ERYN M CANGI

Planetary scientist

CONTACT

- eryn.cangi@colorado.edu
- 503-577-8936
- Boulder, CO
- erynmcangi.science
- @emcangi
- https://www.linkedin.com/in/eryn-cangi/
- 0000-0002-8548-4088
- ADS: https://tinyurl.com/EMCadspubs

? INTERESTS

- Planetary atmospheres and climates
- Astrobiology and habitability
- Comparative planetology
- Surface-atmosphere interactions

EDUCATION

University of Colorado Boulder
Astrophysical & Planetary Sciences
2023 Ph.D.
Dissertation: The Variability of Atmospheric D/H Fractionation on Mars
2019 M.S.

University of Oregon (UO)
2017 B.S. Physics
2010 B.S. Theatre Arts

SKILLS

Programming languages

Most used: Python, Julia

Moderate: MATLAB, IDL

Some: FORTRAN, C++

Other Software

- LaTeX, MS Office
- HTML/CSS, Perl, PHP
- Adobe Suite, Affinity Designer
- DS9, IRAF
- Linux, Windows, and Mac OSX

Languages

English
Spanish

RESEARCH EXPERIENCE

2023 - present — Laboratory for Atmospheric & Space Physics (LASP), Boulder, CO

Research scientist 1

Develop & maintain the MAVEN IUVS echelle channel pipeline. Analyze H and D Lyman α emission data to study and understand the D/H ratio and escape at Mars.

2017 - 2023 — LASP, Boulder, CO

Graduate research assistant **Advisor: Mike Chaffin**

Developed a fully-coupled 1D photochemical model of the martian atmosphere to study how seasonal atmospheric changes affect the D/H ratio, atmospheric escape, and long-term desiccation; analyzed IUVS spectroscopic data before and after regional dust storms.

Summer 2022 — NASA JPL Planetary Science Summer School

Team lead (1 of 6): Proposal manager

Co-led team of 17 grad students & postdocs to develop an Io mission. Contributed to science objectives to characterize alleged dunes, measure the nightside atmosphere.

2016-2017 — UO Dept. of Physics, Eugene, OR

Undergraduate research assistant **Advisor: Greg Bothun**

Developed a ground-based method of detecting cirrus clouds using astronomical flux filter ratios.

Summer 2016 — High Altitude Observatory, Boulder, CO

REU student researcher **Advisor: Astrid Maute**

Evaluated two methods of delineating the solar and lunar semidiurnal migrating tides in Earth general circulation models. (Note: REU run by LASP/NSO)

Summer 2015 — Center for Interdisciplinary Exploration and Research in Astrophysics, Northwestern University, Evanston, IL

REU student researcher **Advisor: Daniel Abrams**

Built an N-body simulator to model formation of astrophysical systems (e.g. dust rings) by non-linear synchronization dynamics.

2014-2015 — UO Dept. of Physics, Eugene, OR

Undergraduate research assistant **Advisor: Ben McMorran**

Performed sample measurement and interferometry experiments using a Mach-Zehnder interferometer.

PUBLICATIONS

The Vulcan Mission to Io: Lessons learned during the 2022 JPL Planetary Science Summer School

K. G. Hanley, Q. McKown, **E. M. Cangi**, C. Sands, N. North, P. M. Miklavčič, M. Bramble, J. M. Bretzfelder, B. D. Byron, J. Caggiano, J. T. Haber, S. J. Laham, D. Morrison-Fogel, K. A. Napier, R. F. Phillips, S. Ray, M. Sandford, P. Sinha, T. Hudson, J. E. C. Sully, and L. Lowes

2024 In prep for submission to the Planetary Science Journal

Martian Atmospheric Deuterium and Hydrogen: A New Paradigm for Escape to Space

J. T. Clarke, M. Mayyasi, D. Bhattacharyya, J.-Y. Chaufray, N.M. Schneider, B.M. Jakosky, R. Yelle, F. Montmessin, M. Chaffin, S. Curry, J. Deighan, S. Jain, J.-L. Bertaux, **E. Cangi**, M. Crismani, J.S. Evans, S. Gupta, F. Lefevre, G. Holsclaw, D.Y. Lo, W.E. McClintock, M.H. Stevens, A.I.F. Stewart, S. Stone, P. Mahaffy, M. Benna, and M. Elrod

2023 Submitted to Science

Seasonal enhancement in upper atmospheric D/H at Mars driven by both thermospheric temperature and mesospheric water

E. M. Cangi, M. S. Chaffin, R. V. Yelle, B. Gregory, and J. Deighan

2023 Submitted to Geophysical Research Letters

Venus Water Loss via HCO^+ Dissociative Recombination: Overlooked, Unmeasured, and Dominant

M.S. Chaffin and **E.M. Cangi**, B.S. Gregory, R.V. Yelle, J. Deighan, R.D. Elliott, H. Gröller

2023 Submitted to Nature

MAVEN/IUVS Observations of OH Prompt Emission: Daytime Water Vapor in the Thermosphere of Mars

M.H. Stevens., **E.M. Cangi**, J. Deighan, S.K. Jain, M.S. Chaffin, J.S. Evans, S. Gupta, J.T. Clarke, N.M. Schneider, S.M. Curry

2023 Submitted to Journal of Geophysical Research: Planets

Polar Science Results from Mars Reconnaissance Orbiter: Multiwavelength, multiyear insights

M. E. Landis, P.J. Acharya, N.R. Alsaeed, C. Andres, P. Becerra, W.M. Calvin, **E.M. Cangi**, S.F.A. Cartwright, M.S. Chaffin, S. Diniega, C.M. Dundas, C.J. Hansen, P.O. Hayne, K.E. Herkenhoff, D.M. Kass, A.R. Khuller, L. McKeown, P. S. Russell, I.B. Smith, S.S. Sutton, J.M. Widmer, J.L. Whitten

2023 Icarus Icarus

Nonthermal Hydrogen Loss at Mars: Contributions of Photochemical Mechanisms to Escape and Identification of Key Processes

B. Gregory, M. S. Chaffin, R. D. Elliott, J. Deighan, H. Gröller, and **E. M. Cangi**

2023 Journal of Geophysical Research: Planets ADS

Fully coupled photochemistry of the deuterated ionosphere of Mars and its effects on escape of H and D

E. M. Cangi, M. S. Chaffin, R. V. Yelle, B. Gregory, and J. Deighan

2023 Journal of Geophysical Research: Planets ADS

The Astrobiology Primer v3.0, Chapter 3: The Origin and Evolution of Planetary Systems

M. J. Schaible, Z. R. Todd, **E. M. Cangi**, C. E. Harman, K. H. G. Hughson, K. Stelmach

2023? Astrobiology (under review)

Enhanced water loss from the martian atmosphere during a regional-scale dust storm and implications for long-term water loss

J. A. Holmes, S. R. Lewis, M. R. Patel, M. S. Chaffin, **E. M. Cangi**, J. Deighan, N. M. Schneider, S. Aoki, A. A. Fedorova, D. M. Kass, & A. C. Vandaele

2021 Earth and Planetary Science Letters, Vol. 571 ADS

Higher Martian atmospheric temperatures at all altitudes increase the D/H fractionation factor and water loss

E. M. Cangi, M. S. Chaffin, and J. Deighan

2020 Journal of Geophysical Research: Planets, Vol. 125 ADS

FUNDING HISTORY

Co-Investigator

NASA SSW Understanding Venus Water Evolution via Photochemical Modeling of Nonthermal Hydrogen and Deuterium
Selected 2023 Escape to Space
PI Mike Chaffin; Co-I Kevin McGouldrick

Graduate student fellowships

2022 NASA FINESST Fellowship

2019 NSF Graduate Research Fellowship

MENTORSHIP

2023-present CU Boulder / LASP

Ebenezer Solomon - undergraduate - chemistry

Co-mentoring with Dave Brain. Photochemistry of early Earth.

2018-2023 CU Boulder / LASP

Ace Stratton - undergraduate - aerospace engineering

Informal mentorship concerning conference attendance, graduate school applications, and research feedback (no direct research guidance).

HONORS AND AWARDS

2022 LASP Barth Graduate Fellowship

2016 & '17 UO Physics Weiser Leadership Award

2016 UO Physics Weiser Undergraduate Research Prize

2016 AAS Chambliss Astronomy Achievement Award

2015 UO Nontraditional Student Award

2014 UO Henry V. Howe Scholarship for Natural Science Majors

2014 UO / SEIU Local 503 Jessie Bostelle Memorial Scholarship

2014 UO General Scholarship

SELECTED CONFERENCE PRESENTATIONS

2022 **American Geophysical Union Fall Meeting** (Chicago, IL)
Poster P42F-2469: Quantifying Thermal and Non-Thermal H & D Escape at Mars Using a Fully-Coupled Ion-Neutral Photochemical Model

2022 **Mars Atmospheric Modeling and Observations** (Paris, FR)
Talk: Fully-Coupled Photochemical Modeling of the Deuterated Ionosphere and Non-Thermal Escape of D

2022 **Astrobiology Science Conference (AbSciCon)** (Atlanta, GA)
Talk: Multi-mode Atmospheric Escape at Mars and Venus Using a Fully Coupled Ion-Neutral Photochemical Model

2021 **American Geophysical Union Fall Meeting** (New Orleans, LA)
Poster P35F-2184: Photochemical modeling of non-thermal processes affecting D escape on Mars

2019 **American Geophysical Union Fall Meeting** (San Francisco, CA)
Talk P52C-04: The Mars D/H Fractionation Factor as a Function of Temperature and Water Vapor

2019 **European Planetary Science Congress & AAS Division for Planetary Science Joint Meeting** (Geneva, SZ)
Talk 1000: Constraining the Mars D/H Fractionation Factor and Water Loss in Photochemical Modeling

2019 **Ninth International Conference on Mars** (Pasadena, CA)
Talk 6068: The Mars D/H Fractionation Factor as a Function of Temperature and Water Vapor

2018 **AAS Division for Planetary Sciences Fall Meeting** (Knoxville, TN)
Poster 315.09: Effect of variations in temperature and water vapor profiles in photochemical modeling of H and D escape from Mars

2017 **American Meteorological Society Annual Meeting** (Seattle, WA)
Poster 233: Delineating the Migrating Solar and Lunar Semidiurnal Atmospheric Tides in the General Circulation Model

2016 **American Astronomical Society Winter Meeting** (Kissimmee, FL)
Poster 141.14: Searching for Simpler Models of Astrophysical Pattern Formation (Chambliss award)

SELECT COURSEWORK - PLANETARY SCIENCE

2021 Planetary Field Geology: Utah. Field lecture assignment: The Colorado River Basin

2020 Topics in Planetary Science: Remote Sensing of Planetary Surfaces

2019 Planetary Field Geology: New Mexico/Arizona. Field lecture assignment: Aeolian processes and dunes
Topics in Planetary Science: Late Accretion
Seminar: Using Earth to Understand Planets [Planetary analogues]
Planetary Surfaces and Interiors

2018 Planetary Field Geology: Hawaii. Field lecture assignment: cinder cone volcanism
Topics in Planetary Science: Astrobiology

2017 Planetary Atmospheres

2016 (Undergraduate courses at UO)
Scientific Programming and Data Visualization
Atmospheric Physics

SELECTED OUTREACH AND SERVICE

2017 - present CU Boulder Sommers-Bausch Observatory

Friday Night Open House Host

Host of public star parties using two 20" Modified Dall-Kirkham telescopes, Dobsonians, binoculars. Fielding questions, giving short off-the-cuff explanations, teaching constellation identification.

2023 LASP / Legacy High School

Job shadow mentor

Hosted local high school student Ryan Middleton for 12 total hours of job shadowing for her career-preparation course as a high school senior. Answered questions and provided advice on her career goals and plans.

2019-2021 CU Boulder Department of Astrophysical and Planetary Sciences

Graduate representative, Graduate Concerns and Curriculum Committee

Served on the faculty/grad student committee for departmental concerns, improvements, and policy overhauls. During my tenure, committee completed a total overhaul of the comprehensive exam procedure and refined and updated graduate coursework syllabi.

2019 - 2022 CU Boulder/LASP

Co-founder, Planetary Science Journal Club

Co-founded an all-career-level journal club focusing first on Mars, then expanding out to solid and terrestrial planetary bodies.

2018 - 2022 CU Boulder - Astropals

Mentor

Member of grad student + post doc mentorship pods within APS department; one-on-one mentoring of junior grad students within the university.

2018 - 2019 CU Boulder - CU Prime

Mentor

Grad student mentor of small groups of physics undergraduates.

2014-2017 University of Oregon Department of Physics

Society of Physics Students: Senior advisor (2016-2017), President (2015-2016), Webmaster (2014-2015)

Revitalized local chapter of SPS: increased participation by moving elections to fall term and enabled better transition of roles between years by creating position of senior advisor.

2015-2016 UO Physics & River Road Elementary School

After School Program Science Mentor

Engaged students at a local Spanish immersion school after school program in science demos and activities along with other UO Physics grads and undergrads.