ERYN M CANGI

Planetary scientist

CONTACT

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? 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; minor Math
2010 B.S. Theatre Arts; minor Spanish

SKILLS

Programming languages

Most used: Python, Julia, IDL

Moderate: MATLAB, IDL

Some: FORTRAN, C++

Other Software Experience

- Tools & Web: Git, Github, HTML/CSS
- Composition: LaTeX, Office
- Design: Adobe products, Inkscape
- Astronomy: DS9, IRAF
- OS: Linux, Mac OSX, Windows

Languages

English - native

Spanish - Between B1/B2

SUMMARY

My expertise lies in UV spectroscopy and photochemical modeling of the Mars and Venus atmospheres to study atmospheric escape, especially via the hydrogen isotope system. As a member of the MAVEN mission at Mars, a graduate of the 2022 NASA JPL Planetary Mission Design School, and a past stage manager in live theatre, I have extensive experience working with diverse teams of all sizes to achieve complex tasks. I have taught and mentored students across the educational landscape in research, the classroom, and outreach contexts.

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
- Perform and advise others on 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
- Modeled the effects of seasonal atmospheric changes on the D/H ratio, atmospheric escape, and long-term desiccation

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 filter flux 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.

TEACHING EXPERIENCE

Spring 2026 — CU Boulder APS Dept., Boulder, CO

Instructor of Record - ASTR 1000: The Solar System

Prepare and deliver twice weekly lectures for non-majors introductory class, along with all associated duties.

Fall 2014 — UO Dept. of Physics, Eugene, OR

Learning Assistant - PHYS 161: Physics of Energy and Environment

Attended lectures and guided discussions/think-pair-share type activities; held office hours for homework help

MENTORSHIP AND ADVISING

Graduate students

2025– Nereida Martinez (CU Physics) - Photochemical modeling of Venus. *Note: Nereida is currently on a leave of absence from CU Physics for personal reasons.*

Undergraduate students

Summer 2026 Carson Crawford - dynamical experiments in photochemical modeling of Mars

2024–25 Simon Correra (Boulder Solar Alliance REU Summer 2024 + remote AY 24-25) - Photochemical modeling

2023–24 Grace Shore (co-advised with Bethan Gregory) - Monte Carlo + Photochemical modeling of Mars
Ebenezer Solomon (co-advised with Dave Brain) - photochemistry of early Earth

2018–23 Ace Stratton (career mentoring)

2018–19 CU Prime - grad student mentor for small groups of physics undergrads

High school

2023 Ryan Middleton, Legacy High School (12 total hours job shadowing over several weeks for career prep course)

Peers

2018–22 CU Boulder Graduate School mentor for junior grad students (one-on-one mentoring, three students)

2018–22 CU Boulder APS Astropals, mentoring junior grads (one group of 3-4 other students per year)

OTHER RELATED HIGHER ED WORK EXPERIENCE

2013-2017 — UO Dept. of Women's, Gender, & Sexuality Studies, Eugene, OR

Undergraduate coordinator, accounts payable

Advised undergraduate majors/minors on course selection and curriculum planning, performed regular degree audits for students approaching graduation, worked with faculty on curriculum redesign. Also processed travel reimbursements and accounts payable duties.

2011-2013 — UO College of Arts and Sciences IT, Eugene, OR

IT consultant

With fellow staff, co-managed a team of 3-5 student employees to collectively provide help desk services to faculty across the college (computer troubleshooting, hardware repair, account lockouts, computer purchase program, etc.).

PUBLIC OUTREACH AND ENGAGEMENT

2017 - present CU Boulder Sommers-Bausch Observatory

Observatory open house Host

Host observatory open house nights using 20” computerized modified Dall-Kirkham telescopes, Dobsonians, binoculars. Prepare observation target plans, teach constellation identification, present any topic in astrophysics and planetary science in plain English, answer questions about anything space-related, engage and entertain guests, tour and show the 24” Cassegrain telescope and observing dome.

2024–2025 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, 4 letters/person, writing about higher education, STEM careers, and overcoming obstacles

2014-2017 UO Pine Mountain Observatory, Bend, OR

Summer observatory open house host

Same activities as Sommers-Bausch Observatory open house hosting, but using only manual Dobsonian telescopes and binoculars.

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 with other UO Physics grads and undergrads.

FIRST AUTHOR PUBLICATIONS

Lyman α measured by MAVEN/IUVS reveals deuterium atom density enhancements consistent with water vapor above 130 km

E. M. Cangi, M. Stevens, M.S. Chaffin, S. Jain, J. Deighan, J. Clarke, M. Mayyasi, N. Schneider

2027 Journal of Geophysical Research: Planets in prep

Transient electron density enhancements on Mars and Venus: a feature of a transitional region

E. M. Cangi, N. B. Pickett, M. S. Chaffin, B. S. Gregory, J. Deighan, M. Benna, P. Withers, L. Andersson, S. Curry

2027 Planetary Science Journal in prep

Venus water loss is dominated by HCO^+ dissociative recombination

E.M. Cangi* and M.S. Chaffin*, B.S. Gregory, R.V. Yelle, J. Deighan, R.D. Elliott, H. Gröller (*first authors contributed equally and may each claim as first authored publication)

2024 Nature Nature

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

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

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

CO-AUTHORED PUBLICATIONS

A coupled-oscillator model for the formation of planetary rings

R. Gong, T. Broeren, E. M. Cangi, D. M. Abrams

2026 arXiv arXiv

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

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

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

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

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. Was called NASA NESSF before 2022.
2022-2023

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

INVITED TALKS

Nov 5, 2026 **North Colorado Astronomical Society** (Fort Collins, CO)
Cycles of life: How tides, seasons, and orbits shape the habitability of other planets

May 26, 2026 **Boulder Solar REU welcome week** (Boulder, CO)

Atmospheres: an in between place between surface and space

July 11, 2026 **Shaw Island Speaker Series** (Shaw Island, WA)
Cycles of life: How tides, seasons, and orbits shape the habitability of other planets

May 30, 2025 **Boulder Solar REU welcome week** (Boulder, CO)
Atmospheres: an in between place

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

CONFERENCE PRESENTATIONS

2025 **American Geophysical Union Fall Meeting** (Washington DC)
Poster P43F-2729 Signatures of martian thermospheric water in D Lyman alpha emissions measured by MAVEN/IUVS

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)

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

MEDIA INTERVIEWS AND PUBLICATIONS

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

SERVICE

2026-present CU Boulder Department of Astrophysical and Planetary Sciences

CU STARRS

Co-run weekly meetings and regular events for CU STARRS, local group focused on training astronomy-enthusiast undergraduates from any major in ground-based astronomical observing and hosting star parties out in communities in the Front Range area with mobile 10" Dobsonians.

2026-present LASP

Science Seminar Committee

Host weekly lab-wide science seminars; solicit talks from internal speakers; coordinate with leadership to organize promotion talks and staff to organize events; find, invite, and host external speakers. Chair seminar sessions.

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)

2024-2026 LASP

Internal newsletter committee

Solicited, organized, and authored announcements and news items 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 - 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.

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.

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.