Myles Bradford Sherman

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Education

2021 - present	Ph.D. Physics (Candidacy 2024-present)	**California Institute of Technology**
2022 - present	Certificate of Practice in University Teaching	**Caltech Future Faculty and Mentors**
2017 - 2021	B.S. Electrical & Computer Engineering and Physics	**Carnegie Mellon University**

Fellowship & Awards

National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP) Awardee
Carnegie Mellon University Physics Department Cutkosky Awardee
Carnegie Mellon University Senior Leadership Recognition Recipient

Physics & Astronomy Research

Interests

- **Formation and evolution of neutron stars** and the distinct histories of their sub-species, particularly the most highly magnetized sample: **magnetars**
- Nature of **Fast Radio Bursts (FRBs)**, coherent extragalactic radio flashes of unknown origin which may be produced by magnetars
- Software and hardware development of novel transient search pipelines for **interferometric radio antenna arrays**, including algorithm development and instrument design
- Statistical application of **multi-wavelength (radio, optical, infrared, and high-energy) observational constraints to physical models** of neutron star emission and evolution

Research Experience

Caltech Radio Group (Thesis Research) **2022-present**
Caltech, Pasadena, CA, USA

Developed **polarization and Faraday rotation measure (RM) synthesis pipeline for FRBs** detected with the Deep Synoptic Array-110 (DSA-110) radio array. Compared the polarization and local magnetic properties of FRBs to Galactic pulsars, concluding that FRBs' local environments resemble those of young pulsars[2,3];

Evaluated the **theoretical pulsar detection rates and radio transient search techniques** for the upcoming Deep Synoptic Array-2000 (DSA-2000) Radio Array[5];

Investigated the formation of magnetars by **searching archival radio, optical/infrared, and *Gaia* proper-motion data for supernova remnants and runaway companion stars**, resulting in two new unbound binary candidates. Used Markov-Chain Monte Carlo simulation to hypothesize that magnetars may preferentially form from stellar mergers[1];

Developed **GPU-based real-time image-plane search for long-duration (134 ms - 160.8 s) radio transients with the DSA-110**; conducted Galactic Plane survey and placed tight constraints on the White-Dwarf binary polar population in the Plane.

Space Radiation Lab **Fall 2021**

Caltech, Pasadena, CA, USA

Characterized the linearity, inter-pixel correlation, and image persistence behavior of Complementary Metal-Oxide Semiconductor (CMOS) detectors for use in future UV astronomy missions[4]

Peterson Lab **2019-2020**
Carnegie Mellon University, Pittsburgh, PA, USA

Constructed CAD models of high impedance radio antennas used to observe the Cosmic Microwave Background to detect the turn on of the universe's first stars; Simulated the frequency and time dependent response of antennas when exposed to the sky and create calibration factor

Center for Space Plasma and Aeronomics Research (CSPAR) **2019**
Research Experience for Undergraduates (REU)
University of Alabama Huntsville, Huntsville, AL, USA

Redesigned PCB layout using KiCAD software for Data Acquisition Board and testing breakout board for TRYAD CubeSat project focused on analysis of Terrestrial Gamma Ray Flashes (TGFs); Updated Arduino code used for evaluation of Science Instrument Package (SIP) and Data Acquisition Board (DAQ), and wrote Testing and Verification Plan to document testing procedures

Observing Experience

Green Bank Telescope (GBT)
Proposal GBT/25A-328: Searching for Radio Emission from the Four 'Low B-Field' Magnetars Myles B. Sherman, Vikram Ravi, Alice P. Curtin, Casey J. Law

Utilized 14.25 awarded hours to observe 4 as-yet radio-quiet magnetars with low, pulsar-like magnetic fields using the L-band ($1-2\,\mathrm{GHz}$) receiver with the Versatile GBT Astronomical Spectrometer (VEGAS) backend in pulsar search mode; Applied the PulsaR Exploration and Search TOolkit (PRESTO) to search for periodic and single-pulse emission, placing constraints on the radio-magnetar emission process

Very Large Array (VLA) Proposal VLA/25A-481: Confirming Radio Detection of Magnetar SGR J0418+5729 Myles B. Sherman, Vikram Ravi, Alice P. Curtin, Casey J. Law, Duncan Lorimer, Marlon Bause

Applied 1.4 hours of awarded Target-of-Opportunity (TOO) time to observation of the radio-quiet magnetar SGR J0418+5729 using the VLA continuum L-band radio imager in C-configuration, following-up and ultimately ruling out candidate single-pulse radio bursts from GBT L-band data.

Palomar 200-inch (P200) Telescope Proposal P14 2025A: DSA-110 Long-Period Radio Transients Myles Sherman, Nikita Kosogorov, Stella Ocker, Casey Law, Kritti Sharma, Vikram Ravi, Liam Connor, Jakob Faber, Mark Hodges

Investigated the IR emission of Long Period Radio Transients with $\sim$ 15 hours (3 half nights) awarded with the P200 Widefield Infrared Camera (WIRC), placing upper limits on the IR emission of CHIME J1634+44.

Logged additional $\sim$ 20 WIRC hours and $\sim$ 12 Next Generation Palomar Spectrograph (NGPS) hours on the P200 telescope supporting DSA-110 FRB Follow-up Observations (Proposal P22: DSA-110 Fast Radio Bursts, Vikram Ravi et al.) and searches for Magnetar bow shocks (Proposal P02: Magnetar Formation and Energetics, Stella Ocker et al.).

Engineering Background

Technical Skills

Programming: Python (including GPU interfacing with JAX and PyTorch), C, Cuda (C++ based NVIDIA GPU language), Arduino API (C++), Labview, Matlab, SystemVerilog (FPGA hardware description)
CAD Software: Solidworks, FEKO EM Simulation, KiCAD, Eagle CAD, Creo Parametric

Lab/Shop Equipment: Soldering iron, Network Analyzer, Spectrum Analyzer, Standard power tools, Bandsaw, Ultimaker Ext. 3D Printer, Form2 3D Printer, Epilog Laser Cutter, Lathe, Mill

Experience

Engineering Lab **2021**
Summer Undergraduate Research Fellowship (SURF)
National Institute of Standards and Technology (NIST), Gaithersburg, MD, USA (Remote)

Characterized the Fluke 8588 Digital Multimeter by fitting resonance models to alternating current (AC) measurment errors; Wrote and modified Labview programs to analyze voltage and current data from the NETZERO House project, investigating the effect of household appliance usage on the power grid

Hardware Engineering Group **2020**
Apple Inc., Cupertino, CA, USA (Remote)

Developed Python libraries utilizing the VXI-11 Protocol to remotely characterize amplifiers for RF frontend system and identify the most suitable device based on distortion and noise factor traits; Analyzed user-end data to categorize anomalies in communication link and successfully identified phase-locked-loop oscillator degradation

Orbital Edge Computing Research Group **2018-2019**
Carnegie Mellon University, Pittsburgh, PA, USA

Configured Software Defined Radio to receive VHF signals from 3 NOAA weather satellites using SDR# software; decoded images for edge computing cube satellite testing; Experimented with OpenCV image matching code for use in satellite vision system

Mechanical Engineering Project Management **2018**
General Electric (GE) Aviation, Lynn, MA, USA

Consolidated preservation procedures for T408 Turboshaft Engine Depot Manual, and completed Maintenance Task Analyses documenting installation procedures for 45 engine parts

Publications

First Author

[1]Sherman, Myles B., et al. "Searching for magnetar binaries disrupted by core-collapse supernovae." Monthly Notices of the Royal Astronomical Society 531.2 (2024): 2379-2414.

[2]Sherman, Myles B., et al. "Deep Synoptic Array Science: Polarimetry of 25 New Fast Radio Bursts Provides Insights into Their Origins." The Astrophysical Journal 964.2 (2024): 131.

[3]Sherman, Myles B., et al. "Deep Synoptic Array Science: Implications of Faraday Rotation Measures of Fast Radio Bursts Localized to Host Galaxies." The Astrophysical Journal Letters 957.1 (2023): L8.

Selected Co-Author

Wharton, Robert S., et al. "High-frequency Fast Radio Burst Search of Nearby Star-forming Galaxies M77 and M82." The Astrophysical Journal 984.2 (2025): 119.

Connor, Liam, et al. "A gas-rich cosmic web revealed by the partitioning of the missing baryons." Nature Astronomy (2025): 1-14.

Sharma, Kritti, et al. "Preferential occurrence of fast radio bursts in massive star-forming galaxies." Nature 635.8037 (2024): 61-66.

Ravi, Vikram, et al. "Deep Synoptic Array science: a 50 Mpc fast radio burst constrains the mass of the Milky Way circumgalactic medium." The Astronomical Journal 169.6 (2025): 330.

[4]Greffe, Timothee, et al. "Characterization of low light performance of a CMOS Sensor for ultraviolet astronomical applications." X-Ray, Optical, and Infrared Detectors for Astronomy X. Vol. 12191. SPIE, 2022.

Conference Presentations & Poster

[3]Sherman, Myles, et al. "Future Radio Instrumentation and the DSA-2000." 2025 FRB Frontiers Conference. (Invited Talk)

[3]Sherman, Myles, et al. "Searching for Magnetar Binaries Disrupted by Core-Collapse Supernovae (CC-SNe)." 245th American Astronomical Society Meeting 2025. (Submitted Talk)

[3]Sherman, Myles, et al. "Searching for Magnetar Binaries Disrupted by Core-Collapse Supernovae (CC-SNe)." FRB 2024 Conference. (Submitted Talk)

[2,3]Sherman, Myles, et al. "Deep Synoptic Array Science: Polarimetry of 25 Localized Fast Radio Bursts and Implications on their Origins and Host Galaxies." 243rd American Astronomical Society Meeting 2024. (Submitted Talk)

[5]Sherman, Myles, et al. "The DSA-2000 Fast Time Domain Search for Pulsars and Fast Radio Bursts." 243rd American Astronomical Society Meeting 2024. (Submitted iPoster)

[2,3]Sherman, Myles, and DSA-110 Collaboration. "Polarization and Rotation Measure for 20 Fast Radio Bursts Detected with the DSA-110." 241st American Astronomical Society Meeting 2023. (Submitted Talk)

Leadership & Outreach

Organization and Peer Review: Contributed to science direction planning and abstract review as part of the **FRB 2025 Conference Science Organizing Committee (SOC)**. Refereed three publications for the Astrophysical Journal (ApJ) and one publication for the Monthly Notices of the Royal Astronomical Society (MNRAS).

Mentorship: Informally mentored two junior graduate students and one post-baccalaureate student through one-on-one meetings, science and software support, and writing contributions

STEM Activity Design: Designed and led interactive demo of the radio transient sky for the Explore Caltech 2024 all-ages outreach event; wrote and distributed easy-to-read introductory pamphlet on the origins of American radio astronomy, **"Pulsars, Magnetars, and Fast Radio Bursts! Radio Waves from Our Galaxy...and Beyond!"**; As **CMU ECE Outreach Lab Development Chair** (2019-2020), developed and led introductory Python programming, electronics, and Arduino lab activities for students at the Oakland Catholic High School and remotely on Zoom during the pandemic; As **CMU National Society Of Black Engineers (NSBE) Pre-College Initiatives Chair** (2018- 2019), led monthly engineering labs for middle school students in the NSBE Jr. program.

Tutoring: Led an EXCEL Collaborative Learning Group section for Physics II for Engineering and Physics Students (Electricity & Magnetism) course at CMU; Offered math, science, and grammar tutoring of middle and high school students through the Pasadena Police Activities League (PAL); Led group science activity teaching students about the origins of astronomy as they constructed simple pinhole cameras to learn the fundamentals of optics