

Dr. Lucas Hunt

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Employment: (For details on duties and accomplishments, see Research/Work Experience below)

05/2020-Current **Computational Physics Inc**
Contractor working at the United States Naval Observatory (USNO)

09/2017-05/2020 **George Mason University**
Contractor/Post-Doctoral Research associate at USNO

08/2010-08/2017 **West Virginia University**
Graduate Research Associate/Graduate Teaching assistant

Education:

08/2010-12/2017 **West Virginia University**
Ph. D. Physics
Thesis: The Evolution of Luminous Compact Blue Galaxies in the COSMOS field between $z \sim 0.0-1.0$
Advisor: Daniel J. Pisano

08/2005-05/2009 **University of Wisconsin Madison**
B.S. Astronomy with concentration in Math and Physics

Research/Work Experience:

05/2020-Current **Contract Radio Astronomer at the United States Naval Observatory**

- Developed fully automated pipeline using Common Astronomy Software Applications (CASA), the current state of the art radio astronomy software to generate images of sources in the International Celestial Reference Frame (ICRF)
- Lead and coordinate large observation campaign of sources in the ICRF using the VLBA
- Continue to use output from above pipeline to investigate source structure in quasars included in the ICRF
- Conduct research with colleagues investigating differences in position between the ICRF at Radio Frequencies and the Gaia Celestial Reference Frame at Optical Wavelengths.
- Part of team investigating position and source structure of ICRF sources at different radio frequencies using the VLBA.

- Management of United States Naval Observatory timeshare on the Very Long Baseline Array (VLBA)
 - Interface with the National Radio Astronomy Observatory to submit observation requests and make sure observations are done on time.
 - Member of the Time Allocation Committee at USNO to determine which projects can make use of USNO's time.
- Maintain Secret Level security clearance

09/2017-05/2020

Post-Doctoral Research Associate and Astronomer at the United States Naval Observatory

- Developed imaging pipeline to create images of active galactic nuclei (AGN) to determine data quality, source structure, and suitability for use as part of the ICRF
- Provided products to the Radio Reference Frame Imaging Database at the USNO, a catalog of images of AGN that are provided to the astronomical community, which allows them to determine source structure and suitability of the source as a radio astronomy calibrator
- Carried out follow-up observations of AGN that require a phase referencing technique to be properly imaged. These images will improve the Radio Reference Frame Imaging Database
- Obtained and maintained Secret Level security clearance

05/2012-09/2017

Research Assistant with Dr. Daniel J. Pisano

- Combined and organized large publicly available datasets to determine optical color, size, and morphology of Luminous Compact Blue Galaxies (LCBGs) in the COSMOS field
- Member of the long-range observation campaign, COSMOS HI Large Extragalactic Survey (CHILES), designed to provide HI information on galaxies in the COSMOS field out to redshift of $z=0.45$
- Provided catalogs organized from publicly available information to be used internally in research carried out by CHILES collaboration members
- Used data products from CHILES to trace the HI content and star formation rate of LCBGs in the COSMOS field
- Traced the evolution of luminosity and number density of LCBGs in the COSMOS field
- Primary Investigator for project searching for the most distant neutral hydrogen emission to date in gravitationally lensed galaxies
- Developed new reduction technique to remove Radio Frequency Interference (RFI) from observations targeting HI in gravitationally lensed galaxies

05/2007-08/2010

Undergraduate Research with Dr. Edward Churchwell

- Searched for cosmic rays and stray light in the Galactic Legacy Infrared Mid-Plane Survey Extraordinaire (GLIMPSE)
- Cataloged "Bubbles", bright circular regions of PAH emission surrounding recently formed stars in GLIMPSE

07/2008

Class Observation Project with Dr. Snezana Stanimirovic

- Searched for HI in galaxies near the Zone of Avoidance using the Arecibo Telescope

Software:	Python, IDL, SQL, LaTeX, CASA, DS9, IRAF, JAVA, C
Observed with:	Green Bank Telescope, Very Large Array, Very Long Baseline Array, Arecibo
Data Reduction/Analysis:	Single Dish Spectral Analysis <ul style="list-style-type: none"> Used GBTIDL to remove RFI from data taken with Green Bank Telescope and combined the data to search for Neutral Hydrogen emission from gravitationally lensed galaxies at high redshift Used IDL to remove RFI and combine data from the Arecibo Telescope searching for HI in galaxies behind the plane of the Milky Way Synthesis Imaging <ul style="list-style-type: none"> Used CASA to calibrate and flag large data sets from the CHILES to search for Neutral Hydrogen Emission in galaxies out to a redshift of 0.45 Used CASA to make an automated calibration and imaging pipeline to make over 11,000 images of over 3,600 sources in the International Celestial Reference Frame Used Astronomical Image Processing Software (AIPS) to calibrate and flag AGN observed with the Very Long Baseline Array Used Difmap to image AGN observed with the Very Long Baseline Array Photometry <ul style="list-style-type: none"> Used IRAF to calculate apparent magnitude of galaxies that have been gravitationally lensed by massive clusters.

Conferences/Talks/Workshops

Invited Talks

May 2021	Chalmers University of Technology "Imaging Sources in the third iteration of the ICRF"	Gothenburg, Sweden
October 2019	Virginia Polytechnic Institute and State University "The Evolution of Luminous Compact Blue Galaxies in COSMOS"	Blacksburg, VA
August 2019	MIAPP Workshop-Galaxy Evolution in a New Era of HI Surveys "Gravitational Lensing and HI"	Munich, Germany
March 2019	NASA Goddard Space Flight Center "Radio Imaging of ICRF 3 Sources: Efficiently Imaging Many Sources"	Greenbelt, MD
April 2018	George Mason University "The Evolution of Luminous Compact Blue Galaxies in COSMOS"	Fairfax, VA
February 2018	The Naval Research Lab "The Evolution of Luminous Compact Blue Galaxies in COSMOS"	Washington, D.C.
July 2017	The United States Naval Observatory "The Evolution of Luminous Compact Blue Galaxies in COSMOS"	Washington, D.C.

Contributed Talks

April 2021	24th Meeting of the European VLBI Group for Geodesy "Update on VLBA Imaging of ICRF3 Sources"	Virtual
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November 2020	VLBA Reference Frame/Celestial Navigation Workshop “An update to the Radio Reference Frame Database”	Washington, D.C.
November 2019	VLBA Reference Frame/Celestial Navigation Workshop “An update to the Radio Reference Frame Database”	Albuquerque, NM
March 2019	24th Meeting of the European VLBI Group for Geodesy and Astrometry “VLBA imaging of ICRF3 Sources”	Gran Canaria, Spain
November 2018	VLBA Reference Frame/Celestial Navigation Workshop “Imaging ICRF3 Sources”	Washington D.C.
June 2018	SKA Pathfinders in HI Science Coordination Committee Meeting “Searching for HI in Gravitationally Lensed Galaxies”	Pingtang, China
January 2018	American Astronomical Society, AAS Meeting #231 “The Evolution of Luminous Compact Blue Galaxies in the COSMOS Field”	Washington, D.C.
January 2017	American Astronomical Society, AAS Meeting #229 “The Search for HI Beyond $z=0.25$ with the VLA and the GBT”	Grapevine, TX
October 2016	Real-time RFI Mitigation: Starting with the GBT “Spectral Line Science in a Heavy RFI Environment”	Socorro, NM
November 2015	SKA in Seoul on HI Science “The Search for HI Beyond $z\sim 0.4$ ”	Yonsei University
March 2015	SKA Pathfinders HI Science Coordination Committee Meeting “The Search for HI Beyond $z\sim 0.4$ ”	Rutgers University
Workshops		
March 2019	3rd IVS VLBI School Workshop: Basics of how VLBI techniques are used to determine geodetic parameters and the international terrestrial reference frame	Gran Canaria, Spain
May 2014	NRAO Synthesis Imaging Workshop Workshop: Interferometry basics, data reduction with CASA, creating science ready images of astronomical sources	NRAO Socorro
July 2013	NAIC/NRAO Single Dish Summer School Workshop: Radio astronomy basics, observation with telescope, data reduction with IDL, presentation of project	Arecibo Telescope

Papers

Published: Peer Reviewed

First Author

“Imaging Sources in the Third Realization of the International Celestial Reference Frame”

Hunt, L.R, Johnson, M. C., Cigan, P.J, Gordon, D., Spitzak, J. AJ Accepted 06/2021

<https://arxiv.org/abs/2107.12349>

“The Search for HI Emission at $z\sim 0.4$ in Gravitationally Lensed Galaxies with the Green Bank Telescope”

Hunt, L. R., Pisano, D. J., & Edel, S. 2016, AJ, 152,30

“The Luminosity Function of Luminous Compact Blue Galaxies in the COSMOS Field”

Hunt, L. R., Pisano, D.J., Crawford, S. M., et al. 2021, ApJ, 909, 49. doi:10.3847/1538-4357/abda4c

Contributing Author

“Fundamental Reference AGN Monitoring Experiment (FRAMEX). I. Jumping Out of the Plane with the VLBA”

Fischer, T. C., Secrest, N. J., Johnson, M. C., et al. 2021, ApJ, 906, 88

“CHANG-ES. XX. High-resolution Radio Continuum Images of Edge-on Galaxies and Their AGNs: Data Release 3”

Irwin, J.; Wiegert, T.; et al. 2019, AJ, 158, 1, 22

“CHILES: H I morphology and galaxy environment at $z = 0.12$ and $z = 0.17$ ”

Hess, K.; Luber, N.; et al. 2019, MNRAS, 484, 2, 2234

“Highest Redshift Image of Neutral Hydrogen in Emission: A CHILES Detection of a Starbursting Galaxy at $z=0.376$ ”

Fernandez, X.; Gim, H. B.; van Gorkum, J.H.; et al. 2016, ApJL, 824, L1

Published: Not Peer Reviewed

First Author

“VLBA Imaging of ICRF3 Sources”

Hunt, L.; Johnson, M.; Fey, A.; Spitzak, J.; Gordon, D.; et al. 2019, Proceedings of the 24th European VLBI Group for Geodesy and Astrometry Working Meeting, 214H

In Prep/Submitted

“HI Properties of Luminous Compact Blue Galaxies in the COSMOS HI Large Extragalactic Survey”

Hunt, L., Pisano, D.J., CHILES Collaboration

Teaching and Outreach

Teaching

Fall 2015

Astronomy 106: Descriptive Astronomy

- Developed a 3-credit hour lecture course for 130 students that covered basic astronomical principals including celestial coordinates, physics of light and energy, orbital motion, basic cosmology, and evolution of planets, stars, and galaxies
- Developed lectures, homework assignments, and exams
- Organized planetarium shows and night observing

Fall 2012

Head TA for Physics 111: General Physics I

- Organized and lead lab meetings to discuss lab procedure and grading policy
- Developed consistent grading policy that was implemented by all TAs during the semester

2010-2012

TA for Physics 101, 111, 112: Introductory Physics I, General Physics I, General Physics II

- Covered Mechanics through Electromagnetics for students at various levels
- Graded labs, exams, and designed short lab quizzes at appropriate knowledge level

Outreach

Spring 2019

Bring your child to work day

- Showed children how scientists at the USNO do their job
- Lead science-based activities to help children of all ages explore the scientific method

Spring 2015

Cub Scout Outreach: Helping Cub Scouts Earn Astronomy Badge

- Described how to use a telescope and assisted with planetarium show

Spring 2015

Career Day: Mason-Dixon Elementary School

- Described duties of an Astronomer to pre-k through 5th Graders

Awards

Fall 2016

Mountains of Excellence Scholarship: Nominated by Advisor

Spring 2011

Outstanding Graduate Teaching Assistant Award: Nominated by Lab Manager

References:

Dr. D.J. Pisano

West Virginia University

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Dr. Jacqueline van Gorkom

Columbia University

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Dr. Steve Crawford

National Aeronautics and Space Administration

steven.m.crawford@nasa.gov