Kiranjyot (Jasmine) Gill

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Research Interests

Core-Collapse Supernovae, Black Holes, Neutron Stars, **Gravitational Waves**, **Neutrinos**,
Multi-Messenger Follow-Up of Transients, Gravitational-Wave Data Analysis,
Terrestrial Gravitational-Wave Observatories, Proposed Space-based and Lunar Gravitational Wave Observatories.

Education

Harvard University — Cambridge, MA
Ph.D in Astronomy & Astrophysics; Advisor: **Jonathan E. Grindlay** — Conferred Feb 2025
M.S in Astronomy — May 2022
Embry-Riddle Aeronautical University — Prescott, AZ
B.S. in Space Physics; Magna Cum Laude; GPA: 3.825 — May 2018

Select Publications Involving **K. Gill**

[1] **K. Gill**, A. Roberts, D. Vartanyan, J. Grindlay, and A. Burrows. Neutrino Oscillations in the Context of Gravitational Waves and Neutrinos from Extra-Galactic Core-Collapse Supernovae. *Planned 2025 submission to The Astrophysical Journal Letters.*

[2] **K. Gill**, M. Branchesi, and J. Grindlay. Third Generation Gravitational Wave Astronomy Prospectives for Massive Stars. *Planned 2024 submission to the Astrophysical Journal Letters.*

[3] **K. Gill**, K. Jani, A. Burrows, A. Loeb, and J. Grindlay. Establishing the First Deep Learning Model for Milli-to-Deci-Hertz Gravitational Wave Detection. *Planned 2024 submission to the Astrophysical Journal.*

[4] **K. Gill**. Milli-to-Deci-Hertz Detection Prospects for Gravitational Waves from Core-Collapse Supernovae. *Submitted to the Astrophysical Journal Letters.*

[5] **K. Gill**, G. Hosseinzadeh, E. Berger, M. Zanolin, and M. Szczepańczyk. Constraining the time of gravitational-wave emission from core-collapse supernovae. *The Astrophysical Journal*, 931(2):159, June 2022.

[6] LGWA Collaboration and K. Gill. The Lunar Gravitational-wave Antenna: Mission Studies and Science Case. *Accepted into JCAP*, Apr 2024. arXiv:2404.09181.

[7] R. Qiu, P. G. Krastev, **K. Gill**, and E. Berger. Deep learning detection and classification of gravitational waves from neutron star-black hole mergers. *Physics Letters B*, 840:137850, May 2023.

[8] C. J. Richardson, M. Zanolin, H. Andresen, M. Szczepańczyk, **K. Gill**, and A. Wongwathanarat. Modeling core-collapse supernovae gravitational-wave memory in laser interferometric data. *Physical Review Letter D*, 105(10):103008, May 2022.

[9] P. G. Krastev, **K. Gill**, V. A. Villar, and E. Berger. Detection and parameter estimation of gravitational waves from binary neutron-star mergers in real LIGO data using deep learning. *Physics Letters B*, 815:136161, April 2021.

[10] B. Bécsy, P. Raffai, **K. Gill**, T. B. Littenberg, M. Millhouse, and M. Szczepańczyk. Interpreting gravitational-wave burst detections: constraining source properties without astrophysical models. *Classical and Quantum Gravity*, 37(10):105011, May 2020.

[11] LIGO Scientific Collaboration, Virgo Collaboration and **K. Gill**. Optically targeted search for gravitational waves emitted by core-collapse supernovae during the first and second observing runs of advanced LIGO and advanced Virgo. *Physical Review D*, 101(8):084002, Apr 2020.

[12] S. Gomez, G. Hosseinzadeh, P. S. Cowperthwaite, V. A. Villar, E. Berger, T. Gardner, K. D. Alexander, P. K. Blanchard, R. Chornock, M. R. Drout, T. Eftekhari, W. Fong, **K. Gill**, R. Margutti, M. Nicholl, K. Paterson, and P. K. G. Williams. A Galaxy-targeted Search for the Optical Counterpart of the Candidate NS-BH Merger S190814bv with Magellan. *The Astrophysical Journal Letters*, 884(2):L55, October 2019.

[13] H. Andresen, E. Müller, H. Th Janka, A. Summa, **K. Gill**, and M. Zanolin. Gravitational waves from 3D core-collapse supernova models: The impact of moderate progenitor rotation. *Monthly Notices of the Royal Astronomical Society*, 486(2):2238–2253, Jun 2019.

[14] LIGO Scientific Collaboration, Virgo Collaboration and **K. Gill**. Gravitational Waves and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A. *The Astrophysical Journal Letters*, 848(2):L13, Oct 2017.

[15] LIGO Scientific Collaboration, Virgo Collaboration and **K. Gill**. GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral. *Physical Review Letters*, 119(16):161101, October 2017.

[16] LIGO Scientific Collaboration, Virgo Collaboration and **K. Gill**. GW170104: Observation of a 50-Solar-Mass Binary Black Hole Coalescence at Redshift 0.2. *Physical Review Letters*, 118(22):221101, June 2017.

[17] LIGO Scientific Collaboration, Virgo Collaboration and **K. Gill**. First targeted search for gravitational-wave bursts from core-collapse supernovae in data of first-generation laser interferometer detectors. *Physical Review D*, 94:102001, Nov 2016.

[18] S. E. Gossan, P. Sutton, A. Stuver, M. Zanolin, **K. Gill**, and C. D. Ott. Observing gravitational waves from core-collapse supernovae in the advanced detector era. *Physical Review D*, 93:042002, Feb 2016.

[19] LIGO Scientific Collaboration, Virgo Collaboration and **K. Gill**. Observation of Gravitational Waves from a Binary Black Hole Merger. *Physical Review Letters*, 116(6):061102, February 2016.

Awards and Scholarships

- Harvard James Mills Pierce Fellowship, 2018-2022
- Harvard Merit/Graduate Society Research Fellowship, 2018
- Embry-Riddle Aeronautical University's Chancellor's Award (Highest University Distinction), 2018
- Embry-Riddle Aeronautical University's Outstanding Graduate in Space Physics, 2018
- Princess of Asturias Award, 2017 **(LIGO collaboration + K. Gill)**
- High Energy Astrophysics Division of AAS - Bruno Rossi Prize, 2017 **(LIGO collaboration + K. Gill)**
- UK Royal Astronomical Society Group Achievement Award in Astronomy, 2017 **(LIGO collaboration + K. Gill)**
- Embry-Riddle Aeronautical University's Outstanding Woman in College of Arts & Sciences, 2017
- Daniel Alumni Scholarship, 2017
- Milner Breakthrough Prize in Fundamental Physics, 2016 **(LIGO collaboration + K. Gill)**
- Gruber Foundation Cosmology Prize, 2016 **(LIGO collaboration + K. Gill)**
- Sigma Pi Sigma National Physics Honor Society Inductee, 2016
- Embry-Riddle Aeronautical University's Woman of Excellence Award, 2016
- Outstanding Talk at APS 4 Corners Conference, 2015
- Embry-Riddle Undergraduate Research Institute Research Grant (10K/year), 2015-2018
- NASA Alumni Endorsement Scholarship, 2014-2018
- Embry-Riddle Aeronautical University's Presidential Scholarship, 2014-2018
- Embry-Riddle Aeronautical University's State Incentive Scholarship, 2014-2018
- Embry-Riddle Aeronautical University's Achievement Scholarship, 2014-2018
- Embry-Riddle Aeronautical University's Dean's List 2014-2018

Select Press Releases

- Student Spotlight for the official Harvard Astronomy Department Webpage, 2018-2024
- International Student Spotlight for NAFSA: Association of International Educators, 2018
- Reflections on the 2017 Nobel, From Students Who Helped Make it Possible, *Sigma Pi Sigma*, 2018
- LIGO and the Nobel Prize in Physics, *Sandy and Friends, AZTV Interview*, 2018
- Prescott Campus Team Contributes to LIGO's Third Gravitational Wave Detection, *ERAU Newsroom*, 2017
- Students Present on LIGO and Gravitational Wave Science, *ERAU Newsroom*, 2017
- Embry-Riddle LIGO team contributes to Nobel Prize, *The Daily Courier*, 2017
- The Sounds of Space, *ERAU Researcher*, 2016
- ERAU Physics Faculty Plays Role in LIGO's Detection of Gravitational Waves, *AZoQuantum*, 2016
- NASA Receives Record Number of Applications for Astronaut Class, *NAZ Today TV Interview*, 2016

Programming Skills

- **Core Languages**: C, C++, Fortran, Python, Java, Perl
- **Scripting & Automation**: Bash, UNIX shell scripting, Matlab
- **Web Development**: HTML, CSS
- **Scientific & Analytical Tools**: ROOT, Mathematica
- **Typesetting**: LaTeX

Software

Proficient in deploying large-scale computational workloads with the Condor job management system across CPU and GPU resources. Skilled in executing large-scale Lagrangian radiation-hydrodynamics simulations and applying open-source Markov Chain Monte Carlo (MCMC) tools, such as `emcee` and `MultiNest`.

Additional Research Experience

– *Visiting Scholar* at the Division of Physics and LIGO Lab at the Massachusetts Institute of Technology; Supervisors: Salvatore Vitale, Ph.D and Rainer Weiss, Ph.D, 2017-2018

– *Visiting Scholar* at the Divison of Computational Astrophysics at Carnegie Observatories; Supervisor: Anthony Piro, Ph.D, 2017

– *Visiting Scholar* at the Division of Physics and LIGO Lab at the California Institute of Technology; Supervisor: Alan Weinstein, Ph.D, 2016-2017

– *Summer Undergraduate Research Fellow* (SURF) at the California Institute of Technology, 2016

Select Invited Talks

· Introducing Novel Methods to Constrain Massive Stars, Harvard AstroAI **November 2024**

· Supernovae and GW memory science with the Moon, Harvard Transient Tea **April 2024**

· Searching for Light Knights in the Dark, Harvard ITC **May 2024**

· Hunting for Gravitational Waves from Massive Stars using AI, Harvard AstroAI **March 2024**

· Supernovae and GW memory science, Vanderbilt University **Oct 2023**

· Gravitational Waves from Optically-Discovered Core-Collapse, University of Toronto **Sep 2023**

· Gravitational Waves from Optically-Discovered Core-Collapse Supernovae, Carnegie Observatories **Aug 2023**

· Gravitational Wave-Electromagnetic Perspective of Core-Collapse Supernovae, 20th HEAD **March 2023**

· Constraining the Time of Gravitational Wave Emission from Core-Collapse Supernovae, Harvard **May 2022**

· Gravitational Wave Emission from Core-Collapse Supernovae, Spoken-WERRD [VIRTUAL] **March 2022**

· Gravitational Wave Emission from Core-Collapse Supernovae, Spoken-WERRD [VIRTUAL] **March 2021**

· LIGO/LSST: New Opportunities in Multi-Messenger Science, Columbia **May 2019**

· Gravitational Waves from Core-Collapse Supernovae in the Local Universe, Harvard **Feb 2019**

· From Dreams to Future Discoveries: Advancing Core-Collapse Supernova Science, Columbia **Nov 2018**

· Improving Multi-messenger Core-Collapse Supernova Science, Princeton **Nov 2017**

· Improving Multi-messenger Core-Collapse Supernova Science, Columbia **Nov 2017**

· Improving Multi-messenger Core-Collapse Supernova Science, Harvard **Nov 2017**

· Improving Multi-messenger Core-Collapse Supernova Science, MIT GRITTS **June 2017**

· Multi-messenger Core-Collapse Supernova Science, Caltech LIGO Lab **June 2016**

· Prospects for Gravitational Wave Searches for CCSNe within the Local Universe, Caltech LIGO Lab **Oct 2016**

· The Local Galaxy Blue Luminosity Distribution and Core-Collapse SN Rate, University of Urbino **June 2015**

Select Leadership and Outreach Activities

- Advised numerous students over the span of ten years. All alumni in STEM college programs and STEM graduate schools. Current mentee is **Alisha Roberts**, Fulbright scholar and first year graduate student at UW-Madison.

- Spearheaded the *Navajo Nation STEM Initiative* with Rhondale Tso (now deceased) and introduced a three-tier curriculum focusing on the college application process and SAT/ACT preparation to Navajo and Hopi-tribe identifying minorities interested in pursuing a STEM-based education.

- Collaborated with Caltech, Embry-Riddle Aeronautical University, Pasadena College Access Plan, and the LIGO Educational Public Outreach Division to bring scholastic and scientific programs to high school students in rural areas. Engaged with underrepresented communities in STEM through scientific presentations tailored for high school students, delivering lectures on laser interferometry science, and promoting opportunities in gravitational wave astrophysics at the high school and entry-undergraduate levels. Implemented a hands-on experience with a mock interferometer provided by the LIGO Scientific Collaboration.