

EVAN J. ARENA

Ph.D. Candidate ◊ Department of Physics ◊ Drexel University
Disque Hall, Office No. 808 ◊ 32 S. 32nd St. ◊ Philadelphia, PA 19104, USA
+1 · (516) · 383 · 4817 ◊ evan.james.arena@drexel.edu

RESEARCH INTERESTS

Theoretical astrophysics and cosmology, including general relativity, gravitational lensing, modified gravity, large-scale structure, 21 cm cosmology, dark energy, inflation, dark matter, radio astronomy, and gravitational waves.

EDUCATION

Drexel University

Ph.D. Student/Candidate of Physics	2018 – Present
M.S. in Physics	2020
GPA: 3.95	

Stony Brook University

B.S. in Physics and Astronomy/Planetary Sciences	2017
GPA: 3.55 (<i>Cum Laude</i>)	
Departmental Honors in Physics	

POSITIONS HELD

Drexel University

Doctoral Teaching Fellow and CoAS Dean's Fellow	2018 – Present
Department of Physics	

Stony Brook University and Brookhaven National Laboratory

Research Assistant	2015 – 2019
SBU Department of Physics & Astronomy and BNL Department of Physics	

Brookhaven National Laboratory

Intern	2012 – 2013
Department of Physics	

AWARDS AND HONORS

Graduate College Continuing Excellence in Teaching Assistance Award, Drexel University	2021
Graduate College Teaching Assistant Excellence Award, Drexel University	2020
Sigma Xi Scientific Research Honor Society Member, Drexel University	2019
College of Arts and Sciences (CoAS) Dean's Fellowship, Drexel University	2018
Sigma Pi Sigma National Physics Honor Society Member, Stony Brook University	2017
Presidential Scholarship, Stony Brook University	2013

RESEARCH HISTORY

2018 – Present	Weak Gravitational Lensing Developed a novel method for measuring the second-order weak gravitational lensing effect known as flexion. Discovery of new weak lensing signals and development of theoretical formalism for cosmic flexion.
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- 2015 – 2019 **Low redshift 21 cm intensity mapping**
Cosmological parameter and modified gravity forecasts for a general 21 cm cosmology experiment, member of the DOE Cosmic Visions Dark Energy 21 cm Working Group, and design and construction of the radio telescope used for the 21 cm Baryon Mapping eXperiment at Brookhaven National Laboratory.
- 2013 **Gravitational Waves**
New method for the indirect detection of gravitational waves.
- 2012 **Modified Newtonian Dynamics**
Investigated the plausibility of Modified Newtonian Dynamics on a local scale based on rotation curves of the Milky Way.

REFEREED PUBLICATIONS

2. **Arena, E. J.**, Goldberg, D. M., and Bacon, D. J., “*Cosmic Flexion*,” Submitted to Phys. Rev. D (2022)
1. Fabritius, J. M., **Arena, E. J.**, and Goldberg, D. M. “*Shape, Color, and Distance in Weak Gravitational Flexion*,” MNRAS 501, 4103 (2021) [[arXiv:2006.03506](#)]

CONFERENCE PROCEEDINGS, SCIENCE BOOKS, WHITE PAPERS

3. Ahmed, Z., Alonso, D., Amin, M. A., Ansari, R., **Arena, E. J.**, Bandura, K., Battaglia, N., Blazek, J., Bull, P., Castorina, E., Chang, T.-C., Connor, L., Davé, R., Dillon, J. S., Dvorkin, C., van Engelen, A., Ferraro, S., Flauger, R., Foreman, S., Frisch, J., Green, D., Holder, G., Jacobs, D., Johnson, M. C., Karagiannis, D., Kaurov, A. A., Knox, L., Liu, A., Loverde, M., Ma, Y.-Z., Masui, K. W., McClintock, T., Meerburg, P. D., Moodley, K., Münchmeyer, M., Newburgh, L. B., Ng, C., Nomerotski, A., O’Connor, P., Obuljen, A., Padmanabhan, H., Parkinson, D., Prochaska, J. X., Rajendran, S., Rapetti, D., Saliwanchik, B., Schaan, E., Sehgal, N., Shaw, J. R., Sheehy, C., Sheldon, E., Shirley, R., Silverstein, E., Slatyer, T., Slosar, A., Stankus, P., Stebbins, A., Timbie, P., Tucker, G. S., Tyndall, W., Villaescusa-Navarro, F., Wallisch, B., and White, M., “*Packed Ultra-wideband Mapping Array (PUMA): A Radio Telescope for Cosmology and Transients*,” ArXiv e-prints (2019) [[arXiv:1907.12559](#)]
2. Ahmed, Z., Alonso, D., Amin, M. A., Ansari, R., **Arena, E. J.**, Bandura, K., Beardsley, A., Bull, P., Castorina, E., Chang, T.-C., Davé, R., Dillon, J. S., van Engelen, A., Ewall-Wice, A., Ferraro, S., Foreman, S., Frisch, J., Green, D., Holder, G., Jacobs, D., Karagiannis, D., Kaurov, A. A., Knox, L., Kuhn, E., Liu, A., Ma, Y.-Z., Masui, K. W., McClintock, T., Moodley, K., Münchmeyer, M., Newburgh, L. B., Nomerotski, A., O’Connor, P., Obuljen, A., Padmanabhan, H., Parkinson, D., Perdureau, O., Rapetti, D., Saliwanchik, B., Sehgal, N., Shaw, J. R., Sheehy, C., Sheldon, E., Shirley, R., Silverstein, E., Slatyer, T., Slosar, A., Stankus, P., Stebbins, A., Timbie, P., Tucker, G. S., Tyndall, W., Villaescusa-Navarro, F., and Wulf, D., “*Research and Development for HI Intensity Mapping*,” ArXiv e-prints (2019) [[arXiv:1907.13090](#)]
1. Cosmic Visions 21 cm Collaboration, Ansari, R., **Arena, E. J.**, Bandura, K., Bull, P., Castorina, E., Chang, T.-C., Foreman, S., Frisch, J., Green, D., Karagiannis, D., Liu, A., Masui, K. W., Meerburg, P. D., Newburgh, L. B., Obuljen, A., O’Connor, P., Shaw, J. R., Sheehy, C., Slosar, A., Smith, K., Stankus, P., Stebbins, A., Timbie, P., Villaescusa-Navarro, F., and White, M., “*Inflation and Early Dark Energy with a Stage II Hydrogen Intensity Mapping experiment*,” ArXiv e-prints (2018) [[arXiv:1810.09572](#)]

CONFERENCES AND TALKS

Contributed Talks

“Hybrid analytic image modeling and image moments approach to gravitational lensing”

Public talk for my Physics Ph.D. Candidacy Exam, Drexel University	4 Jun. 2020
Research talk to incoming graduate students, Drexel University	17 Sep. 2019
“Observation of gravitational waves through precision stellar redshift measurement”	
High School Research Program conference, Brookhaven National Laboratory	16 Aug. 2013

Poster Presentations

“Hybrid analytic image modeling and image moments approach to gravitational lensing”	
First-year graduate student presentations, Drexel University	11 Jun. 2019
“Dark matter and its alternatives”	
High School Research Program conference, Brookhaven National Laboratory	27 Nov. 2012

SOFTWARE DEVELOPED

Authored

F-SHARP	Code for computing weak gravitational lensing correlations. <i>Publicly available code written in Python.</i> https://github.com/evanjarena/F-SHARP
Lenser	A tool for measuring weak gravitational flexion. <i>Publicly available code written in Python.</i> https://github.com/DrexelLenser/Lenser
21cmMG	A suite for probing modified gravity with 21 cm cosmology. <i>Publicly available code written in Python.</i> https://github.com/evanjarena/21cmMG
Fisher21cm	Fisher forecast for a general 21 cm experiment. <i>Publicly available code written in Python.</i> https://github.com/evanjarena/Fisher21cm

Contributed

LensTools	Useful computing tools for weak lensing analyses. <i>Publicly available code written in Python.</i> https://github.com/apetri/LensTools
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TEACHING

Drexel University

Teaching Assistant (Recitation and Lab Instructor)

PHYS 100, *Preparation for Engineering Studies*

PHYS 152, *Introductory Physics I*

PHYS 154, *Introductory Physics III*

Winter: 2021, 2020, 2019

Spring: 2022, 2021, 2020, 2019

Fall: 2021, 2020, 2019, 2018

Grader

PHYS 131, *Survey of the Universe*

PHYS 231, *Introductory Astrophysics*

Winter 2022

Winter 2022

Guest Lecturer

PHYS 231, *Introductory Astrophysics*

Winter 2022

Stony Brook University

Lecturer

Della Pietra High School Applied Math Program

Spring 2017

PROFESSIONAL ACTIVITIES AND SERVICE

Collaborations	External Collaborator, Dark Energy Survey (DES) Member, Packed Ultra-wideband Mapping Array (PUMA) [Inactive] Member, Baryon Mapping eXperiment (BMX) [Inactive]
Working Groups	Member, DOE Cosmic Visions Dark Energy 21 cm Working Group [Inactive]

Outreach Activities

Invited to appear on the Drexel University Teaching Assistant Orientation Panel, as part of the Teaching Assistant Orientation and Preparation Course GRAD T580 (17 Sep. 2020).

Gave a physics demonstration at the Kaczmarczik Lecture Series Open House, hosted by the Drexel University Department of Physics (14 Nov. 2018).

Committee Work

Treasurer of the Drexel University Physics Graduate Student Association (2020 – 2021).