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 ('CU')
Astrophysical & Planetary Sciences
2023 Ph.D.
Dissertation: The Variability of Atmospheric D/H Fractionation on Mars
Advisor: Mike Chaffin
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 Experience

- Composition: LaTeX, MS Office
- Web: HTML/CSS, Perl, PHP
- Design: Adobe Suite, Affinity
- Astronomy: DS9, IRAF
- OS: Linux, Windows, and Mac OSX

Languages

English
Spanish

RESEARCH EXPERIENCE

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

Research scientist

- Develop & maintain the MAVEN IUVS echelle channel pipeline
- Analyze H and D Lyman α emission data to study the D/H ratio and escape at Mars
- Martian and venusian photochemical modeling

2017 - 2023 — LASP, Boulder, CO

Graduate research assistant **Advisor: Mike Chaffin**

- Developed a fully-coupled 1D photochemical model of the martian atmosphere ("bluejay")
- Modeled the effects of seasonal atmospheric changes on 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**

Wrote 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 history of Martian water during the Hesperian and Amazonian epochs

B. M. Jakosky, N. R. Alsaeed, **E. M. Cangi**, M. S. Chaffin, J. Deighan, M. E. Landis, M. T. Mellon, E. M. B. Thiemann

2025 Icarus Icarus

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

2024 Icarus ADS

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 Planetary Science Journal ADS

Martian atmospheric hydrogen and deuterium: Seasonal changes and 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

2024 Science Advances SciAdv

Venus water loss is dominated by HCO^+ dissociative recombination

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

2024 Nature Nature

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

2024 Astrobiology ADS

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

2024 Geophysical Research Letters ADS

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

2024 Journal of Geophysical Research: Planets ADS

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

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 MDAP Quantifying the Martian Dehydration Rate
Selected 2025
PI Robin Ramstad; Co-I Mike Chaffin; Collaborator Bethan Gregory

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

Graduate student fellowships

NASA FINESST Seasonal variation of deuterium ions and non-thermal deuterium escape at Mars
2022-2023
1-year award

NSF GRFP Constraining the D/H ratio of Mars using MAVEN data and photochemical modeling
2019-2022

MENTORSHIP AND ADVISING

2025– CU Boulder / LASP

Advisor: Nereida Martinez

Photochemical modeling of the venusian atmosphere

2024–2025 Boulder Solar Alliance REU / LASP

Advisor: Simon Correra (undergraduate)

Photochemical modeling of sulfur and chlorine chemistry on Venus. Summer REU 2024 plus remote work 2024-2025 AY.

2023–2024 CU Boulder / LASP

Co-advisor: Grace Shore (undergraduate)

Improving our group Monte Carlo and photochemical models of H and D escape at Mars and Venus using updated collisional cross sections. Co-advising with Bethan Gregory (Oxford)

2023–2024 CU Boulder / LASP

Co-advisor: Ebenezer Solomon (undergraduate)

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

2023 LASP / Legacy High School

Job shadow mentor: Ryan Middleton - high school student

12 total hours of job shadow hosting/mentoring for Ryan's career-preparation course as a high school senior. Introduced to typical day-to-day activities, answered questions and provided advice on her career goals and plans.

2018–2023 CU Boulder / LASP

Mentor: Ace Stratton - undergraduate

Informal mentorship concerning conference attendance, graduate school applications, and research.

2018–2023 CU Boulder Graduate School

Peer mentor

One-on-one semi-formal peer mentoring, meeting roughly once-twice a month, with other graduate students at CU Boulder.

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.

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

INVITED TALKS

May 30, 2025 **Boulder Solar REU welcome week** (Boulder, CO)
Atmospheres: an in between place (introductory lectures for the students in a first week 'boot camp')

Apr 8, 2025 **University of Washington Astrobiology Colloquium** (Seattle, WA)
There's more than one way to parch a planet: secondary atmospheric escape at Mars and Venus and implications for exo/planetary habitability

Oct 24, 2024 **University of Massachusetts Lowell Physics seminar** (virtual)
Escape from terrestrial planets: water loss and the evolution of habitability on Mars and Venus

SELECTED CONFERENCE PRESENTATIONS

2024 **American Geophysical Union Fall Meeting** (Washington DC)
Poster P21C-2991 Diurnal Trends in Atomic D/H in the Martian Atmosphere
Lightning talk SM13E-08 Venus Water Loss is Dominated by HCO^+ Dissociative Recombination

2024 **Tenth International Conference on Mars** (Pasadena, CA)
Poster: Seasonal Variations in Atomic D/H in the Upper Atmosphere of Mars

2024 **Astrobiology Science Conference (AbSciCon)** (Providence, RI)
Talk 213-04: Escape from Terrestrial Planets: Lessons from Mars and Venus

2023 **American Geophysical Union Fall Meeting** (San Francisco, CO)
Poster SH33C-3077: Open Science Updates to the Echelle Channel Software Pipeline for the Imaging UltraViolet Spectrograph (IUVS) Onboard the MAVEN Mars Orbiter
Poster P21C-3037: The Importance of Being Ionized: New Insight Into Atmospheric Escape from Terrestrial Planets Through Fully-Coupled Ion-Neutral Photochemistry

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 **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)

MEDIA INTERVIEWS AND PUBLICATIONS

Sep 2024 **Interview with Simon Devos** (Epsiloon Magazine)

May 2024 **Hotel Mars podcast - with Bethan Gregory** (CBS Eye on the World)
https://tinyurl.com/HMEMCBG - note that I am not on the title slide for some reason but am in the recording

May 2024 **Así pudo perder Venus su agua [Here's how Venus could have lost its water]** (SINC)
https://tinyurl.com/VWSINC

May 2024 **Radio interview for segment on Venus water loss** (Australian Broadcasting Corporation)
https://www.abc.net.au/listen/programs/am/researchers-new-process-caused-venus-to-lose-all-its-water/103813062

May 2024 **An overlooked molecule could help solve the Venus water mystery** (The Hindu)
https://tinyurl.com/VenusWaterTH

May 2024 **Venus is losing water faster than previously thought – here's what that could mean for the early planet's habitability** (The Conversation)
https://tinyurl.com/VenusWater

Nov 2023 **Five Martian Mysteries That Have Scientists Scratching Their Heads** (AGU EOS)
https://tinyurl.com/MWMarticle

SELECTED TOPICAL COURSEWORK

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

2020 Topics in Planetary Science: Remote Sensing of Planetary Surfaces

2019
1. Planetary Field Geology: New Mexico/Arizona. Field lecture assignment: Aeolian processes and dunes
2. Late Accretion
3. Seminar: Using Earth to Understand Planets
4. Planetary Surfaces and Interiors

2018
1. Planetary Field Geology: Hawai'i. Field lecture assignment: cinder cone volcanism
2. Astrobiology

2017 Planetary Atmospheres

2016 (Undergraduate courses)
1. Scientific Programming and Data Visualization
2. Atmospheric Physics

OUTREACH AND ACTIVITIES

2024–present Letters to a Pre-Scientist (https://prescientist.org)

Pen-pal

Pen-pal program linking scientists with 5th through 10th graders (one-on-one) at low income schools around the nation. Year-long program with 8 total letters (4/person) discussing higher education, STEM careers, and overcoming obstacles

2017 - present CU Boulder Sommers-Bausch Observatory

Friday Night Open House Host

Host observatory open houses using 20” Modified Dall-Kirkham telescopes, manual Dobsonians, binoculars. Presenting observation targets and associated astrophysics in plain English, answering questions about anything space-related, teaching constellation identification. Give tours of the 24” research telescope and dome.

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.

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.

2014-2017 UO Pine Mountain Observatory

Open house/star party host

Communicating astronomy to the public. Observed popular targets using (manual) Dobsonian telescopes, described constellation identification, gave sky tours, answere qduestions.

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.

SERVICE

2024-present LASP

Sustainability committee

Identify opportunities and plans for increasing sustainability at LASP. Instigated effort to establish a LASP-sponsored breakfast station for 2025 winter bike-to-work day (Feb 14, 2025)

2024-present LASP

Internal newsletter compilation committee

Solicit and compile employee news and updates for monthly internal LASP newsletter.

2023-present Peer reviewer

Icarus, Journal of Geophysical Research, Planetary Science Journal, the Astrophysical Journal

Spring 2022 CU Boulder Department of Astrophysical and Planetary Sciences

Graduate representative, astronomy instructor hiring committee

Served as one of two graduate student representatives for a successful astronomy undergraduate instructor search. Reviewed shortlist pre-interview video responses, developed site visit interview questions, interviewed candidates, and participated in full committee meetings with faculty.

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.