

Matthew C. Brennan

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Education

- Harvard University**
2017 – Ph.D. candidate in Earth & Planetary Sciences
2020 M.A. in Earth & Planetary Sciences
University of Chicago
2017 B.S. with Honors in Geophysical Sciences
2017 B.S. in Environmental Sciences

Research Positions

- 2017 – **Graduate student**
Laboratory for Mineral Physics, Harvard University
Advisor: Dr. Rebecca A. Fischer
2016 – **Synchrotron user**
GSECARS & HP-CAT, Advanced Photon Source, Argonne National Laboratory
Beamline 12.2.2, Advanced Light Source, Berkley National Laboratory
2015 – 2017 **Laboratory technician**
Laboratory for Mineral Physics, University of Chicago
Advisor: Dr. Andrew J. Campbell
Thesis: “Molten Iron – Solid Silicate Interactions in Earth's Deep Interior”
2016 **Department of Energy Summer Undergraduate Laboratory Intern (SULI)**
Energy Systems Division, Argonne National Laboratory
Advisor: Dr. May Wu
Project: “Water Use for Power Generation in the United States”

Publications

- In review **“Water storage capacity of the Martian mantle through time”** Dong, J., Fischer, R. A., Stixrude, L., Lithgow-Bertelloni, C., Eriksen, Z. & Brennan, M. C.
In press **“Timing of Martian Core Formation from Models of Hf–W Evolution Coupled with *N*-body Simulations.”** Brennan, M. C., Fischer, R. A., Nimmo, F., & O’Brien, D. P. (2021) *Geochimica et Cosmochimica Acta*.
2021 **“High-Pressure deformation of iron–nickel–silicon alloys and implications for Earth’s inner core.”** Brennan, M. C., Fischer, R. A., Couper, S., Miyagi, L., Antonangeli, D., & Morard, G. (2021). *Journal of Geophysical Research: Solid Earth*, 126, e2020JB021077.

- 2020 **“Equation of state of TiN at high pressures and temperatures: A possible host for nitrogen in planetary mantles.”** Daviau, K., Fischer, R.A., Brennan, M. C., Dong, J., Suer, T.-A., Couper, S., Meng, Y., & Prakapenka, V.B. (2020). *Journal of Geophysical Research: Solid Earth*, 126, e2020JB020074.
- 2019 **“Core formation and geophysical properties of Mars.”** Brennan, M. C., Fischer, R. A., & Irving, J. C. (2019). *Earth and Planetary Science Letters*, 530, 115923.

Presentations and Proposals

- 2021 **“Strength and texturing of iron alloys at high pressures and temperatures”**
Synchrotron Proposal (Beamline 12.2.2, Advanced Light Source)
- 2020 **“High pressure deformation and texturing of Fe–Ni–Si alloys”**
Oral Presentation (COMPRES Annual Meeting)
- 2019 **“Martian Core Formation: Implications from the Hf–W System.”**
Poster Presentation (Goldschmidt Conference)
- 2019 **“Physical properties of iron alloys with implications for inner core anisotropy”**
Fellowship Proposal (NSF Graduate Research Fellowship)
- 2019 **“Using Core Formation and Geophysical Modelling to Predict the Core Radius and Seismic Properties of Mars.”**
Oral Presentation (Lunar and Planetary Science Conference)
- 2018 **“A Core Formation Model with Implications for the Properties of the Martian Interior.”**
Oral Presentation (AGU Fall Meeting)
- 2018 **“The Composition and Seismic Properties of the Martian Interior.”**
Oral Presentation (Goldschmidt Conference)
- 2018 **“Mantle Melting Temperatures of the Earth and Mars”**
Synchrotron Proposal (GSECARS, Advanced Photon Source)
- 2017 **“Deep-Earth Partitioning between Molten Iron Alloys and Solid Silicates.”**
Poster Presentation (AGU Fall Meeting)

Teaching

- Fall 2021 **Head Teaching Fellow: EPS 10 (A Brief History of the Earth)**
- Spring 2021 **Teaching Fellow: ASTRON 16 (Stellar and Planetary Astronomy)**
- Fall 2020 **Teaching Fellow: EPS 10 (A Brief History of the Earth)**
- Fall 2019 **Teaching Fellow: EPS 142 (Mineralogy)**

Honors and Awards

- 2021 **Derek Bok Center Teaching Certificate**
- 2019 – **National Science Foundation Graduate Research Fellow**
- 2019 – 2020 **Associate Member of Sigma Xi Honor Society**

2017 **Departmental Honors in Geophysical Sciences**
University of Chicago

2014 – 2017 **Dean's List**
University of Chicago

Service and Outreach

2021 **Program leader**
EPS Summer Short-Term Student Program

2020 – **Peer reviewer**
Nature Communications, Nature Reviews: Earth & Environment, Physics and Chemistry of Minerals

2020 **Student panelist**
COMPRES Annual Meeting

2020 **Science Education Partner**
Harvard Museum of Natural History

2018 – 2020 **Museum volunteer trainer**
Harvard Museum of Natural History

2018 – 2019 **Graduate Outreach Chair**
Department of Earth & Planetary Sciences, Harvard University

2018 **Volunteer tutor**
Cambridge School Volunteers, Cambridge Public Schools

2017 – **Laboratory Safety Officer**
Department of Environmental Health & Safety, Harvard University

2017 – 2018 **Gallery guide**
Harvard Museum of Natural History

Skills

Experiment **Diamond anvil cell**
(assembly, sample loading, ruby fluorescence, laser heating, Raman spectroscopy)

Synchrotron X-ray diffraction
(axial and radial geometries, beamline operation, diffraction analysis)

Scanning electron microscopy
(focused ion beam, backscattered electron detector, EDS analysis)

Optical telescope
(celestial coordinates, image acquisition, image analysis)

Piston-cylinder press
(stack assembly, hydraulic operation, thermocouple operation, sample recovery)

Computation **Programming**
(Python, Keras, MATLAB, Mathematica, L^AT_EX, HTML)

X-ray diffraction
(DIOPTAS, MAUD, BEARTEX, FIT2D, APEX3, Olex²)