

Curriculum Vitae: McKinley C. Brumback, Ph.D.

CONTACT INFORMATION Department of Physics mbrumback@middlebury.edu
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Middlebury, VT, USA 05753 Citizenship: USA

RESEARCH INTERESTS neutron star X-ray binaries, ultraluminous X-ray pulsars, accretion physics

PROFESSIONAL APPOINTMENTS **Assistant Professor of Physics - Middlebury College** July 2023-present
Postdoctoral Research Fellow - University of Michigan Sept. 2022 - June 2023
University of Michigan Department of Astronomy Advisor: Prof. Jon Miller
Postdoctoral Research Associate - Caltech 2020-2022
Space Radiation Laboratory Advisor: Prof. Fiona Harrison

EDUCATION **Ph.D. - Dartmouth College**, Hanover, NH June 2020
Ph.D., Physics & Astronomy Advisor: Prof. Ryan Hickox
Thesis: "A Broad-Band X-ray Study of Magnetic Accretion in Neutron Star X-ray Binaries." *Examine geometry and kinematics of inner accretion disk structure in accreting X-ray binaries using timing and spectroscopic analysis of NuSTAR and XMM-Newton data.*

B.S. - Hamilton College, Clinton, NY May 2014
B.S., *summa cum laude.* Advisor: Prof. Gordon Jones Major: Physics. Minors: Education Studies, Mathematics
Thesis: "Designing an EPR Experiment: A Study in Physics Pedagogy." *Designed, built, and tested an electron paramagnetic resonance apparatus to measure the Zeeman splitting of energy levels in Rubidium atoms*

TEACHING EXPERIENCE **Courses Taught**
Phys 155 - Intro to the Universe. *Middlebury College* Fall 2023
Astro 399 - Research Seminar. *University of Michigan* Spring 2023

Mentorship

SURF Mentor, Caltech Summer 2021, 2022
Mentor to undergraduate student for 10 weeks through Caltech's Summer Undergraduate Research Fellowship program. Guided students through all stages of a project doing X-ray timing of neutron stars including data reduction, analysis, and written and oral presentations.

Teaching Assistant, Dartmouth College

Astronomy 74: Astrophysics Fall 2019
Astronomy 2/3: Exploring the Universe Summer 2018, 2016; Fall 2016
Physics 1/2: Understanding the Universe Spring 2016
Physics 3: General Physics I Fall 2015
Astronomy 1: Exploration of the Solar System Spring 2015; Summer 2015, 2017
Physics 4: General Physics II Winter 2015
TA duties include conducting laboratory experiments, lecturing on lab concepts, grading assignments, tutoring students individually

Writing Center Tutor

September 2011 - May 2014
Nesbitt-Johnston Writing Center, Hamilton College
Tutored students individually on writing skills
6 hours per week

Classroom Teaching September 2013 - May 2014
 Clinton Middle School, Clinton, NY 13323
For completion of Education Studies Minor. Over 100 hours of experience in seventh grade science classroom. Wrote and lectured physics lessons and labs, conducted science demonstrations in class, assisted with grading and group activities

PROFESSIONAL ACTIVITIES

AAS Committee for Sexual-orientation and Gender Minorities in Astronomy
 Committee Member 2021–Present
 co-Chair 2022–Present
SGMA advises the American Astronomical Society Board of Trustees on ways to promote equality for LGBTQIA+ astronomers in the workplace. Recent and ongoing activity includes LGBTQIA+ guides for conferences, advocacy for trans astronomers, response to JWST naming decision

AAS Task Force Member
 Vice Chair, Future of AAS Meetings Task Force 2023–Present
 Member, Volunteer Compensation Task Force 2022–2023

Scholarly Journal Peer Reviewer: MNRAS, A&A, JOAA 2021–Present

NASA Guest Observer Program Reviewer: *NuSTAR*, *NICER*

NICER Users Group Member 2022–Present

HEX-P Science Team Member 2022–Present
Accreting neutron stars sub-group; Media Communications team

OBSERVING PROGRAMS AND EXPERIENCE

NICER Guest Observer Program
 Cycle 3 - Co-I on 120 ks observation of SMC X-1; Priority A
 Cycle 2 - PI on 30 ks observation of Her X-1; Priority A
 Cycle 2 - PI on 100 ks observation of SMC X-1; Priority A

NuSTAR Guest Observer Program
 Cycle 7 - PI on 120 ks observation of SMC X-1 joint with XMM-Newton; Priority B
 Cycle 4 - PI on 120 ks observation of Her X-1 joint with XMM-Newton; Priority A

MDM Observatory
 Hiltner 2.4-m Telescope (2016, 3 nights; 2017, 7 nights)
 Optical spectroscopy and imaging with OSMOS

PUBLICATIONS

ORCID ID: 0000-0002-4024-6967

First Author Refereed Publications

12. **Brumback, M.C.**, Vasilopoulos, G., Coley, J.B., Dage, K., Miller, J.M. 2023. ApJ, 953, 89. “Constraining the Evolution of the Unstable Accretion Disk in SMC X-1 with NICER”
11. **Brumback, M.C.**, Grefenstette, B.W, Buisson, D.J.K., Bachetti, M., Connors, R., Jaodand, A., Krivonos, R., Ludlam, R., Madsen, K.K., Mastroserio, G., Tomsick, J.A., Wik, D. 2022. ApJ, 926, 187. “Extending the baseline for SMC X-1’s spin and orbital behavior with NuSTAR stray light”
10. **Brumback, M.C.**, Hickox, R.C., Fürst, F.S., Pottschmidt, K., Tomsick, J.A., Wilms, J., Staubert, R., Vrtilik, S. 2021. ApJ, 909, 186. “A broad-band X-ray view of the precessing accretion disk and pre-eclipse dip in the pulsar Her X-1 with NuSTAR and XMM-Newton”
9. **Brumback, M.C.**, Hickox, R.C., Fürst, F.S., Pottschmidt, K., Tomsick, J.A., Wilms, J. 2020. ApJ, 888, 125. “Modeling the precession of the warped inner accretion disk in the pulsars LMC X-4 and SMC X-1 with NuSTAR and XMM-Newton”
8. **Brumback, M.C.**, Hickox, R.C., Bachetti, M., Ballhausen, R., Fürst, F.S., Pike, S., Pottschmidt, K., Tomsick, J.A., Wilms, J. 2018. ApJL, 861, L7. “Discovery of

pulsation dropout and turn-on during the high state of the accreting X-ray pulsar LMC X-4”

7. **Brumback, M.C.**, Hickox, R.C., Fürst, F.S., Pottschmidt, K., Hemphill, P., Tomsick, J.A., Wilms, J., Ballhausen, R. 2018. ApJ, 852, 132. “A Possible Phase-dependent Absorption Feature in the Transient X-Ray Pulsar SAX J2103.5+4545”

Selected Contributing Author Refereed Publications

6. Hu, C-P., Dage, K.C., Clarkson, W.I., **Brumback, M.C.**, et al. 2023. MNRAS, 520, 3. “Monitoring observations of SMC X-1’s excursions (MOOSE) - II. A new excursion accompanies spin-up acceleration”
5. Ludlam, R.M., Grefenstette, B.W., **Brumback, M.C.**, Tomsick, J.A., Buisson, D.J.K., Coughenour, B.M., Mastroserio, G., et al. 2022. ApJ, 934, 1, 59. “StrayCats. II. An Updated Catalog of NuSTAR Stray Light Observations”
4. Dage, K., **Brumback, M.C.**, Neilsen, J., Hu, C-P., et al 2022 MNRAS, 514, 2, 5457. “Monitoring Observations of SMC X-1’s Excursions (MOOSE) I: Program Description and Initial High-State Spectral Results”
3. Staubert, R., Ducci, L., Fürst, F.S., Wilms, J., Rothschild, R.E., Pottschmidt, K., **Brumback, M.C.**, Harrison, F. 2020 A&A, 642, A196. “The cyclotron line energy in Her X-1: stable after the decay”
2. Bachetti, M., Maccarone, T.J., Brightman, M., **Brumback, M.C.**, et al., 2020. ApJ, 891, 44. “All at once: transient pulsations, spin down and a glitch from the Pulsating Ultraluminous X-ray Source M82 X-2 ”
1. Pike, S.N., Harrison, F.A., Bachetti, M., **Brumback, M.C.**, Fürst, F.S., et al. 2018. ApJ, 875, 144. “Observing the transient pulsations of SMC X-1 with NuSTAR”

AWARDS

Fellowships

Department of Education GAANN Fellowship	2014–2015
Elihu Root Fellowship, Hamilton College	May 2014
Clare Boothe Luce Undergraduate Research Award	May 2013

Student Awards

Physics and Astronomy Graduate Research Award, Dartmouth College	June 2019
Graduate Student Poster Session Winner, Dartmouth College	April 2017, 2019
The Southworth Prize in Physics, Hamilton College	May 2014
Leonard E. and Sue J. Kingsley Prize Scholarship, Hamilton College	May 2013

LEADERSHIP AND SERVICE

Physics and Astronomy Women’s Group

Graduate student leader, Dartmouth College	2019–2020
<i>Organize regular meetings, provide reading material, and facilitate meaningful discussion.</i>	

Public Observing

Shattuck Observatory, Hanover, NH	2017–2020
<i>Operate 12 inch telescopes and present research for general public viewing.</i>	

Guest Astronomer: Montshire Astronomy Day

The Montshire Museum of Science, Norwich, VT	2015–2020
<i>Design and facilitate family-friendly astronomy activities</i>	

SCIENTIFIC PRESENTATIONS

Selected Talks

Particle-Astro-Nuclear Seminar at Wayne State University	Mar 2023
American Astronomical Society Meeting #241, Seattle, Washington	Jan 2023
Colloquium at University of Michigan	Oct 2022
Seminar at McGill University	Feb 2022
Colloquium at Howard University	Oct 2021
Seminar at Hamilton College	Nov 2020

Seminar at Michigan State University	June 2020
American Astronomical Society Meeting #235, Honolulu, Hawaii	Jan 2020
European Week of Astronomy and Space Sciences, Lyon, France	June 2019
ULX Pulsar Workshop, ESAC, Madrid, Spain	June 2018

Selected Posters

AAS HEAD Meeting; Pittsburgh, PA	March 2022
AAS HEAD Meeting; Monterey, CA	March 2019
AAS HEAD Meeting; Sun Valley, ID	Aug 2017
<i>NuSTAR</i> Science Meeting; Pasadena, CA	Nov 2016
AAS HEAD Meeting; Naples, FL	April 2016

SOFTWARE

Computer Programming

Python, IDL, L^AT_EX, HTML, MATLAB

Data Reduction and Mission Specific Software

HEASoft, Xspec, NuSTARDAS, XMMDAS, NICERDAS, HENDRICS, Stingray, CIAO, SPEX