CONNER DAILEY

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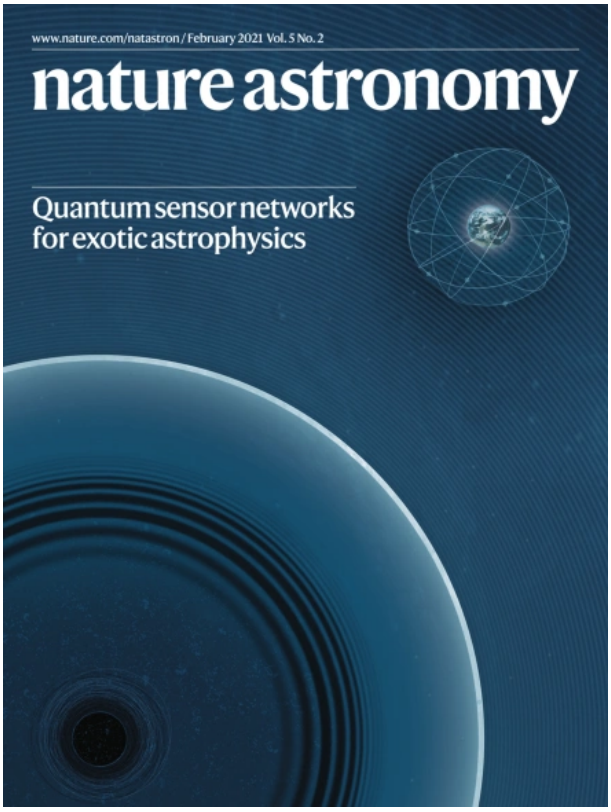
EDUCATION

Doctor of Philosophy in Theoretical Physics August 2020 - Present
University of Waterloo, Perimeter Institute
Advisors: Dr. Niayesh Afshordi, Dr. Erik Schnetter

Master of Science in Physics August 2017 - August 2019
University of Nevada, Reno GPA: 3.845/4.000
Advisor: Dr. Andrei Derevianko
Thesis Title: "Probing exotic fields with networks of atomic clocks" (see Published Theses)

Bachelor of Science in Physics August 2014 - May 2017
University of Nevada, Reno GPA: 3.827/4.000
Advisor: Dr. Andrei Derevianko
Minors: Astronomy and Mathematics

PUBLICATIONS



- Dailey, C., Afshordi, N. & Schnetter, E. "Reflecting boundary conditions in numerical relativity as a model for black hole echoes" (2023). URL `https://arxiv.org/abs/2301.05778`.
- Dailey, C., Bradley, C., Kimball, D. F. J., Sulai, I. *et al.* "Quantum sensor networks as exotic field telescopes for multi-messenger astronomy". *Nature Astronomy* **5**, 150–158 (2021).
- Roberts, B. M., Blewitt, G., Dailey, C., Murphy, M. *et al.* "Search for domain wall dark matter with atomic clocks on board global positioning system satellites". *Nature Communications* **8** (2017).
- Roberts, B. M., Blewitt, G., Dailey, C. & Derevianko, A. "Search for transient ultralight dark matter signatures with networks of precision measurement devices using a bayesian statistics method". *Physical Review D* **97**, 083009 (2018).
- Afach, S. *et al.* Search for topological defect dark matter with a global network of optical magnetometers. *Nature Physics* **17**, 13961401 (2021).
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- Heck, S., Gatton, A., Larsen, K. A., Iskandar, W. *et al.* "Symmetry breaking in the body-fixed electron emission pattern due to electron-retroaction in the photodissociation of H_2^+ and D_2^+ close to threshold". *Physical Review Research* **1**, 033140 (2019).

OTHER ACADEMIC PROGRAMS

Symmetries Graduate School 2023 January 2023 - February 2023
Perimeter Institute for Theoretical Physics, Waterloo, Ontario, Canada

PRISMA$^+$ Internship Program January 2020 - March 2020
Johannes Gutenberg University, Mainz, Germany

The 37th Advanced School in Theoretical Physics:
New Ideas for Old Puzzles in Particle Physics December 2019 - January 2020
The Israel Institute of Advanced Studies, Jerusalem

PUBLISHED THESES

"Probing exotic fields with networks of atomic clocks"

Masters Thesis, University of Nevada, Reno, 2019-08

Abstract:

An exotic light field (ELF) is a class of field beyond the standard model that could be produced in high-energy astrophysical events with enough amplitude to be detected with precision measurement sensors. A model that describes an ELF as a pulse of ultra-relativistic matter waves and an estimate of the sensitivity for current and future networks of atomic clocks to detect ELFs is developed here. The global positioning system (GPS) is presented as an existing network of atomic clocks that has the potential to probe ELFs. A first proof-of-principle search for ELFs emitted as bursts from the GW170817 neutron star merger was performed with data from GPS. Although no concrete evidence was found for ELFs, a foundation has been produced for future searches for ELFs originating from many other astrophysical events, such as gamma ray bursts, black hole mergers, and solar flares for the last 20 years of GPS operation.

PROFESSIONAL RESEARCH EXPERIENCE

Graduate Research Assistant August 2020 to Present
University of Waterloo, Ontario
Advisors: Dr. Niayesh Afshordi, Dr. Erik Schnetter

Graduate Research Assistant January 2018 to December 2019
University of Nevada, Reno
Advisor: Dr. Andrei Derevianko

Undergraduate Research Assistant January 2016 to May 2017
University of Nevada, Reno
Advisor: Dr. Andrei Derevianko

Undergraduate Research Assistant April 2016 to July 2017
University of Nevada, Reno
Advisor: Dr. Joshua Williams

TEACHING EXPERIENCE

Graduate Teaching Assistant September 2022 to December 2022
Course Title: ECE 105 - Physics of Electrical Engineering
University of Waterloo
Supervisor: Dr. Kostadinka Bizheva

Graduate Teaching Assistant May 2022 to September 2022
Course Title: SCI 238 - Introductory Astronomy
University of Waterloo
Supervisor: Dr. Niayesh Afshordi

Graduate Teaching Assistant May 2022 to September 2022
Course Title: SCI 207 - Life, the Universe, and Everything
University of Waterloo
Supervisor: Dr. Richard Epp

Graduate Teaching Assistant September 2021 to December 2021
Course Title: ECE 105 - Physics of Electrical Engineering
University of Waterloo
Supervisor: Dr. Kostadinka Bizheva

Graduate Teaching Assistant May 2021 to August 2021
Course Title: SCI 270 - Astronomical Observations
University of Waterloo
Supervisor: Dr. Brian McNamara

Graduate Teaching Assistant January 2021 to May 2021
Course Title: SCI 238 - Introduction to Astronomy
University of Waterloo
Supervisor: Dr. Niayesh Afshordi

Graduate Teaching Assistant August 2019 to December 2019
Course Title: PHYS 181L - Physics for Scientists and Engineers II - Lab
University of Nevada, Reno
Supervisor: Dr. Bernhard Bach

Graduate Teaching Assistant January 2018 to May 2018
Course Title: PHYS 152L - General Physics II - Lab
University of Nevada, Reno
Supervisor: Dr. Bernhard Bach

Graduate Teaching Assistant August 2017 to December 2017
Course Title: PHYS 151L - General Physics I - Lab
University of Nevada, Reno
Supervisor: Dr. Bernhard Bach

FIRST-AUTHOR CONFERENCE PRESENTATIONS

Testing Gravity 2023 January 2023
Vancouver, British Columbia, Canada
Type: Poster Presentation
Title: "Reflecting boundary conditions in numerical relativity as a model for black hole echoes"

APS April Meeting 2019 "Quarks 2 Cosmos" April 2019
Denver, Colorado, USA
Session ID: L09.00006
Type: Invited Talk
Title: "Progress in dark matter search with the global positioning system"

APS Division of Atomic and Molecular Physics Meeting 2018 June 2018
Fort Lauderdale, Florida, USA
Session ID: M01.00081
Type: Poster Presentation
Title: "Searching for Dark Matter and Exotic Physics with Atomic Clocks and the GPS Constellation"

PhysCon 2016 November 2016
San Francisco, California, USA
Session ID: S1 - 54
Type: Poster Presentation
Title: "Preliminary steps in detecting Dark Matter with the GPS Satellite Constellation"

CO-AUTHOR CONFERENCE PRESENTATIONS

APS Division of Atomic and Molecular Physics Meeting 2022 May 2022
Chicago, Illinois, USA
Session ID: E03.003
Title: "GPS.ELF: Search for emission of exotic low-mass fields from the binary neutron star merger (GW170817) using GPS atomic clocks"

APS Division of Atomic and Molecular Physics Meeting 2020 June 2020
Portland, Oregon, USA
Session ID: K01.00151
Title: "Search for Exotic Field Emission from the GW170817 Binary Neutron Star Merger Using GPS Atomic Clocks"

APS Division of Atomic and Molecular Physics Meeting 2019 May 2019
Milwaukee, Wisconsin, USA
Session ID: S01.00035
Title: "Global Network of Clocks and Magnetometers as Exotic Light Field Telescopes"

2019 Joint Conference of the IEEE International Frequency Control Symposium and European Frequency and Time Forum (EFTF/IFC) April 2019
Orlando, Florida, USA
DOI: 10.1109/FCS.2019.8856056
Title: "DAMNED-DArk Matter from Non-Equal Delays New test of the fundamental constants variation"

APS Division of Atomic and Molecular Physics Meeting 2018 June 2018
Fort Lauderdale, Florida, USA
Session ID: D06.00007
Title: "New Precision Measurements from GPS. DM Observatory for Exotic Physics Searches: Atomic Clock Phases every Second to < 0.1 ns"

APS Division of Atomic and Molecular Physics Meeting 2017 June 2017
Sacramento, California, USA
Session ID: Q1.00023
Title: "Using Global Network Precision Measurements to Search for Exotic Physics"

APS April Meeting 2017 "Quarks 2 Cosmos" January 2017
Washington D.C., USA
Session ID: C6.00002
Title: "First Results of the GPS.DM Observatory: Search for Dark Matter and Exotic Physics with Atomic Clocks and GPS Constellation"

American Geophysical Union, Fall Meeting 2016 December 2016
San Francisco, California, USA
Session ID: G53A-05
Title: "First Results in the Search for Dark Matter from the GPS.DM Observatory"

SCHOLARSHIPS

International Doctoral Student Award
2020, 2021

Marie Curie Graduate Award
2020

Governor Guinn Millennium Scholarship
2014, 2015, 2016, 2017

TMCC/UNR Thompson Scholarship
2014, 2015

ASUN Academic Scholarship
2015, 2016

HONORS AND AWARDS

UNR College of Science Dean's List
2015, 2016, 2017, 2018

Nevada Undergraduate Research Award
2016

2013 UNR Physics Exam Award
2013

Silver Scholar Award
2009

MEMBERSHIPS

American Physical Society
Society of Physics Students
Sigma Pi Sigma
National Society of High School Scholars

OTHER AWARDS

Second Place Recurve Flight 2 February 2015
The Vegas Shoot,
International Archery Tournament

Eagle Scout April 2014
Boy Scouts of America