

Matthew C. Brennan

mcbrennan@lanl.gov

(505) 665-3971

mcbrennan.github.io

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

Positions

2024 – now	Scientist Static High Pressure Team, Los Alamos National Laboratory
2022 – 2024	Harold Agnew National Security Postdoctoral Fellow Static High Pressure Team, Los Alamos National Laboratory
2017 – 2022	Graduate Research Assistant Laboratory for Mineral Physics, Harvard University
2016 – now	Synchrotron X-ray user HPCAT & GSECARS, Advanced Photon Source, Argonne National Laboratory Beamline 12.2.2, Advanced Light Source, Berkeley National Laboratory
2015 – 2017	Laboratory Technician Laboratory for Mineral Physics, University of Chicago
2016	Department of Energy SULI Program Researcher Energy Systems Division, Argonne National Laboratory

Publications

2025	“Crystal Structure and Thermal Expansion of Ta₂O₅ from Neutron Diffraction” <u>M. C. Brennan</u> , S. C. Vogel, B. T. Sturtevant (2025). <i>Physical Review Materials</i> 9, 073605.
2025	“Nonlinearity of the Post-Spinel Transition and its Expression in Slabs and Plumes Worldwide” J. Dong, R. A. Fischer, L. P. Stixrude, <u>M. C. Brennan</u> , K. Daviau, T. Suer, K. M. Turner, Y. Meng, V. B. Prakapenka (2025). <i>Nature Communications</i> 16, 1039.
2024	“Phase Comparison and Equation of State for Ta₂O₅” <u>M. C. Brennan</u> , D. A. Rehn, L. Q. Huston, B. T. Sturtevant (2024). <i>Journal of Physics: Condensed Matter</i> 36, 275401.

- 2023 **“Thermal Equation of State of U_6Fe from Experiments and Calculations”** M. C. Brennan, J. D. Coe, S. C. Hernandez, S. Crockett, L. Q. Huston, S. M. Thomas, B. T. Sturtevant, E. D. Bauer (2023). *Physical Review B* 108, 064108.
- 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

- 2025 **“Recent High-Pressure Experiments that Shed Light on Planetary Cores”**, Invited Talk (APS SCCM Meeting)
- 2024 **“Synthesis and Characterization of Metastable Tetragonal UTe_2 at Ambient Conditions”**, Poster (Gordon Research Conference)
- 2024 **“High-Pressure Investigations of U-bearing Intermetallics”**, Invited Talk (Energy and Natural Resources Security Group, LANL)
- 2023 **“Thermal Equation of State of U_6Fe ”**, Talk (APS SCCM Meeting)
- 2023 **“The First Thermal Equation of State for U_6Fe ”**, Talk (Dynamic Material Properties Meeting, LANL)
- 2023 **“Update on the U_6Fe Equation of State”**, Invited Talk (Production Science Chemistry L2 Review, DOE)

- 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 **“Static Deformation of Iron–Nickel–Silicon Alloys at High Pressures”**, Invited Talk (Shock & Detonation Physics Group, LANL)
- 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 (AGU Fall Meeting)
- 2021 **“Deep Mars”**, Invited Talk (Harvard EPS Colloquium)
- 2020 **“High-Pressure Deformation and Texturing of Fe–Ni–Si alloys”**, Talk (COMPRES Annual Meeting)
- 2019 **“Martian Core Formation: Implications from the Hf–W System”**, Poster (Goldschmidt Conference)
- 2019 **“Using Core Formation and Geophysical Modelling to Predict the Core Radius and Seismic Properties of Mars”**, Talk (Lunar and Planetary Science Conference)
- 2018 **“A Core Formation Model with Implications for the Properties of the Martian Interior”**, Talk (AGU Fall Meeting)
- 2018 **“The Composition and Seismic Properties of the Martian Interior”**, Talk (Goldschmidt Conference)
- 2017 **“Deep-Earth Partitioning between Molten Iron Alloys and Solid Silicates”**, Poster (AGU Fall Meeting)

Teaching & Mentoring

- 2024 – 2025 **Graduate Research Assistant Mentor** (LANL)
- 2021 **Head Teaching Fellow**, A Brief History of the Earth (Harvard EPS 10)
- 2021 **Teaching Fellow**, Stellar and Planetary Astronomy (Harvard ASTRON 16)
- 2020 **Teaching Fellow**, A Brief History of the Earth (Harvard EPS 10)
- 2019 **Teaching Fellow**, Mineralogy (Harvard EPS 142)

Honors & Awards

- 2024 **APS Student and Dissertation Award** (American Physical Society GCCM)
- 2023 **Harold Agnew National Security Postdoctoral Fellowship** (LANL)

2022 **Glenn T. Seaborg Nuclear Science Fellowship** (LANL)
 2021 **Derek Bok Center Teaching Certificate** (Harvard University)
 2019 **National Science Foundation Graduate Research Fellowship**
 2017 **Departmental Honors in Geophysical Sciences** (University of Chicago)
 2014 – 2017 **Dean's List** (University of Chicago)

Service & Outreach

2025 **Co-chair** (APS SCCM Early Career and Student Symposium)
 2025 **Site Review Committee Member** (NNSA SSAA Centers of Excellence)
 2025 – 2027 **Executive Committee Member** (American Physical Society GCCM)
 2024 **Student Research Symposium Judge** (LANL)
 2023 – 2025 **Users' Executive Committee Member** (Advanced Photon Source)
 2023 **Guest speaker** (Pajarito Environmental Education Center)
 2023 – now **Proposal reviewer** (NSF Chemical Evolution of the Solid Earth, ANR Appel à Projets Générique, NASA Emerging Worlds, Advanced Photon Source User Meeting, NNSA SSAA Centers of Excellence)
 2022 **Featured speaker** (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**, Summer Short-Term Student Program (Harvard Earth & Planetary Sciences)
 2020 – now **Peer reviewer** (*Planetary Science Journal*, *Physics Letters*, *Physics & Chemistry of Minerals*, *Nature Reviews: Earth & Environment*, *Nature Communications*, *Physics of the Earth & Planetary Interiors*)
 2020 **Early career 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** (Harvard Earth & Planetary Sciences)
 2018 **Tutor**, Cambridge School Volunteers (Cambridge Public Schools)
 2017 – 2022 **Laboratory Safety Officer**, Department of Environmental Health & Safety (Harvard University)