

BRIAN A. CLARK

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RESEARCH PROFILE

Experimental astrophysics PhD and National Science Foundation Graduate Research Fellow, working with the Askaryan Radio Array (ARA). Interested in ultra-high energy neutrino astronomy, specifically the construction, simulation, and data analysis of radio-based Antarctic neutrino telescopes.

EDUCATION

Ph.D in Physics, The Ohio State University , Columbus, Ohio USA	2014-2019
Advisor: Prof. Amy Connolly	
M.S. in Physics, The Ohio State University , Columbus, Ohio USA	2014-2016
B.A. in Physics, Washington University in St. Louis , St. Louis, Missouri USA	2010-2014
<i>Cum Laude</i> , Advisor: Prof. Henric Krawczynski	

AWARDS

National Science Foundation Graduate Research Fellowship	2016-2019
APS Division of Astrophysics Travel Award	2017, 2019
Bunny and Thomas Clark Graduate Scholarship Honorable Mention	2019
OSU Graduate Enrichment Fellowship	2014-2015
WUSTL Undergraduate Physics Research Fellow	Summer 2011

EXPERIENCE

The Ohio State University , Columbus, OH USA	August 2014 - present
<i>Ph.D. Student</i> , Ultra-High Energy Neutrino Astrophysics	
<ul style="list-style-type: none">• Developed frequency and time-series analysis techniques to analyze radio emission from solar flares in the ARA prototype station; this is the first extraterrestrial emission observed by the array.• Implemented filtering techniques to remove human-made noise from ARA data, and utilized them in a search for a diffuse flux of ultra-high energy neutrinos.• Built and tested printed circuit boards for RF signal conditioning and power distribution, improving access to instrument dynamic range and operability in harsh environments.• Lead and directed the mechanical and electrical systems integration of three new neutrino detecting stations, including the management of a three person team of junior students.• Deployed to Antarctica for five weeks to lead the commissioning and calibration of five neutrino detecting stations; performed rapid on site assessment of instrument performance.	
Washington University in St. Louis , St. Louis, MO USA	October 2012 - May 2014
<i>Undergraduate Research Associate</i> , X-Ray Astrophysics	
<ul style="list-style-type: none">• Participated in X-Calibur collaboration to detect x-rays in the upper atmosphere, including fabrication of CCDs in a cleanroom environment.• Wrote Monte Carlo simulations to explore Stokes parameters in x-ray astronomy by using methods of Bayesian confidence intervals.	

PUBLICATIONS

5. “NuRadioMC: Simulating the radio emission of neutrinos from interaction to detector”
C. Glaser *et. al.* (incl. **B. A. Clark**)
Submitted to Eur. Phys. J. C (2019). [arXiv:1906.01670]
4. “Design and Performance of an Interferometric Trigger Array for Radio Detection of High-Energy Neutrinos”
P. Allison *et. al.* for the ARA Collaboration (incl. **B. A. Clark**)
Nuclear Instruments and Methods A Vol 930 Pg 112-125 (2019). [arXiv:1809.04573]
3. “Observation of Reconstructable Radio Emission Coincident with an X-Class Solar Flare in the Askaryan Radio Array Prototype Station.”
P. Allison *et. al.* for the ARA Collaboration (incl. **B. A. Clark** as corresponding author)
Submitted to Astroparticle Physics (2018). [arXiv:1807.03335]
2. “Measurement of the real dielectric permittivity ϵ_r of glacial ice.”
P. Allison *et. al.* for the ARA Collaboration (incl. **B. A. Clark**)
Astroparticle Physics Vol 108 Pg 63-73 (2019). [arXiv:1712.03301]
1. “Analyzing the Data from X-ray Polarimeters with Stokes Parameters.”
F. Kislak, **B. Clark**, M. Bielick, H. Krawczynski.
Astroparticle Physics Vol 68 Pg 45-51 (2015). [arXiv:1409.6214]

SCIENTIFIC TALKS

National & International Conferences

4. APS April Meeting, Denver CO. 2019/04/15
Searching for Neutrinos & Cosmic Rays and Studying Antarctic ice with Askaryan Radio Array.
3. APS April Meeting, Columbus OH. 2018/04/16
Directional Reconstruction as a Means of Lowering Thresholds for Point-Source Searches in the Askaryan Radio Array.
2. TeV Particle Astrophysics, Columbus OH. 2017/08/11
The Askaryan Radio Array: Current Status and Future Plans.
1. APS April Meeting, Washington DC. 2017/01/31
Observation of Reconstructable Radio Waveforms from Solar Flares with Askaryan Radio Array.

Colloquia, Seminars, and Other Talks

8. OSU CCAPP Seminar, Columbus OH. 2019/07/16
The Quest for Ultra-High Energy Neutrinos
7. Ohio Section of the APS Fall 2018 Meeting, Toledo OH. 2018/09/29
Latest Results in the Search for Ultra-High Energy Neutrinos in the Askaryan Radio Array
6. OSU Physics Summer Seminar Series, Columbus OH. 2018/06/26
Ultra-High Energy Neutrino Astrophysics with Radio-Based Detectors.
5. OSU CCAPP Seminar, Columbus OH. 2018/05/22
The Askaryan Radio Array: Detector Status and Prospects for Using Directional Reconstruction in Point-Source Searches.
4. Colloquium, College of Wooster Physics Department, Wooster OH. 2016/10/04
Ultra-High Energy Neutrino Astrophysics with Radio Detectors.

3. Computing in High Energy Astropart. Phys. Research 2016, Columbus OH. 2016/05/26
Machine Learning Prospects in Trigger Thresholds for High Energy Radio Neutrino Astronomy.
2. OSU Physics Summer Seminar Series, Columbus OH. 2016/04/23
Trigger Thresholds in High Energy Neutrino Astronomy.
1. Ohio Section of the APS Spring 2016 Meeting, Dayton OH. 2016/04/09
Ultra-High Energy Neutrino Astrophysics with the Askaryan Radio Array (ARA).

RELEVANT SKILLS

Programming/Software	C++, C, Python, BASH, Energia, Code Composer Studio, PADS
Mechanical/Electrical	Surface mount soldering, power distribution, RF signal conditioning

TEACHING

The Ohio State University, Columbus, OH

TA Training Facilitator, University Center for the Advancement Teaching **August 2016**

- Facilitated two-day “introduction to teaching and learning” workshop for 30 first-time Teaching Assistants across the University’s 40 STEM science programs.
- Built confidence in new TAs, guided development of teaching identities, addressed diversity in the classroom, and aided participant planning for long-term classroom success.

Teaching Assistant–“Astronomy 1143: Stars, Galaxies, and Cosmology” **Spring 2016**

- Aided student learning by teaching review sessions and lecturing when lead faculty was absent for 80 student introductory survey course, open to students across the university
- Moderated online forum, in collaboration with lead faculty, for students to exchange questions and clarify concepts.

Teaching Assistant–“Physics 1251: E&M, Optics, and Quantum Mechanics” **Fall 2015**

- Guided student learning in the recitation and laboratory context for four contact hours per week.
- Facilitated quantitative laboratory experiments including team-based problem solving exercises.
- Designed rubrics for fair, efficient, and consistent grading of quiz and examination instruments.

OUTREACH AND SERVICE

Coordinator for ASPIRE Workshop for High School Women, OSU	July 2015-present
Physics Climate and Diversity Committee, OSU	January 2017-May 2018
Volunteer Judge, Ohio State Science Day	2015-present
Talk, Columbus Science Pub	May 2018
Talk, The Wellington School, Columbus, OH	April 2018
Officer, Physics Graduate Student Council, OSU	October 2014-May 2017

MENTORSHIP

- Graduate Students:** Lauren Ennesser, Keith McBride, Andrés Medina, Julie Rolla, Jorge Torres-Espinosa
- Undergraduate Students:** Ian Best, Eliot Ferstl, Suren Gourapura, Hannah Hassan, Scott Janse, Spoorthi Nagasmudram, Victoria Niu, Alex Patton, Jude Rajasekera, Cade Sbrocco, Lucas Smith, Jason Torok
- High School Students:** Addison Hartman, Natalie Keyes

REFERENCES

Amy Connolly

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The Ohio State University
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Dave Besson

Professor of Physics and Astronomy
The University of Kansas
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James Beatty

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