Tristan D. Weber

4245 Martin Dr, Boulder, CO, 80305, USA
tristan.weber@colorado.edu • (734) 395-6432

EDUCATION

Ph.D. in Astrophysics and Planetary Science - University of Colorado, Boulder *Summer 2020*

M.S. in Astrophysics and Planetary Science - University of Colorado, Boulder *Fall 2016*

B.S. in Earth Systems Science and Engineering - University of Michigan *Spring 2014*
Minor in Computer Science

RESEARCH INTERESTS

Evolution of planetary atmospheres, and associated effects on climate and habitability.
Solar wind interaction with planetary atmospheres.
Data analysis of in-situ spacecraft measurements.
Comparative planetology to understand planetary evolution.

RESEARCH EXPERIENCE

Graduate Research Assistant *Fall 2014 - Present*

Thesis Work: Characterization of magnetic topology at Mars using particle and fields data from the MAVEN spacecraft. Performed analysis of topological structure and variability with a focus on implications for ion escape processes. *Advisor: David Brain*

Add. Project: Analysis of first in-situ detections of interplanetary dust at Mars. Developed an algorithm for identification of dust impacts on the Langmuir Probe and Waves (LPW) instrument. *Advisor: Laila Andersson*

Undergraduate Research Assistant *2013 - 2014*

Project 1: Study of the plasma environment of Europa in preparation for the *JUNO* mission to Jupiter. Data from the *Galileo* spacecraft were reanalyzed and compared to a hybrid-MHD model of the moon's plasma environment. *Advisor: Fran Bagenal*

Project 2: Analysis of data from the *WIND* spacecraft to constrain non-thermal heating mechanisms in the solar corona. *Advisor: Justin Kasper*

AWARDS

NASA Earth and Space Science Fellowship *2018-2020*
"The Role of Crustal Magnetic Fields in Atmospheric Escape at Mars"

Invited Talks

"Bulletin from Mars: Latest MAVEN insights", The Liason Capital Hill *19 April, 2016*
"IMF influence on magnetic topology at Mars", University of Tokyo *23 May, 2019*
"Effects of crustal magnetic fields on ion escape.", MAVEN PSG *30 April, 2020*

OUTREACH

Public Talks

"Alone, So Far: Exploring the Fermi Paradox", Fiske Planetarium *28 Sep, 2017*
"Thinking Like an Astrobiologist", Emerson Elementary School *21 December, 2017*
"Exploring the Rocky Planets", Emerson Elementary School *10 April, 2016*
"Why Mars is Horrible (Now)", Boulder Nerd Night *7 May, 2018*

Astronomy Day at CU Boulder

Facilitated learning activities on the MAVEN mission to Mars and its science goals. *2015, 2016*

TEACHING EXPERIENCE

Instructor of Record

ASTR 2040 – The Search for Life in the Universe – *Summer 2017*

- Undergraduate non-majors, 27 students

ASTR 2040 – The Search for Life in the Universe – *Summer 2019*

- Undergraduate non-majors, 32 students

Substitute taught for ASTR 3720 (107 Students) and FYSM 1000-007 (30 Students).

Teaching Assistant

AOSS 380 – Radiative and Dynamical Processes – *Fall 2013*

AOSS 320 – Earth Systems Evolution – *Winter 2014*

PROFESSIONAL DEVELOPMENT

UC Santa Cruz ISEE Professional Development Program

Designed and facilitated an inquiry-based learning activity for incoming college freshmen from underrepresented groups. Students used laboratory materials to model and investigate a natural phenomenon of their choice, then used their gained understanding of buoyancy to explain this phenomenon to peers. – *Summer 2019*

Earned a Certificate in Inclusive Inquiry STEM Education – *Fall 2019*

GEOL 5700 – Teaching and Learning in Post Secondary Education

Course focused on scientific communication, education theory, learning sciences, and evidence-based strategies for teaching and learning to guide future course development.

PROGRAMMING SKILLS

Expertise in MATLAB, IDL, and C++. Large research projects conducted in each language.
Experience with Python, Mathematica, Maple, JavaScript, PHP, SQL, and Prolog.

PUBLICATIONS

[1] **Weber, T.**, Brain, D., Mitchell, D., Xu, S., Connerney, J., Halekas, J. (2017). Characterization of low-altitude nightside Martian nagnetic topology using electron pitch angle distributions. *Journal of Geophysical Research: Space Physics*, 122(10), 9777-9789.

[2] **Weber, T.**, Brain, D., Mitchell, D., Xu, S., Espley, J., Halekas, J., Lillis, R., Jakosky, B. (2019). The influence of solar wind pressure on Martian crustal magnetic field topology. *Geophysical Research Letters*, 46(5), 2347-2354.

[3] **Weber, T.**, Brain, D., Mitchell, D., Xu, S., Espley, J., Halekas, J., Mazelle, C., Lillis, R., DiBraccio, G., Jakosky, B. (*Submitted*). The influence of interplanetary magnetic field direction on the topology of Martian crustal field cusps. *Geophysical Research Letters*.

[4] Andersson, L., **Weber, T. D.**, Malaspina, D., Crary, F., Ergun, R. E., Delory, G. T. et al. (2015). Dust observations at orbital altitudes surrounding Mars. *Science*, 350(6261), aad0398.

[5] Xu, S., **Weber, T.**, Mitchell, D. L., Brain, D. A., Mazelle, C., DiBraccio, G. A., Espley, J. (2019). A technique to infer magnetic topology at Mars and its application to the terminator region. *Journal of Geophysical Research: Space Physics*, 124(3), 1823-1842.

[6] Kasper, J. C., Klein, K. G., **Weber, T.**, Maksimovic, M., Zaslavsky, A., Bale, S. D., Case, A. W. (2017). A Zone of Preferential Ion Heating Extends Tens of Solar Radii from the Sun. *The Astrophysical Journal*, 849(2), 126.

[7] Xu, S., Mitchell, D., Luhmann, J., Ma, Y., Fang, X., Harada, Y., Hara, T., Brain, D., **Weber, T.**, Mazelle, C. and DiBraccio, G.A., (2017). High-Altitude Closed Magnetic Loops at Mars Observed by MAVEN. *Geophysical Research Letters*, 44(22).

[8] Ergun, R. E., Andersson, L. A., Fowler, C. M., Woodson, A. K., **Weber, T. D.**, Delory, G.T., Andrews, D.J., Eriksson, A.I., McEnulty, T., Morooka, M.W. and Stewart, A.I.F., (2016). Enhanced O2+ loss at Mars due to an ambipolar electric field from electron heating. *Journal of Geophysical Research: Space Physics*, 121(5), 4668-4678.

[9] C. M. Fowler, L. Andersson, R. E. Ergun, M. Morooka, G. Delory, D. J.Andrews, R. J. Lillis, T. McEnulty, **T. D. Weber**, T. M. Chamandy, et al. (2015). The first in situ electron temperature and density measurements of the Martian nightside ionosphere. *Geophysical Research Letters*, 42, 8854–8861,

[10] D. J. Andrews, L. Andersson, G. T. Delory, R. E. Ergun, A. I. Eriksson, C. M. Fowler, T. McEnulty, M. W. Morooka, **T. D. Weber**, B. M. Jakosky. (2015) Ionospheric plasma density variations observed at Mars by MAVEN/LPW. *Geophysical Research Letters*, 42, 8862–8869

[11] Jakosky, B. M., J. M. Grebowsky, J. G. Luhmann, ... **T. Weber**, P. Withers, T. Woods, and R. Yelle. MAVEN Observations of the Response of Mars to an Interplanetary Coronal Mass Ejection. *Science* 350.6261 (2015)

[12] Bougher, S., Jakosky, B., Halekas, J., Grebowsky, J., Luhmann, J., Mahaffy, P., ... **Weber, T.**, Withers, P., Woods, T., and Yelle., R. (2015). Early MAVEN Deep Dip campaign reveals thermosphere and ionosphere variability. *Science*, 350(6261), aad0459.

[13] Jakosky, B. M., Brain, D., Chaffin, M., Curry, S., Deighan, J., Grebowsky, J., Andersson, L., ...**Weber, T.**, Withers, P., Xu, S., Yelle, R., Yigit, E., Zurek, R. (2018). Loss of the Martian atmosphere to space: Present-day loss rates determined from MAVEN observations and integrated loss through time. *Icarus*, 315, 146-157.

[14] Xu, S., Fang, X., Mitchell, D. L., Ma, Y., Luhmann, J. G., DiBraccio, G. A., **Weber, T.** et al. (2018). Investigation of Martian magnetic topology response to 2017 September ICME. *Geophysical Research Letters*, 45(15), 7337-7346.

[15] Lillis, R. J., Mitchell, D. L., Steckiewicz, M., Brain, D., Xu, S., **Weber, T.** et al. (2018). Ionizing electrons on the Martian nightside: Structure and variability. *Journal of Geophysical Research: Space Physics*, 123(5), 4349-4363.

[16] Fowler, C. M., Lee, C. O., Xu, S., Mitchell, D. L., Lillis, R., **Weber, T.** et al. (2019). The Penetration of Draped Magnetic Field Into the Martian Upper Ionosphere and Correlations With Upstream Solar Wind Dynamic Pressure. *Journal of Geophysical Research: Space Physics*, 124(4), 3021-3035.

[17] Brain, D., **Weber, T.**, Xu, S., Mitchell, D.L., Lillis, R., Halekas, J., Espley, J., Jakosky, B.. (2020). Variations in Nightside Magnetic Field Topology at Mars. *Geophysical Research Letters*, 47(19), e2020GL088921.

[18] Xu, S., Mitchell, D. L., McFadden, J. P., Fillingim, M. O., Andersson, L., Brain, D. A., **Weber, T.**, Lillis, R. (2020). Inverted–V Electron Acceleration Events Concurring With Localized Auroral Observations at Mars by MAVEN. *Geophysical Research Letters*, 47(9), e2020GL087414.

[19] Xu, S., Mitchell, D. L., **Weber, T.**, Brain, D. A., Luhmann, J. G., Dong, C., Curry, S., Ma, Y., DiBraccio, G., Halekas, J., Dong, Y., Mazelle, C. (2020). Characterizing Mars's Magnetotail Topology With Respect to the Upstream Interplanetary Magnetic Fields. *Journal of Geophysical Research: Space Physics*, 125(3)