'Sonny' Chester E. Harman Jr.

CONTACT INFORMATION

Department of Geosciences
Pennsylvania State University
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RESEARCH INTERESTS

Planetary atmospheres; atmospheric evolution; exoplanetary systems, their detection, ongoing processes, and characterization; educational outreach; prebiotic atmospheric conditions; biosignatures and false positives; habitable zones

EDUCATION

Penn State University, University Park, PA

Ph.D., Geosciences/Astrobiology [Computational Science] expected 5/2017

- *Atmospheric Evolution: Studies in Redox Balance and Hydrogen Escape*
- Advisor: Professor James F. Kasting
- Area of Study: Planetary Atmospheres
- GPA: 3.84 / 4.0

M.S., Geosciences, May 2013

- Thesis Topic: *Atmospheric Production of Glycolaldehyde Under Hazy Prebiotic Conditions*
- Advisor: Professor James F. Kasting
- GPA: 3.90 / 4.0

Millersville University, Millersville, PA

B.S., Physics, May 2010

- *cum Laude*, with Honors in Physics, minor in Mathematics
- Astrophysics specialization
- Senior Thesis: *SNR in the Large Magellanic Cloud*
- J./S. GPA: 3.79 / 4.0

EXPERIENCE

Penn State University, University Park, PA

Research *Research Assistant* **Fall 2011, 2012, 2014, 2015; Spring 2013; 2014 on**

- Advisor-directed research projects and readings.

Graduate Researcher **Summers 2012-2015**

- Advisor-directed research project.

Teaching *Teaching Assistant*

- Teaching Assistant for EARTH 002: The Earth System **Fall 2013**
  - Substitute lecturer, grader.

- Lab Instructor for GEOSC 001: Physical Geology **Spring 2012**
  - Responsible for supervising three 2-hour lab sections. Managed field trip coordination and lab report grading.

Millersville University, Millersville, PA

Research *Senior Research Project* **2009 - 2010**

- Senior research supervised and sponsored by faculty advisor
- Keynote presentation for Outstanding Student Research

Teaching *Individual Tutor* **2009 - 2010**

- Provided individualized instruction to students struggling with core physics courses.
- Coordinated with other tutors to provide expert assistance across the entire spectrum of course material.

Departmental Roles

- 'Welcoming' Committee Co-Chair **2011 - 2012**
- Geosciences Departmental Colloquium Co-Chair (2 years) **2012 - 2014**

Grants and Awards

- Current work is supported by:
  - NASA Habitable Worlds ("Are O_2 and O_3 Reliable Biosignature Gases...")
  - Emerging Worlds ("Water Loss and Hydrogen Escape from Early Venus")
- Collaborator on:
  - NASA Exobiology ("Prebiotic Chemistry of the Young Earth and Mars...")
  - NIAC ("SCEPS in Space...")
- Krynine Scholarship **Spring 2015, 2016**
- Selected proposal, AbGradCon Proposal-Writing Workshop, Team 8: *Biosignatures in Glacial Settings* **August 2012**
- Fund for Excellence in Graduate Recruitment Award **Fall 2011**
- Outstanding Undergraduate Student Research, Speaker **Spring 2010**

Skills

Linux/Unix shell scripting, FORTRAN, python, LaTeX, Matlab

Certifications

Red Cross CPR (exp. 9/2017); SOLO CPR (exp. 1/2018)
SOLO Wilderness First Responder (exp 1/2019)

Outreach

- AbGradCon Organizer - AbGradCon 2016 (Boulder, CO) **July 2016**
- 2016 Undergraduate Exhibition Judge (Penn State) **April 2016**
- AbGradCon Organizer - AbGradCon 2015 (Madison, WI) **July 2015**
- Shake Rattle and Rocks - PSU Geosciences **Spring 2013, 2014, 2015**
- Science@Home Mentor - through SAGANet **Spring 2014, 2015**
- AbGradCon Organizer - AbGradCon 2014 (Troy, NY) **August 2014**
- Alien AstronoMysteries - PSU Astronomy **Fall 2012**

Conferences

- Workshop Without Walls (Tempe, AZ) **02/2016**
- Pathways to Habitable Worlds [satellite] invited speaker **07/2015**
- Pathways to Habitable Worlds (Zurich, Switzerland) speaker **07/2015**
- AbGradCon 2015 presenter and speaker **07/2015**
- AbSciCon 2015 (Chicago, IL) speaker, session chair **06/2015**
- AbGradCon 2014 (Troy, NY) speaker **07/2014**
- EBI 2014 (Tucson, AZ) poster **03/2014**
- AbGradCon 2013 (Montreal, Quebec) poster **06/2013**
- AbGradCon 2012 (Los Angeles, CA) poster **08/2012**

Schools

- NExSS Winter School **02/2016**
- SciFund Challenge Science Outreach Class **11/2015**
- EBI Astrobiology School **03/2014**
- 2014 International Summer School in Astrobiology **06/2014**

Refereed Journal Publications

[1] Schwieterman, E.W., Meadows, V.S., Domagal-Goldman, S.D., Deming, D., Arney, G.N., Luger, R., **Harman, C.E.**, Misra, A., Barnes, R.. Identifying Planetary Biosignature Impostors: Spectral Features of CO and O_4 Resulting from Abiotic O_2/O_3 Production. *ApJL*. 2016: 819(1) doi:10.3847/2041-8205/819/1/L13

[2] **Harman, C.E.**, Schwieterman, E.W., Schottelkotte, J.C. and Kasting, JF.. Abiotic O_2 Levels on Planets around F, G, K, and M Stars: Possible False Positives for Life? *ApJ*. 2015: 812(2) doi:10.1088/0004-637X/812/2/137

[3] Kasting, J.F., Kopparapu, R., Ramirez, R.M., and **Harman, C.E.**. Remote Life Detection Criteria, Habitable Zone Boundaries, and the Frequency of Earth-like Planets around M and Late-K Stars. *PNAS*. 2014. doi:10.1073/pnas.1309107110

[4] Kasting, J. F., and **Harman, C. E.**. Inner edge of the habitable zone. *Nature*. 2013: 504. doi:10.1038/504221a

[5] **Harman, C.E.**, Kasting, J.F., and Wolf, E.T.. Atmospheric Production of Glycolaldehyde Under Hazy Prebiotic Conditions. *Origins of Life and the Evolution of the Biosphere*. 2013: 13(1). doi:10.1007/s11084-013-9332-7