

JOEL B. COLEY

Work Address

Department of Physics & Astronomy
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SCIENTIFIC INTERESTS

Binary star evolution at key phases in their lifetime; Particle Acceleration in High Mass Gamma-ray Binaries and Transitional Millisecond Pulsars; Probing Accreting Environments in High Mass X-ray Binaries using a Multi-wavelength approaches; Scientific Education and Outreach

EDUCATION

- **University of Maryland Baltimore County**
 Ph.D., Physics Sept. 2015
 Admission to PhD Candidacy May 2012
 M.S., Applied Physics Dec. 2010
- **Wheeling Jesuit University** May 2007
 B.S., Physics (Minor, Mathematics)

GRANTS AND PROPOSALS AS PRINCIPAL INVESTIGATOR

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| XMM AO 20 Proposal (Principal Investigator) | 2020 |
| Probing the Superorbital Modulation in the Supergiant X-ray binary 4U 1909+07 through its Compton-thick Absorbing Medium | |
| Funds Awarded: TBD | |
| TESS Cycle 3 Proposal (Principal Investigator) | 2020 |
| co | |
| Funds Awarded: \$40,000 | |
| K2 Cycle 5 Proposal (Science Principal Investigator) | 2017 |
| K2 Observations of the Prototypical Transitional Millisecond Pulsar PSR J1023+0038 (Budget PI: Patricia Boyd) | |
| Funds Awarded: \$30,000 | |
| NuSTAR Cycle 3 Proposal (Science Principal Investigator) | 2017 |
| LMC P3: An Extreme Particle Accelerator (Institutional PI: Robin H. D. Corbet) | |
| XMM AO 16 Proposal (Science Principal Investigator) | 2016 |
| LMC P3: An Extreme Particle Accelerator (Budget PI: Robin H. D. Corbet) | |
| Funds Awarded: \$63,143 | |

K2 Cycle 4 Proposal (Science Principal Investigator) 2016
 Probing the Circumstellar Environment of the Supergiant Fast
 X-ray Transient IGR J17544-2619 using K2 (Institutional PI: Patricia
 Boyd)

OBSERVING TIME AS CO-INVESTIGATOR

NuSTAR Cycle 6 Proposal (Co-Investigator) 2020
 Unraveling the Enigmatic Super-orbital Modulation Observed in 4U
 1538-52
 (PI: Nazma Islam)

NuSTAR Cycle 6 Proposal (Co-Investigator) 2020
 Characterizing the Hard X-ray Spectrum of SFXT IGR J17391-3021
 with NuSTAR
 (PI: Pragati Pradhan)

NICER Cycle 2 Proposal (Co-Investigator) 2020
 Confirming the Nature of the White Dwarf Candidate RX J0648.0-4418
 with NICER
 (PI: Christian Malacaria)

NICER Cycle 2 Proposal (Co-Investigator) 2020
 A High-Cadence NICER Investigation of Warped Accretion Disk
 Precession in the X-ray Pulsar Her X-1
 (PI: McKinley Brumback)

NICER Cycle 2 Proposal (Co-Investigator) 2020
 Constraining the Evolution of the Geometry of the Unstable Warped
 Accretion Disc in SMC X-1
 (PI: McKinley Brumback)

NuSTAR Cycle 5 Proposal (Co-Investigator) 2019
 Probing the Origin of Slow Pulsations in 4U 0115+65
 (PI: Pragati Pradhan)

NuSTAR Cycle 5 Proposal (Co-Investigator) 2019
 Physical Processes in the New Gamma-ray Binary 3FGL J1405.4-6119
 (PI: Robin Corbet)

NuSTAR Cycle 4 Proposal (Co-Investigator) 2018
 The Giant Elliptical Galaxy Hiding in Our Backyard: The Resolved X-
 ray Binary Population in Maffei 1 (PI: Neven Vulic)

NuSTAR Cycle 4 Proposal (Co-Investigator) 2018
 Properties and Cause of Superorbital Periods in Supergiant X-ray Binaries
 (PI: Robin Corbet)

Fermi Cycle 9 Proposal (Co-Investigator) 2016
 New Gamma-ray Binaries (PI: Robin Corbet)

NASA 14-ADAP14-0167 (Co-Investigator) 2015
 Properties of X-ray Binaries From Long-Term X-ray Monitoring (PI:
 Robin Corbet)

NuSTAR Cycle 1 Proposal (Co-Investigator) 2015
 Properties and Cause of Superorbital Periods in Supergiant X-ray Binaries

(PI: Robin Corbet)

RESEARCH EXPERIENCE

NASA POSTDOCTORAL FELLOWSHIP

November
2015-Present

- Development of model to constrain free-free opacity in gamma-ray binaries
- Development of zero-crossing model for periodicity searches in X-ray binaries
- Development of Dynamic Power Spectra and Dynamic Folded Light Curves to monitor changes in periodic modulation in X-ray binaries
- Reduction and Analysis of Data using FTOOLS
- Model fitting using XSPEC and ROBOT
- Programming in Python, Perl and other languages

UMBC CRESST Program Research Assistant

2011-2015

- Development of model to constrain mass and radius of the donor stars in eclipsing XRBs
- Detailed timing and spectral analysis of High Mass X-ray and Gamma-ray Binaries using Suzaku, Rossi X-ray Telescope Explorer ASM and PCA, Swift BAT and XRT, Fermi LAT and MAXI
- Reduction and Analysis of Data using FTOOLS
- Model fitting using XSPEC and ROBOT
- Programming in IDL and Perl

Wheeling Jesuit University Research Assistant

2005-2007

- Programming in Python
- CCD data reduction using the Image Reduction and 2004-2007 Analysis Facility (IRAF) software

TEACHING EXPERIENCE

PHYS 210 (Classical Mechanics I)

Howard University
Department of Physics & Astronomy

August 2020-
Present

PHYS 010 (General Astronomy)

Howard University
Department of Physics & Astronomy

August 2018-
Present

PHYS 140 (Introduction to Astrophysics I)

Howard University
Department of Physics & Astronomy

August 2018-
December 2019

UMBC Teaching Assistant for Algebra-Based Introductory Physics

January-May
2010

UMBC Teaching Assistant for Calculus-Based Introductory Physics

2008-2009

Mathematics Tutor

2001-2002

- Tutored a middle school student who had special needs
- Discovered interest in mentoring, which prompted development of tutoring/coaching skills

STUDENTS MENTORED

- **Trinity Sager, Howard University (junior)** January 2021-present
Working on NICER data on the High-mass X-ray binary SMC X-1
- **Jonathan Barnes, Howard University (graduate student)** September 2019-present
Working on NuSTAR and XMM-Newton data on the Gamma-ray binary 4FGL J1405.1-6119
- **Zachary Combs, Maryland Institute College of the Arts (senior)** Jan. 2020-May 2020
Worked on an Animation for X-ray binary star systems
“X-ray Binary Stars”
- **Stephen Perozziello, Maryland Institute College of the Arts (junior)** Jan. 2020-May 2020
Worked on an Animation for X-ray binary star systems
“X-ray Binary Stars”
- **Bipul Poudyal, Howard University (junior)** September 2019-December 2019
K2 and Swift data analysis on IGR J17544-2619
- **Paras Pokharel, Howard University (junior)** June 2019-present
CRESST II Summer Internship Program (co-mentor)
- **Steve Anusie, Howard University (junior)** January 2019-June 2019
CRESST II Internship Program (co-mentor)
- **Jason Hinkle, University of Maryland College Park (junior)** June 2018-August 2018
NASA Summer 2018 Intern Program (co-mentor)
Archival and new XMM-Newton Observations of LMC P3 (PI of new observations: Coley)
“LMC P3: An Extreme Particle Accelerator” (Coley et al. 2019, in prep)
- **William Baker, Towson University (senior, currently a fifth year student at Towson University)** June 2017-August 2017
NASA Summer 2017 Intern Program
Archival and new XMM-Newton Observations of LMC P3 (PI of new observations: Coley)
“LMC P3: An Extreme Particle Accelerator” (Coley et al. 2019, in prep)
- **Gregory Huxtable, University of Maryland Baltimore County (sophomore, currently a senior at University of Maryland Baltimore County)** June 2016-February 2017
NASA Summer 2016 Intern Program (co-mentor)
NuSTAR observations of IGR J16493-4348 (PI: Corbet)
“A Study of the 20 Day Superorbital Modulation in the High-Mass X-ray Binary IGR J16493-4348” (Coley et al. 2019; ApJ 879:34)

PROFESSIONAL ACTIVITIES

- **Member: NuSTAR User’s Committee** 2020-Present

Member: <i>Fermi</i> LAT Collaboration	2020-Present
Member: American Astronomical Society	2015-Present
Member: American Astronomical Society	2015-Present
Peer-reviewer for <i>Swift</i> Guest Observer Program Cycle 16	2019
Peer-reviewer for <i>NuSTAR</i> Guest Observer Program Cycle 5	2019
Peer-reviewer for <i>NICER</i> Guest Observer Program Cycle 1	2019
Peer-reviewer for <i>Fermi</i> Guest Observer Program Cycle 11	2018
Peer-reviewer for <i>Swift</i> Guest Observer Program Cycle 13 and 14	2016-2017
Referee for The Astrophysical Journal and MNRAS	

PUBLIC OUTREACH

“Sharing Your Faith in Science: A Look into our Universe” Howard Community College	March 2017
“A Look Into High Mass X-ray and Gamma-ray Binaries” University of Maryland College Park Observatory Open House	January 2017
“Sharing Your Faith in Science: A Look into our Universe” Bridgeway Community Church	May 2016

WORK EXPERIENCE

Maryland Science Center	2002-2008
<ul style="list-style-type: none"> • Served as an on-site facilitator in the state-of-the-art update centers • Researched projects that resulted in creative methods to communicate science to the public • Presented the latest information in the form of explainers such as the vacuum of space and the effects of UV radiation on earth • Presented at the Science on a Sphere (SOS) • Knowledgeable on the latest and greatest in Earth and Space Science 	

INTERNSHIPS

Intern/Mentor Program Maryland Science Center I was paired with Flavio Mendez, director of SpaceLink, who served as mentor in my junior and senior years of high school. Mr. Mendez served in a key role in the production of the Hubble Space Telescope (HST). Due to my enthusiasm and work ethic, Mr. Mendez hired me as an assistant in SpaceLink at the Maryland Science Center.	2001-2003
Intern/Mentor Program Johns Hopkins Applied Physics Laboratory Ms. Connie Finney served as mentor in my sophomore year of high school. While there I observed the roles that physicists play in various projects.	2001-2002

HONORS/AWARDS

Master Graduate Teaching Assistant	2009
University of Maryland Baltimore County (UMBC)	
<ul style="list-style-type: none"> • Master Graduate Teaching Assistant of the Pilot Graduate Teaching Assistant Course at UMBC 	
Leadership Series	2005
Wheeling Jesuit University, Wheeling West Virginia	
<ul style="list-style-type: none"> • Mentored 16-19 freshmen during the 2005-2006 and 2006-2007 academic years 	
Presidential Scholarship	2003
Wheeling Jesuit University, Wheeling West Virginia	
State of Maryland Distinguished Scholar	2003
Honorable Mention Certificate of Completion	

REFERENCES

- Patricia T. Boyd
Patricia.t.boyd@nasa.gov
Chief, Exoplanets and Stellar Astrophysics Laboratory
NASA Goddard Space Flight Center
- Robin H.D. Corbet
Robin.Corbet@nasa.gov
Senior Research Scientist
NASA Goddard Space Flight Center
University of Maryland, Baltimore County CRESST
- Katja Pottschmidt
katja@milkyway.gsfc.nasa.gov
NASA Goddard Space Flight Center
University of Maryland, Baltimore County CRESST
- Mark Henriksen
henrikse@umbc.edu
Associate Professor
University of Maryland, Baltimore County
- Hans A. Krimm
hkrimm@nsf.gov
Program Director
National Science Foundation
- Guillaume Dubus
Guillaume.dubus@univ-grenoble-alpes.fr
Institut de Planetologie et d'Astrophysique de Grenoble

Additional references available upon request