

# Matthew C. Brennan

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## Education

- Harvard University**  
2022 Ph.D. in Earth & Planetary Sciences  
2020 M.A. in Earth & Planetary Sciences
- University of Chicago**  
2017 B.S. with Honors in Geophysical Sciences / B.S. in Environmental Sciences

## Research Positions

- 2022 – now **Glenn T. Seaborg Postdoctoral Fellow**  
Static High Pressure Team, Los Alamos National Laboratory  
Project: “Equations of State and Material Synthesis using High-Pressure Experimental Techniques”
- 2017 – 2022 **Graduate Student**  
Laboratory for Mineral Physics, Harvard University  
Dissertation: “Investigating Planetary Core Formation with Geophysical Modeling and High-Pressure Mineralogy”
- 2016 – now **Synchrotron X-ray 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  
Thesis: “Molten Iron – Solid Silicate Interactions in Earth's Deep Interior”
- 2016 **Department of Energy SULI Program Researcher**  
Energy Systems Division, Argonne National Laboratory  
Project: “Water Use for Power Generation in the United States”

## Publications

- In review **“Nonlinearity of the post-spinel transition and its expression in slabs and plumes worldwide”** J. Dong, R. A. Fischer, L.P. Stixrude, M. C. Brennan, K. Daviau, T. Suer, K. M. Turner, Y. Meng, V. B. Prakapenka
- In review **“Investigating E-MORB and OIB petrogenesis using machine learning”** Z.T. Eriksen, S.B. Jacobsen, C. H. Langmuir, J. Dong, M.C. Brennan, J.T. Gu

- 2023 **"Comparisons of the core and mantle compositions of earth analogs from different terrestrial planet formation scenarios"** J. Gu, R. A. Fischer, M. C. Brennan, M. Clement, S. A. Jacobsen, N. A. Kaib, D. P. O'Brien, S. N. Raymond (2023). *Icarus* 394, 115425.
- 2022 **"Water storage capacity of the Martian mantle through time"** J. Dong, R.A. Fischer, L. Stixrude, C. Lithgow-Bertelloni, Z. T. Eriksen, M.C. Brennan (2022) *Icarus* 385, 115113.
- 2022 **"Timing of Martian core formation from models of Hf–W evolution coupled with N-body simulations."** M.C. Brennan, R. A. Fischer, F. Nimmo, D. P. O'Brien (2022) *Geochimica et Cosmochimica Acta* 316, 295–308.
- 2021 **"High-Pressure deformation of iron–nickel–silicon alloys and implications for Earth's inner core."** M.C. Brennan, R. A. Fischer, S. Couper., L. Miyagi, D. Antonangeli, G. Morard (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."** K. Daviau, R. A. Fischer, M. C. Brennan, J. Dong, T. Suer, S. Couper, Y. Meng, V. B. Prakapenka, (2020). *Journal of Geophysical Research: Solid Earth* 126, e2020JB020074.
- 2020 **"Core formation and geophysical properties of Mars."** M.C. Brennan, R. A. Fischer, J. C. Irving (2020). *Earth and Planetary Science Letters* 530, 115923.

## Presentations

- 2022 **"High-Pressure Deformation of Iron–Nickel–Silicon Alloys and Implications for Earth's Inner Core"**, Invited Talk (Materials at Extreme Conditions Group, Stony Brook University)
- 2022 **"A Mineral Physics Perspective on the Martian Core"**, Invited Talk (Planetary Geophysics Group, ETH Zürich)
- 2021 **"A Mechanically Strong Inner Core Implied by Deformation of Silicon-bearing Alloys"** Poster Presentation (AGU Fall Meeting)
- 2021 **"Deep Mars"** Invited Talk (Harvard EPS Colloquium)
- 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 **"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)
- 2017      **“Deep-Earth Partitioning between Molten Iron Alloys and Solid Silicates.”** Poster Presentation (AGU Fall Meeting)

## Teaching

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

## Service and Outreach

- 2023      **Proposal reviewer**, Centers of Excellence for Characterization of Materials Properties under Extreme Conditions (Stewardship Science Academic Alliance)
- 2022      **Featured speaker**, “From Blue to Red: How Mars Got and Lost its Water” (Science in the News Public Seminar Series)
- 2022      **Curatorial assistant**, Mineral Type Specimens (Harvard Mineralogical & Geological Museum)
- 2021      **Guest speaker**, Cambridge Rindge and Latin School Astronomy Club
- 2021      **Program leader**, Harvard EPS Summer Short-Term Student Program
- 2020 – now      **Peer reviewer** (*Nature Communications*, *Nature Reviews: Earth & Environment*, *Physics and Chemistry of Minerals*)
- 2020      **Panelist**, “Conducting research and managing your career in the time of pandemic” (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** (Harvard University Earth & Planetary Sciences,)
- 2018      **Tutor**, Cambridge School Volunteers (Cambridge Public Schools)
- 2017 – 2022      **Laboratory Safety Officer**, Department of Environmental Health & Safety (Harvard University)

## Honors and Awards

- 2022 – 2024    **Glenn T. Seaborg Nuclear Science Fellowship**
- 2021            **Derek Bok Center Teaching Certificate**
- 2019 – 2022    **National Science Foundation Graduate Research Fellowship**
- 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)