Name: Joel B. Coley

Code: 661

Home institution: Howard University

What do you do for CRESST:
My role in CRESST II is that of an Assistant Professor at Howard University. I work with a 50% cooperative agreement between CRESST II and Howard University with the aim of connecting both undergraduate and graduate students in the Howard University Department of Physics & Astronomy with NASA GSFC. The aim of my research focuses on evolution at key phases in the lifetime of binary star systems, specifically when X-ray and/or gamma-ray emission is observed.

What is your background:
I first became fascinated with the Universe as a whole at Middle School in Ellicott City, Maryland after being exposed to a brief unit on the Universe in sixth grade science class. Shortly thereafter, I witnessed two shuttle launches including when the late Senator John Glenn traveled to Earth orbit for the second time at the age of 76. In high school, I was an intern at both the Johns Hopkins Applied Physics Laboratory and the Maryland Science Center, the later became a place of employment during the summers until I began graduate school at the University of Maryland Baltimore County (UMBC) in 2008. I earned my Bachelors of Science in Physics with a Minor in Math from Wheeling Jesuit University in Wheeling, WV in 2007, my Masters of Science in Applied Physics from UMBC in 2010 and my Doctorate from UMBC in 2015, in which the research for my dissertation "Probing the Structure and Morphology of X-ray and Gamma-ray Binaries Using a Multi-Wavelength, Multi-Mission Approach" was conducted at NASA Goddard through CRESST. I remained at NASA Goddard as a NASA Postdoctoral Fellow from Nov. 2015-August 2018, where I now serve in my role as an Assistant Professor at Howard University.

Favorite part of being a CRESST Scientist:
My favorite part of being a CRESST Scientist with a 50% cooperative agreement with Howard University is every day I further hone both of my passions, which is to deepen my appreciation and understanding of the Universe, particularly the physics of accretion on to compact objects such as highly magnetized neutron stars, as well as mentor and inspire the next generation of scientists to reach their goals as well. The interactions with other CRESST scientists, even during this virtual environment we are currently living in, is incredibly rewarding.

Highlight of research as a CRESST Scientist:
The aim of my research is to study accretion processes under different conditions, particle acceleration and stellar variability. This includes the evolutionary history of interacting binary

star systems such as High-Mass X-ray binaries, High-Mass Gamma-ray binaries and Transitional Millisecond Pulsars using different observatories such as *NuSTAR*, *Swift*, *Neutron star Interior Composition Explorer (NICER)*, *Transiting Exoplanet Survey Satellite (TESS)* and *Fermi.* The aims of Dr. Coley's research is to study accretion processes under different conditions, particle acceleration and stellar variability.

Selected List of Publications:

1. **"Superorbital Modulation in the High-Mass X-ray Binary 4U 1538-52, and Possible Modulation in IGR J16393-4643"**
   Corbet, Robin H.D.; **Coley, Joel B**.; Krimm, Hans A.; Pottschmidt, Katja; Roche, Paul ApJ; arXiv:2010.12556
2. **"Discovery of the Galactic High-Mass Gamma-ray Binary 4FGL J1405.1-6119"**
   Corbet, Robin H.D.; Chomiuk, L; Coe, M. J.; **Coley, Joel B**.; Dubus, G.; Edwards, P.; Martin, P.; McBride, V.; Stevens, J; Strader, J., Townsend, L. J.; ApJ 884, 93
3. **"A Study of the 20 Day Superorbital Modulation in the High-Mass X-ray Binary IGR J16493-4348"**
   Coley, Joel B.; Corbet, Robin H.D.; Huxtable, Greg; Fürst, Felix; Krimm, Hans A.; Pearlman, A. B.; Pottschmidt, Katja; ApJ 879:34
4. **"The Orbital Parameters of the Eclipsing High-Mass X-ray Binary Pulsar IGR J16493-4348 From Pulsar Timing"**
   Pearlman, A.; **Coley, Joel B**.; Corbet, Robin H.D.; Pottschmidt, K.; ApJ 873:86
5. **"Diverse Long-Term Variability of Five Candidate High-Mass X-ray Binaries from Swift Burst Alert Telescope Observations"**
   Corbet, Robin H.D.; **Coley, Joel B**.; Krimm, Hans A.; ApJ 846:161
6. **"A Luminous Gamma-ray Binary in the Large Magellanic Cloud"**
   Corbet, Robin H.D.; Chomiuk, L; Coe, M. J.; **Coley, Joel B**.; Dubus, G.; Edwards, P.; Martin, P.; McBride, V.; Stevens, J; Strader, J.; ApJ 829:105
7. **"Probing the Masses and Radii of Donor Stars in Eclipsing X-ray Binaries with the Swift Burst Alert Telescope"**
   Coley, Joel B; Corbet, Robin H.D.; Krimm, Hans A.; ApJ 808:140
8. **"Probing the Mysteries of the X-ray Binary 4U 1210-64 with ASM, PCA, MAXI, BAT and Suzaku"**
   Coley, Joel B.; Corbet, Robin H.D.; Mukai, Koji; Pottschmidt, Katja; ApJ 793:77

Selected Invited Talks:

- **"A Study of Superorbital Modulation in Wind-fed Supergiant X-ray binaries"**

The Catholic University of America

- **"Transient and Variable Gamma-ray Surprises in the Galaxy"**

AAS 2019 Conference, Seattle WA, January 2019

Selected Contributed Talks:

- **"A Study of Superorbital Modulation in Wind-fed Supergiant X-ray binaries"** February 2020
  The Catholic University of America

- **"Transient and Variable Gamma-ray Surprises in the Galaxy"** January 2019
  AAS 2019 Conference, Seattle WA, January 2019
- **"A Multi-Wavelength Study of the Gamma-ray binaries LMC P3 and 1FGL J1018.6-5856"** October 2017
  Dr. Remeis-Sternwarte and Erlangen Center for Astroparticle Physics

Public Talks:

- **"Sharing Your Faith in Science: A Look into our Universe"**

Howard Community College

- **"A Look Into High Mass X-ray and Gamma-ray Binaries"**

University of Maryland College Park Observatory Open House

List of awards won:

Grants

TESS Cycle 3 Proposal (Principal Investigator) **2020**
Probing the Radiative Losses in the High-mass Gamma-ray Binary PSR B1259-63 with TESS, Swift and Fermi

K2 Cycle 5 Proposal (Science Principal Investigator)
K2 Observations of the Prototypical Transitional Millisecond Pulsar PSR J1023+0038

NuSTAR Cycle 3 Proposal (Science Principal Investigator) **2017**
LMC P3: An Extreme Particle Accelerator

XMM AO 16 Proposal (Science Principal Investigator) **2016**
LMC P3: An Extreme Particle Accelerator

To Contact Joel to learn more about his work or collaboration, he can be reached at:
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