Derek D. White

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Education

May 2022 **M.S. in Physics**
California State University, Fullerton

August 2020 **B.S. in Physics, *summa cum laude***
California State University, Fullerton

Research Experience

June 2017 – August 2022 **Research Assistant**
CSUF Gravitational-Wave Physics and Astronomy Center (GWPAC)
Principal Investigator: Dr. Jocelyn Read

- Created a Multi-Scale Gradient, Continuously Conditional, Generative Adversarial Network (MSG-CcGAN) to create simulations of the collision of neutron stars, given input parameters for the stars' masses and tidal properties.
- Created a repository of 50,000 multi-channel time-series waveform approximants of colliding neutron stars with known masses and tidal properties.
- Created a public GitLab repository of numerical relativity gravitational-wave simulations formatted for use in lalsuite and PyCBC Python research libraries.
- Joined LIGO-Virgo Collaboration's Offline Searches team in running searches for gravitational-wave signals more computationally thoroughly than possible during the observatories' live runs.
- Reviewed and debugged code for the LIGO-Virgo Collaboration paper reporting the discovery of neutron star/black hole collisions.
- Wrote how-to manual on using remote computing clusters, virtual environments, and Jupyter notebooks for all GWPAC members.
- Taught new team members the basics of Python and scientific computing on GWPAC's computing clusters.
- Participated and presented in bi-weekly GWPAC meetings.
- Attended weekly international conference calls for LIGO-Virgo Collaboration's Numerical Relativity and PyCBC groups.

Publications

2021 **"Observation of Gravitational Waves from Two Neutron Star–Black Hole Coalescences"**
LIGO Scientific Collaboration, Virgo Collaboration, et al. Published in Astrophysical Journal Letters, ApJL, 915, L5 (2021). arXiv:2106.15163 [astro-ph.HE].

- For reviewing and debugging code used to calculate the mass ejected when a neutron star collides with another stellar object.

Publications (Continued)

2020 **"GW190425: Observation of a Compact Binary Coalescence with Total Mass ~3.4 Msol"**
LIGO Scientific Collaboration, Virgo Collaboration, et al. Published in Astrophysical Journal Letters, ApJL, 892, L5 (2020). arXiv:2001.01761 [astro-ph.HE].

- For running offline searches for gravitational waves on data from LIGO's detectors from late July 2019 and for reporting the detection of a gravitational wave in this data.

2017 **"Search for Post-merger Gravitational Waves from the Remnant of the Binary Neutron Star Merger GW170817"**
B. P. Abbott, et al. Published in Astrophysical Journal Letters, ApJL, 851, L16 (2017). arXiv:1710.09320 [astro-ph.HE]

- For contributing to code used in injection recovery tests to calibrate the search pipeline described in this paper.

Other I am a listed author on over 20 additional papers for my overall contributions to the LIGO-Virgo Collaboration.

Teaching/Work Experience

Fall 2020 – Spring 2022 **Lab Instructor**
Physics Department, California State University, Fullerton

- Taught six sections of Electromagnetism and Modern Physics labs, including four online and two in person.

Spring 2018 **Supplemental Instructor/Tutor**
Fullerton College

- Taught twice-weekly, hour-long, group-based instruction and activity sessions for Intro to Calculus students.
- Tutored same students in-class as the professor's assistant.

May 2011 – June 2017 **Luthier**
Advanced Shell Technology

- Constructed and assembled high-end acoustic guitars.
- Led production of guitar tools and parts for sale to other luthiers.

Awards and Recognitions

2021 **Nancy Goodhue-McWilliams Fellowship**

- $6,250 fellowship through CSUF and GWPAC. Awarded to 1-2 students per year.
- Awarded for excellence in research and mentoring of younger students.

2020 **Outstanding Scholarship Award, CSUF Physics**

- For excellence in undergraduate studies. Awarded to two students per year.

Fall 2018 – Spring 2020 **CSUF College of Natural Science and Mathematics Dean's List**

- GPA: 3.95

Presentations

"Numerical Simulation Infrastructure for Gravitational Wave Data Analysis"
Poster, authors: Derek D. White, Dr. Jocelyn Read

March 2019 • LIGO-Virgo Collaboration annual conference, Wisconsin
April 2019 • American Physical Society conference, Colorado
October 2019 • American Physical Society Far West Chapter conference, California

July 2021 **"Machine Learning, Neural Networks, and LIGO"**
Oral, author: Derek D. White

- CSUF GWPAC Summer Presentation Series, Online

Memberships

- LIGO -Virgo Collaboration
- American Physical Society
- Society of Physics Students
- Phi Theta Kappa Honors Society

Technical Skills

- Programming languages: Python, C, C++
- Python libraries: numpy, pandas, tensorflow, keras, pytorch, pyplot, seaborn, pycbc, lalsuite
- Computer skills: Anaconda, Jupyter, Google Colab, Git, Vim, computing clusters, Linux bash

Example Work

https://github.com/dwhite25/MSG-CcGAN

- Implementation of Multi-Scale Gradient, Continuously Conditional, Generative Adversarial Network.

https://git.ligo.org/derek.white/public-lvcnr-matter

- Publicly available repository of few hundred unique gravitational-wave simulations from neutron-star collisions, formatted for immediate use in lalsuite and PyCBC Python research libraries.