James Marcus Hughes

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EDUCATION

PhD student in Computer Science, *Current*
University of Colorado, Boulder, CO

Bachelor of Arts in Computer Science and Astronomy, *June 2018*
Williams College, Williamstown, MA

RESEARCH EXPERIENCE

Machine Learning to Produce Thematic Solar Maps
Summer REU Student, University of Colorado Boulder and NOAA
Thesis Student, Williams College
Boulder, CO – May 2017-Present
Contact: Dr. Daniel Seaton, Dr. Jon Park

- One of 20 accepted from over 500 applicants
- Awarded funding through competitive application to present results at the Fall 2017 American Geophysical Union conference
- Paper submitted

Question and Answer System
Student, Williams College
Williamstown, MA — Spring 2017
Contact: Dr. Jon Park

- Developed question answering system based on pattern matching and instance detection
- Code performed best in approximately 20 person course
- Wrote a paper describing the system and results

Catalog of Dark Molecular Hydrogen in the I-GALFA Survey
Research Student, Western Kentucky University
Bowling Green, KY Summer 2017
Contact: Dr. Steve Gibson

- Beginning with a 3-dimensional image cube, isolated small cold clouds of hydrogen algorithmically using Python based on spectral qualities and a brute force search
- Modeled different components of the cold hydrogen interstellar medium to approximate dark/missing molecular component

Correlation of OH, C+, and Ionizing O and B Type Stars
Summer Intern, Space Telescope Science Institute/Johns Hopkins
Baltimore, MD June 2014-September 2014, January 2016
Contact: Dr. Ron Allen

- Wrote IDL code to interactively examine multiple wavelengths of targets
- Systematically explored literature for targets of interest
- Constructed model of physics for C+ features

Search for Circumbinary Planets in K2 Campaigns
Summer Intern, Swarthmore College
Swarthmore, PA June 2015-August 2015
Contact: Dr. Eric Jensen

- Designed Python procedure to identify eclipsing binaries, mask strong periodic signals, and discover fainter planets orbiting two-star systems
- Utilized parallel processing and distributed network computing to process 76000 lightcurves

TEACHING EXPERIENCE

Instructor for Undergraduate Discrete Mathematics
University of Colorado Boulder
Boulder, CO - Summer 2019

- Taught 32 lectures for 20 students
- Prepared an open-source curriculum
- Completed a voluntary video observation to improve teaching

Tutor and Curriculum Developer for CodeConnects
The Coding School
Boulder, CO - Summer 2019

- Taught 20 one-on-one sessions with a student over video chat
- Worked on standardizing Python Year Two Curriculum

Teaching Assistant for Computer Science, Mathematics, and Astronomy
Williams College
Williamstown, MA September 2015-Spring 2018
Contact: Dr. William Lenhart, Dr. Thomas Garrity, Dr. Steven Souza, Dr. Jon Park

- Graded Abstract Algebra Assignments
- Managed observatory sessions for introductory astronomy courses
- Tutored students during data structures lab
- Graded artificial intelligence assignments

Tutor for Brayton Elementary and Colegrove Elementary
North Adams Public Schools
North Adams, MA, September 2014-Present

- Volunteer 3.5 hours per week to help local students with reading comprehension
- Assisted in writing activities
- Mentored students learning basic computer skills

Gatton Academy Leaders in Education
Dishman-McGinnis Elementary
Bowling Green, KY, November 2012-May 2014

- Founded high school club to provide weekly enrichment activities for local elementary school students after school
- Built curriculum for activities
- Managed approximately 20 student tutors

MEMBERSHIPS

- American Geophysical Union Student Member
- American Astronomical Society Student Member
- Sigma Xi research community

AWARDS

- *Sigma Xi Society, 2018* awarded for undergraduate research contributions
- *Thesis with honors, 2018* awarded for outstanding computer science undergraduate thesis at Williams College
- *Jack Kent Cooke Foundation Scholar, 2014-2018* annual scholarship of up to $30,000 awarded based on achievement and financial need
- *Research Travel Grant, 2018* awarded by the Laboratory for Atmospheric and Space Physics to present summer research at American Geophysical Union Winter 2018 conference, one of 9 awards
- *Class of 1973 Scholarship, 2017*: awarded based on contribution to the college community

PUBLICATIONS

1. **Hughes JM,** Hsu VW, Seaton DB, Bain HM, Darnel JM, et al. 2019. Real-time solar image classification: Assessing spectral, pixel-based approaches. J. Space Weather Space Clim. 9, A38. [journal/arxiv]
2. Seaton, D. B., Darnell, J. M, Hsu, V., and **Hughes, J.M.** *GOES-R Series Solar X-Ray and Ultraviolet Irradiance*, chapter in The GOES-R Series, edited by Steven Goodman Timothy Schmit Jaime Daniels Robert Redmon, published by Elsevier, October 2019
3. Shoemaker, T., **Hughes, J.M.,** Marlow, F., Maddern, M., Potter, E., *Mason Jar Mentality;* Journal of Inter-Religious Studies, November, 2014

PROFESSIONAL SERVICE

1. *Reviewer* for the Eigth Annual Conference on Machine Learning (ICLR 2020)
2. *Member* of 2019 Faculty Search Committee for University of Colorado Boulder Computer Science Department
3. *Reviewer* for the Seventh Annual Conference on Machine Learning (ICLR 2019)
4. *Member* of 2017 Faculty Search Committee for Williams College Astronomy Department
5. *Reviser* of College Application Essays for *Students With Ambition Go* (SWAG)

INVITED TALKS

1. Boulder Solar Day, Boulder, CO, 23 March 2019, "Machine Learning and Solar Physics", slides
2. National Oceanic and Atmospheric Administration, Boulder, CO, 15 February 2018, "Solar Thematic Map Generation and Machine Learning"
3. Southwest Research Institute, Boulder, CO, 14 February 2018, "Solar Thematic Map Generation and Machine Learning"

CONFERENCE TALKS

1. Solar Heliospheric and Interplanetary Environment Conference, 2019, Boulder, CO, oral presentation, Python and Solar Physics
2. American Geophysical Union 2017 Fall Conference, New Orleans, LA, poster presentation, SUVI Thematic Maps: a new tool for space weather forecasting
3. Keck Northeast Astronomy Symposium, Hamilton, NY, oral presentation, SUVI Thematic Maps: a new tool for space weather forecasting
4. Williams College Physics Colloquium 10/6/2017, Williamstown, MA, oral presentation, SUVI Thematic Maps: a new tool for space weather forecasting
5. American Astronomical Society January 2017 Conference, Grapevine, TX, poster presentation, Properties of Cold HI Emission Clouds in the Inner-Galaxy ALFA Survey
6. Keck Northeast Astronomy 2016 Symposium, Middletown, CT, oral presentation, Characterizing Interstellar Dark Molecular Hydrogen With Narrow 21-cm Emission
7. Keck Northeast Astronomy 2015 Symposium, Williamstown, MA, oral presentation, Search for Circumbinary Planets in K2 Campaigns
8. Philly Astronomy 2015, Philadelphia, PA, poster presentation,Search for Circumbinary Planets in K2 Campaigns
9. Space Astronomy Summer Program Student Symposium 2014, Baltimore, MD, oral presentation, Correlation of OH, C+, and Ionizing O and B Type Stars
10. American Astronomical Society Winter 2014 Conference, Washington, D.C., poster presentation, Catalog of Dark Molecular Hydrogen in the I-GALFA Survey
11. Kentucky Academy of Science 2014 Meeting, Morehead, KY, oral presentation, Catalog of Dark Molecular Hydrogen in the I-GALFA Survey
12. American Astronomical Society Kentucky Area 2015 Meeting, Lexington, KY, oral presentation, Catalog of Dark Molecular Hydrogen in the I-GALFA Survey
13. Western Kentucky University 2013 Research Conference, Bowling Green, KY, poster presentation, Catalog of Dark Molecular Hydrogen in the I-GALFA Survey
14. Western Kentucky University 2014 Research Conference, Bowling Green, KY, oral presentation, Catalog of Dark Molecular Hydrogen in the I-GALFA Survey
15. Southeastern Section of the American Physical Society 2013 Conference, Bowling Green, KY, oral presentation, Catalog of Dark Molecular Hydrogen in the I-GALFA Survey
16. Naval Observatory Colloquium 2013, Flagstaff, AZ, oral presentation, Novel Calibration and Study of Spatial/Temporal Light Pollution Trends

PRESS COVERAGE

1. "Detecting Solar Features in Real Time", *National Centers for Environmental Information*, December 3, 2019, [link]
2. "Detecting Solar Flares, More in Real Time," *CIRES Website*, December 3, 2019, [link]
3. "Gatton Academy Students Present at National Astronomy Conference," *Gatton Academy Press*, January, 15, 2014, [link]

REFERENCES Available upon request.