAPIR Seminar; Pasadena, CA — November 2018

Invited Talk: "The Joint Role of LISA and the Electromagnetic Sector"
LISA Consortium #3; Marseille, France — November 2018

Invited Talk: "A multi-frequency, multi-messenger approach to assessing the origin of the LIGO events"
High Energy Phenomena Seminar; Cambridge, MA — October 2018

Member of the "Multimessenger astrophysics: future directions" Panel
Eternal Multi-Messenger Workshop; CCA Flatiron Institute; New York, NY — August 2018

Invited Talk: "Black Hole Binary Demographics"
Unsolved Problems in Astrophysics and Cosmology; Budapest, Hungary — July 2018

Invited Talk: "Tidal Disruptions and the Stellar Mass Function"
ITC Lunch; Cambridge, MA — July 2018

Invited Talk: "Tools for Characterizing a Population of Massive Black Hole Binaries"
TAC Seminar, Berkeley, CA — September 2017

Invited Talk: "Black-Hole Binary Within A Star"
And then there was Light: Electromagnetic Signatures of Stellar Mass Binary Black Hole Mergers, Lorentz Center Leiden, Netherlands — September 2017

Invited Talk: "The Biggest Black Hole Binaries"
CfA Summer Colloquium, Cambridge, MA — July 2017

Invited Talk: "Accretion Onto Black Hole Binaries: Prospects for observations"
The migration issue: from protoplanets to supermassive black holes; KAVLI Institute for Cosmology, Cambridge, UK — May 2017

Invited Talk: "Imaging and Weighing Compact Massive Black Hole Binaries with Sub-millimeter Interferometry "
Galaxies and Cosmology Seminar; Cambridge, MA — April 2017

Invited Talk: "Massive Black Hole Binaries and the Low Frequency Gravitational Wave sky: Electromagnetic Signatures"
ITC Gravitational Wave Astronomy Seminar; Cambridge, MA — February 2017

"Tools for Characterizing a Massive Black Hole Binary Population"
Testing Gravity; Vancouver, Canada January 2017

"Predicting Observational Signatures of Gas Disks Around Massive Black Hole Binaries"
Dissertation Talk 227th AAS; Kissimmee, FL January 2016

Invited Talk: "Hydrodynamics of Circumbinary Disks and Corresponding Binary Signatures"
Workshop on Relativity and Astrophysics AstroGR:2015; Sao Paulo, Brazil August 2015

"From Rings to Cavities, Transitions in Circumbinary Disks"
Astronomy workshop at the Columbia Global Center; Santiago, Chile May 2015

"Migration Mechanisms in Planetary Systems"
Unsolved Problems in Astrophysics and Cosmology; Budapest, Hungary June 2014

Invited Talk: "Gravity from Astronomy"
Juniata College Physics Department November 2012

Publications (submitted and accepted)

32 Total; 17 first author; *denotes student

Spikey: A Search for Lensing Flares from SMBH Binaries
***Hu, B., **D'Orazio, Daniel J.**, Haiman, Z., Smith, K. L., Snios, B., Charisi, M., Di Stefano, R.
Submitted to MNRAS (2019); arXiv:1910.xxxxx

Repeated Gravitational Lensing of Gravitational Waves in Hierarchical Black Hole Triples
D'Orazio, Daniel J., Loeb, A.
Submitted to PRD (2019); arXiv:1910.02966

Detecting Gravitational Self Lensing from Stellar-Mass Binaries Composed of Black Holes or Neutron Stars
D'Orazio, Daniel J., Di Stefano, R.
Submitted to MNRAS (2019); arXiv:1906.11149

Gravitational-wave captures of single black holes in globular clusters
Samsing, J.; **D'Orazio, Daniel J.**; Kremer, K.; Rodriguez, C. L.; Askar, A.
Submitted to PRD (2019); arXiv:1907.11231

Probing the Survival of Planetary Systems in Globular Clusters with Tidal Disruption Events
Kremer, K.; **D'Orazio, Daniel J.**; Samsing, J.; Chatterjee, S.; Rasio, F. A.
Accepted to ApJ (2019); arXiv:1908.06978

Testing the relativistic Doppler boost hypothesis for the binary candidate quasar PG1302-102 with multi-band Swift data
Xin, C.; Charisi, M.; Haiman, Z.; Graham, M.; Stern, D.; **D'Orazio, Daniel J.**; Schiminovich, D.
Submitted to MNRAS (2019); arXiv:1907.11246

The tidal disruption event AT2017eqx: spectroscopic evolution from hydrogen rich to poor suggests an atmosphere and outflow
Nicholl, M. et al. (including **D'Orazio, Daniel J.**)
Monthly Notices of the Royal Astronomical Society, Volume 488, Issue 2, p.1878-1893 (2019)

Probing gas disc physics with LISA: simulations of an intermediate mass ratio inspiral in an accretion disc
Derdzinski, A.; **D'Orazio, Daniel J.**; Duffell, P; Haiman, Z; MacFadyen, A
Monthly Notices of the Royal Astronomical Society, Volume 486, Issue 2, p.2754-2765 (2019)

Detecting the Orbital Motion of Nearby Supermassive Black Hole Binaries with Gaia
D'Orazio, Daniel J.; Loeb, A.
Submitted to PRD; arXiv:1808.09974

Black Hole Pulsar
Levin, J.; **D'Orazio, Daniel J.**; Garcia-Saenz, S.
Physical Review D, Volume 98, Issue 12, id.123002 (2018)
How Post-Newtonian dynamics shape the distribution of stationary binary black hole LISA sources in nearby globular clusters
Samsing, J., **D'Orazio, Daniel J.**
Physical Review D, Volume 99, Issue 6, id.063006 (2019)

Constraining the Stellar Mass Function from the Deficiency of Tidal Disruption Flares in the Nuclei of Massive Galaxies
D'Orazio, Daniel J., Loeb, A., Guillochon, J.
Monthly Notices of the Royal Astronomical Society, Volume 485, Issue 3, p.4413-4422 (2019)

Black Hole Mergers From Globular Clusters Observable by LISA II: Gravitational Wave Signatures Including Eccentric Populations
D'Orazio, Daniel J., Samsing, J.
Monthly Notices of the Royal Astronomical Society, Volume 481, Issue 4, p.4775-4785 (2018)

Black Hole Mergers From Globular Clusters Observable by LISA I: Eccentric Sources Originating From Relativistic N-body Dynamics
Samsing, J., **D'Orazio, Daniel J.**
Monthly Notices of the Royal Astronomical Society, Volume 481, Issue 4, p.5445-5450 (2018)

Black Hole Mergers from Globular Clusters Observable by LISA and LIGO: Results from post-Newtonian Binary-Single Scatterings
Samsing, J., **D'Orazio, Daniel J.**, Askar, A., Giersz, M.
Submitted to MNRAS; arXiv:1802.08654

Testing the Relativistic Doppler Boost Hypothesis for Supermassive Black Hole Binary Candidates
Charisi, M., Haiman, Z., Schiminovich, D., **D'Orazio, Daniel J.**
Monthly Notices of the Royal Astronomical Society, Volume 476, Issue 4, p.4617-4628 (2018)

Repeated Imaging of Massive Black Hole Binary Orbits with Millimeter Interferometry: Measuring Black Hole Masses and the Hubble Constant
D'Orazio, Daniel J., Loeb, A.
Astrophysical Journal Volume 863 Number 185 (2018)

Periodic Self Lensing from Accreting Massive Black Hole Binaries
D'Orazio, Daniel J., Di Stefano, R.
Monthly Notices of the Royal Astronomical Society, vol. 474, pp. 2975-2986 (2018)

A Single Progenitor Model for GW150914 and GW170104
D'Orazio, Daniel J., Loeb, A.
Physical Review D, Volume 97, Issue 8 (2018)

Lighthouse in the Dust: Infrared Echoes of Periodic Emission from Massive Black Hole Binaries
D'Orazio, Daniel J., Haiman, Z.
Monthly Notices of the Royal Astronomical Society, vol. 470, pp. 1198-1217 (2017)

Bright Transients from Black Hole - Neutron Star Mergers
D'Orazio, Daniel J., Levin, J., Murray, N., Price, L.
Physical Review D, Volume 94, Issue 2 (2016)

A transition in circumbinary accretion discs at a binary mass ratio of 1:25
D'Orazio, Daniel J., Haiman, Z., Duffell, P., Farris, B. D., MacFadyen, A. I.
Monthly Notices of the Royal Astronomical Society, vol. 459, pp. 2379-2393 (2016)

Relativistic boost as the cause of periodicity in a massive black hole binary candidate
D'Orazio, Daniel J., *Haiman, Z., Shiminovich, D. S*
Nature (Letters), vol. 525, pp. 351-353 (2015)

A reduced orbital period for the supermassive black hole binary candidate in the quasar PG 1302-102?
D'Orazio, Daniel J., Haiman, Z., Duffell, P., Farris, B. D., MacFadyen, A. I.
Monthly Notices of the Royal Astronomical Society, vol. 452, pp. 2540-2545 (2015)

The Migration of Gap-opening Planets is Not Locked to Viscous Disk Evolution
Duffell, P., Haiman, Z., MacFadyen, A. I., **D'Orazio, Daniel J.**, *Farris, B. D.,*
The Astronomical Journal Letters, vol. 792, issue 1, article id. L10, 4 pp. (2014)

Accretion into the Central Cavity of a Circumbinary Disk
D'Orazio, Daniel J., Haiman, Z., MacFadyen, A. I.
Monthly Notices of the Royal Astronomical Society, vol. 436, pp. 2997-3020 (2013)

Big black hole, little neutron star: Magnetic dipole fields in the Rindler spacetime
D'Orazio, Daniel J., *Levin, J.*
Physical Review D, vol. 88, Issue 6, id. 064059 (2013)

An analytic solution for weak-field Schwarzschild geodesics
D'Orazio, Daniel J., Saha, P.
Monthly Notices of the Royal Astronomical Society, Volume 406, Issue 4, pp. 2787-2792. (2010)

Measuring the speed of light using beating longitudinal modes in an open-cavity HeNe laser
D'Orazio, Daniel J., *Pearson, M. J., Schultz, J. T., Sidor, D., Best, M. W., Goodfellow, K. M., Scholten, R. E., White, J. D.*
American Journal of Physics, Volume 78, Issue 5, pp. 524-528 (2010)

White Papers

Stellar multiplicity: an interdisciplinary nexus
Price-Whelan, Adrian; Breivik, Katelyn; **D'Orazio, Daniel J.**; Hogg, David W.; Johnson, L. Clifton; Moe, Maxwell; Morton, Timothy D.; Tayar, Jamie
Astro2020 Decadal Review: Astronomical Society, Vol. 51, Issue 3, id. 206 (2019)

Multimessenger science opportunities with mHz gravitational waves
Baker, John et. al (including **D'Orazio, Daniel J.***)*
Astronomical Society, Vol. 51, Issue 3, id. 123 (2019)

Multi-Messenger Astrophysics With Pulsar Timing Arrays
Kelley, Luke et. al (including **D'Orazio, Daniel J.**)
Astro2020 Decadal Review: Astronomical Society, Vol. 51, Issue 3, id. 490 (2019)

Selected Press
The New York Times, "More Evidence for Coming Black Hole Collision"
CNN, "Black holes heading for 'massive collision,' says astronomer"
Scientific American "Flickering Quasar May Hold Black Holes on a Collision Course"