

Hilary Egan

APS Department • University of Colorado Boulder •
513.444.7516 • hilary.egan@colorado.edu

Education

- **University of Colorado Boulder** **Boulder, CO**
Astrophysics and Planetary Science, Phd Program 2013 – Present
- **Michigan State University** **East Lansing, MI**
College of Natural Science, B.S. Physics 2009 – 2013
 - Minors in Computer Science and Mathematics

Research Interests

- Exoplanet habitability and atmospheric evolution
- Star-planet interactions
- Plasma environments of magnetized and unmagnetized planets
- Machine learning and high performance computing

Research Experience

- **University of Colorado Boulder** **May 2016 – present**
Research Assistant with David Brain
 - Used a hybrid plasma model to simulate ion escape from unmagnetized and weakly magnetized terrestrial exoplanets, under a variety of stellar wind conditions
 - Ran a model comparison project, bringing together a team of Mars plasma modellers to assess the similarities and differences between the simulation codes, while also comparing to in situ data from MAVEN
- **National Renewable Energy Laboratory** **January 2016 – May 2016**
Practicum with Caleb Phillips
 - Processed a large timeseries dataset of power consumption by the NREL super-computer Peregrine. Used machine learning techniques to mine the datasets for insights into typical power characteristics and patterns across a wide variety of user applications
 - Created an a priori power prediction model to use in conjunction with a simulated scheduler in order to determine if peak power consumption could be reduced by rescheduling jobs
- **University of Colorado Boulder** **August 2013 – January 2016**
Research Assistant with Jack Burns
 - Characterized the statistical properties of magnetic fields in cosmological simulations of galaxy clusters
- **Michigan State University** **May 2012 – August 2013**
Research Assistant with Brian O’Shea
 - Developed a tool for fitting synthetic UV absorption spectra, now part of simulation analysis code yt.
 - Used this tool in conjunction with a large scale simulation to analyze the physical conditions of the Warm-Hot Intergalactic Medium

Student Mentorship

- Jeremy Osowski (*CU Undergrad*) **January 2018 – present**
Supervised project on resolution dependent effects on MHD models used for global Martian plasma modeling
- Stephanie Panoncillo (*CU Undergrad*) **January 2017 – December 2017**
Supervised project “*The asymmetry of the Martian Current Sheet in a Multi-fluid MHD Model*” (AGU 2017)

Awards and Honors

John T. Gosling Endowed Fellowship (2018)
DOE CSGF Communicate Your Science Essay Contest (2017)
Department of Energy Computational Science Graduate Fellowship (2014-2018)
Thomas H. Osgood Undergraduate Physics Award for Outstanding Senior in Physics (2013)
Hantel Fellowship (2012, 2013)
College of Natural Science Dean's Research Scholarship (2012)
Bruce van der West Award for Outstanding Junior in Physics (2011, 2012)

Service

yt Executive Committee (2015-Present)
APS Star Planet Interactions Group Co-chair (2016-2017)
Promoting Inclusive Communities in Astronomy (PICA)- Co-chair (2013-2014)
APS Department Graduate Student Concerns Committee- Co-chair (2013-2014)

Computing Time Awarded

- National Energy Research Scientific Computing Center (PI, 400k CPU hours) **August 2018**
Planetary Magnetic Fields and Habitability
- University of Colorado Summit (PI, 300k CPU hours) **August 2017**
Stellar Influence on Ion Escape from Exoplanets
- University of Colorado Janus (Co-I, 800k CPU hours) **January 2014**
Cosmological Structure Formation: From Reionization to Galaxy Clusters

Publications

- [1] **Egan, H.**, Y. Ma, C. Dong, R. Modolo, R. Jarvinen, S. Bougher, J. Halekas, D. Brain, J. McFadden, J. Connerney, D. Mitchell, and B. Jakosky. Comparison of Global Martian Plasma Models in the Context of MAVEN Observations. *Journal of Geophysical Research (Space Physics)*, 123:3714–3726, May 2018. 10.1029/2017JA025068.
- [2] **Egan, H.**, Y. Ma, C. Dong, R. Jarvinen, R. Modolo, J. S. Halekas, D. A. Brain, S. W. Bougher, J. E. P. Connerney, J. P. McFadden, D. L. Mitchell, and B. M. Jakosky. Physics of Martian Ion Plume from Magnetosphere Simulations. *AGU Fall Meeting Abstracts*, December 2017.
- [3] S. G. Panoncillo, **Egan, H.**, C. Dong, J. E. P. Connerney, D. A. Brain, and B. M. Jakosky. Asymmetry of the Martian Current Sheet in a Multi-fluid MHD Model. *AGU Fall Meeting Abstracts*, December 2017.
- [4] D. A. Brain, **Egan, H.**, Y. J. Ma, R. Jarvinen, B. M. Jakosky, T. E. Moore, and K. Garcia-Sage. Do habitable worlds require magnetic fields? *AGU Fall Meeting Abstracts*, December 2017.
- [5] D. Brain, M. Chaffin, B. Jakosky, J. Luhmann, C. Dong, R. Yelle, and **Egan, H.** Would Mars be Habitable If It Orbiting an M Dwarf? Lessons from the MAVEN Mission. In *Habitable Worlds 2017: A System Science Workshop*, volume 2042 of *LPI Contributions*, page 4043, November 2017.
- [6] B. Bugbee, C. Phillips, **Egan, H.**, R. Elmore, K. Gruchalla, and A. Purkayastha. Prediction and characterization of application power use in a high-performance computing environment. *Statistical Analysis and Data Mining: The ASA Data Science Journal*, 10(3):155–165. 10.1002/sam.11339.
- [7] **Egan, H.**, Y. Ma, C. Dong, R. Modolo, S. W. Bougher, J. S. Halekas, D. A. Brain, J. P. McFadden, J. E. P. Connerney, F. G. Eparvier, D. L. Mitchell, and B. M. Jakosky. Comparison of Global Martian Plasma Models Using MAVEN Data. *AGU Fall Meeting Abstracts*, pages P13A–1898, December 2016.
- [8] **Egan, H.**, B. W. O'Shea, E. Hallman, J. Burns, H. Xu, D. Collins, H. Li, and M. L. Norman. Length Scales and Turbulent Properties of Magnetic Fields in Simulated Galaxy Clusters. *ArXiv e-prints*, January 2016. 1601.05083.
- [9] C. B. Hummels, **Egan, H.**, M. S. Peeples, D. W. Silvia, B. D. Smith, and M. Turk. Generating Synthetic Spectra for Observing the Simulated CGM and IGM. In *American Astronomical Society Meeting Abstracts #225*, volume 225 of *American Astronomical Society Meeting Abstracts*, page 314.06, January 2015.

- [10] **Egan, H.**, B. D. Smith, B. W. O'Shea, and J. M. Shull. Bringing Simulation and Observation Together to Better Understand the Intergalactic Medium. *ApJ*, 791:64, August 2014. 10.1088/0004-637X/791/1/64.