Allison Pease

apease13@asu.edu; https://allisonpease.com

Updated 7/2025

EDUCATION:

Doctor of Philosophy: Earth and Environmental Science 2025
Michigan State University, East Lansing, Michigan
Thesis: *The Physical Properties of Iron-Nitrogen-Carbon alloys within Planetary Cores*
GPA: 4.00/4.00

Master of Science: Earth and Environmental Science 2020
University of Michigan, Ann Arbor, Michigan
Thesis: *Liquidus Determination of the Fe-S and (Fe, Ni)-S Systems at 14 and 24 GPa: Implications for the Mercurian Core*
GPA: 4.00/4.00

Bachelor of Arts Major: Geology, Physics 2018
Augustana College, Rock Island, Illinois
South Dakota School of Mines and Technology, Volcanology Field Camp
Senior Thesis: *The Humite Mineral Group*
Junior Thesis: *Sea Level Budget along the East Coast of North America*
GPA: 3.73/4.00

ACADEMIC AWARDS:

Total Awarded for Academic and Research Excellence > $50,000

National Science Foundation, Earth Sciences Postdoctoral Fellowship (EAR-PF), 2025
Submitted–January, not awarded, 3/4 reviewers rated project as "Excellent"
Carnegie Science, Earth & Planets Laboratory Postdoctoral Fellowship, *Awarded* 2025
Arizona State University, Exploration Fellowship in Earth and Space Sciences, *Finalist* 2025
Michigan State University, Alfred J. Ruth Zeits Endowed Fellowship ($20,000) 2024
Facility for Open Research in a Compressed Environment (FORCE), Corning Incorporated Student Poster Award ($250) 2024
Michigan Space Grant Consortium, Graduate Fellowship ($5000) 2023
National Nuclear Security Administration, Stewardship Science Academic Program, Outstanding Poster Award 2023
Inclusive STEM Teaching Project, Certificate of Completion 2023
Mineralogical Society of America, Grant for Research in Crystallography ($5000) 2022
Michigan Space Grant Consortium, Graduate Fellowship ($5000) 2022
Michigan State University, Department of Earth and Environmental Science, Lucile and Gordon Pringle Fellowship ($1500) 2022
National Science Foundation, GRFP, *Honorable mention* 2020
University of Michigan, Rackham Graduate Student Research Grant ($1500) 2019
Geological Society of America, Ian SE Carmichael Research Award ($2500) 2019

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University of Michigan, Department of Earth and Environmental Science Turner Grant (~$2000/award)	2018, 2019
Phi Beta Kappa	2018
Augustana College, Department of Geology, Departmental Distinction	2018
Augustana College, Department of Physics, Excellence in Research Award	2018
Augustana College, Hasselmo Prize for Academic Pursuit ($5000)	2017
Augustana College, Department of Geology, Dr. C. Leland Hornberg Academic Scholarship (~$500/award)	2015, 2017

Total Awarded for Meeting Attendance ~ $9,000

Facility for Open Research in a Compressed Environment (FORCE), Travel funding ($500)	2024
International Union of Crystallography, High-Pressure Workshop, Young and Early Career Scientists Award	2022
Michigan State University, Graduate School Travel Fellowship ($600)	2022
Michigan State University, Department of Earth and Environmental Science Travel award (~$800/award, 7 awards received)	2021 – 2025
American Geophysical Union, Travel Grant (~$500/award)	2016, 2017

RESEARCH EXPERIENCE:

Arizona State University, Postdoctoral Research Scholar 07/2025 – Present
Advisor: Dan (Sang-Heon) Shim

Lawerence Livermore National Laboratory, Physics Division Graduate Student – Summer 2024 05/2024 – 06/2025
Advisor: Earl F. O'Bannon III
I performed ultra-high-pressure experiments in the diamond anvil cell coupled with Raman spectroscopy to characterize secondary pressure calibrations above 1 Mbar. (After September 2024, in an ongoing academic collaboration with LLNL).

Michigan State University, Research Assistant 10/2020 – 06/2025
Advisor: Susannah M. Dorfman
I performed high pressure-temperature experiments in the diamond anvil cell coupled with synchrotron radiation to experimentally constrain the origin of anisotropy in the inner core and determine mineralogical stability of major mantle phases within the lower mantle.

University of Michigan, Graduate Student Researcher 05/2018 – 08/2020
Advisor: Jie Li

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I performed high-pressure-temperature experiments in a multi-anvil apparatus to investigate the liquidus of Fe-Ni-S alloys and constrain the core compositions of small terrestrial bodies (e.g. Mars and Mercury).

Augustana College, Undergraduate Researcher 09/2017 – 05/2018
Mentors: Michael Wolf and Stephen Gramsch
I performed ultra-high temperature metamorphism experiments on clinohumite in the Paris Edinbrugh Cell and cold-seal vessels to experimentally constrain olivine and ilmenite growth conditions in the Alps.

Geophysical Laboratory Carnegie Institute, Undergraduate Researcher 06/2017 – 08/2017
Mentor: Stephen Gramsch
Using diamond anvil cells and Raman spectroscopy, I determined the stability of norbergite, chondrodite, humite, and clinohumite from 1bar - 20GPa.

Lamont-Doherty Earth Observatory, REU 06/2016 – 08/2016
Mentor: James Davis
Generated a numerical model using PERL and MATLAB to calculate sea level rise along the East Coast of North America. Correlating tide gauge data to ocean density/dynamics, GIA, inverted barometer effect, and mass exchange with ice sheets.

TEACHING EXPERIENCE

Teaching Assistant Fall 2023
The Dynamic Earth (GLG 201)
Michigan State University; East Lansing, MI
Taught lab sections, worked 1-on-1 with students, and made improvements to labs.

Teaching Assistant Fall 2020, 2024
Mineralogy and Geochemistry (GLG 321)
Michigan State University; East Lansing, MI
Taught lab sections, worked 1-on-1 with students, updated, improved, and converted laboratory assignments to be accessible with an online platform.

Graduate Student Instructor Summer 2020
Energy and the Environment (Earth 344)
University of Michigan; Ann Arbor, MI
Taught and facilitated discussion-based lab sections in a virtual environment, worked 1-on-1 with students, and graded lab assignments.

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Graduate Student Instructor Fall 2019
Earth Materials (Earth 315)
University of Michigan; Ann Arbor, MI
Modified, taught, and improved laboratory assignments. Graded lab assignments and worked 1-on-1 with students.

Teaching Assistant 2015 – 2018
Phys & Environ Geology (GEOL 101)
Augustana College Geology Department; Rock Island, IL
Assisted the professor in teaching the lab, graded labs, and ran study sessions.

Teaching Assistant 2015 – 2018
Principles of Physics (PHYS 101, PHYS 102, PHYS 103)
Acoustics (PHYS 105)
Basic Physics (PHYS 203)
Augustana College Physics Department; Rock Island, IL
Assisted the professor in teaching the lab, graded labs, and ran study sessions.

Geology and Physics Tutor 2016 – 2018
GEOL 101, GEOL 116, GEOL 112, GEOL 340,
PHYS 101, PHYS 102, PHYS 201, PHYS 202
Augustana College Learning Commons; Rock Island, IL

PUBLICATIONS

Listed here include: 4 first author publications and 1 first author publication under review

Allison Pease, Claire Zurkowski, Stella Chariton, Heidi Krauss, Daniel Sneed, Vitali Prakapenka, Bruce Baer, Susannah M. Dorfman, Earl F. O'Bannon, *Raman Scattering of Rhenium Under Extreme Pressures for Secondary Pressure Calibration (JAP)*

Allison Pease, Jiachao Liu, Mingda Lv, Jack Piper, Yoshio Kono, Susannah M. Dorfman, 2025, *Liquid Structure of Iron-Nitrogen-Carbon Alloys within the Cores of Small Terrestrial Bodies* **(*JGR-Planets*)**

Allison Pease, Jiachao Liu, Mingda Lv, Yuming Xiao, Katherine Armstrong, Dmitry Popov, Lowell Miyagi and Susannah M. Dorfman, 2024, *Strength, plasticity, and spin transition of Fe-N compounds in planetary cores* (***PEPI***)

Allison Pease and Jie Li, 2022, Liquidus Determination of the Fe-S and (Fe, Ni)-S Systems at 14 and 24 GPa: Implications for the Mercurian Core **(*EPSL*)**

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Allison Pease, Daniel Sneed, Cara Vennari, Earl F. O'Bannon, *High-pressure Cr3+ luminescence of a natural $MgAl_2O_4$ spinel to 55 GPa (submitted)*

Mario Cueva Calderón, **Allison Pease**, Wanyue Peng, Megan Rylko, Susannah M. Dorfman, and Alexandra Zevalkink, *Compressibility and High-Pressure Structure of $CaMg_2Bi_2$ and $YbMg_2Bi_2$ (under review)*

PRESENTATIONS

Listed here are 30 presentations with 2 invited oral presentations among 10 oral presentations.

2025

Allison Pease*, Reproducing Planetary Interiors in the Lab Through Extreme Pressure–Temperature Experiments,* Invited Oral Presentation, Augustana College.

Allison Pease*, From Diamonds to Mantle Dynamics: The Role of Davemaoite in Earth's Deep Interior,* Oral Presentation, Augustana College.

Allison Pease, *Exploring the properties of planetary interiors using experimental techniques,* Oral Presentation, Geological Society of America (GSA).

2024

Allison Pease, Claire Zurkowski, Stella Chariton, Daniel Sneed, Vitali Prakapenka, Earl O'Bannon. *Raman Scattering of Rhenium Under Extreme Pressures for Secondary Pressure Calibration,* poster*,* American Geophysical Union (AGU).

Allison Pease, Jiachao Liu, Mingda Lv, Yuming Xiao, Katherine Armstrong, Dmitry Popov, Lowell Miyagi, and Susannah M. Dorfman. *Generating anisotropy in planetary cores through the deformation of iron nitrides and iron carbides,* poster, American Geophysical Union (AGU).

Luisa Chavarria, Hannah Bausch, **Allison Pease**, Vitali Prakapenka, Katherine Armstrong, Maddury Somayazulu, Susannah M. Dorfman. *Lower Mantle ferropericlase as a major reservoir for sodium,* Goldschmidt.

Allison Pease, Jiachao Liu, Jack Piper, Mingda Lv, Yoshio Kono, and Susannah M. Dorfman. *Liquid Structure of Iron and Iron-Nitrogen-Carbon Alloys within the Cores of Terrestrial Bodies,* Oral Presentation, Geological Society of America (GSA).

Allison Pease, Mario Cueva Calderón, Stella Chariton, Vitali Prakapenka and Susannah M. Dorfman, *Thermal Equation of State of Transition-Metal-Bearing Ca-perovskite (Davemaoite) and implications for the lower mantle,* Invited Oral Presentation*,* Corning.

Allison Pease, Jack Piper, Mingda Lv, Jiachao Liu, Yoshio Kono, and Susannah M. Dorfman. *Liquid Structure of Iron-Nitrogen-Carbon Alloys within the Cores of Terrestrial Bodies*, poster, Stewardship Science Academic Programs Symposium (SSAP).

Allison Pease, Mario Cueva Calderón, Stella Chariton, Vitali Prakapenka and Susannah M. Dorfman, *Thermal Equation of State of Transition-Metal-Bearing Davemaoite and Implications for Large Low Shear Velocity Provinces (LLSVPs),* poster*,* Facility for Open Research in a Compressed Environment (FORCE).

2023

Allison Pease, Mario Cueva Calderón, Stella Chariton, Vitali Prakapenka and Susannah M. Dorfman, *Thermal Equation of State of Transition-Metal-Bearing Davemaoite and Implications for Large Low Shear Velocity Provinces (LLSVPs),* poster, American Geophysical Union Fall Meeting (AGU).

Jack Piper, **Allison Pease**, Mingda Lv, Jiachao Liu, and Susannah M. Dorfman. *Experimental Measurements of the Structure of Liquid Iron Nitrogen Alloys*, poster, American Geophysical Union Fall Meeting (AGU)

Allison Pease, Mario Cueva Calderón, Stella Chariton, Vitali Prakapenka and Susannah M. Dorfman, *Thermal Equation of State of Transition-Metal-Bearing Davemaoite and Implications for Large Low Shear Velocity Provinces (LLSVPs),* Oral Presentation, Michigan Space Grant Consortium Fall Conference (MSGC)

Susannah M. Dorfman, **Allison Pease**, Byeongkwan Ko, Mario Calderón-Cueva, Stella Chariton, Vitali Prakapenka. *Solid solution in Perovskites and Effects on Thermoelastic Properties of Planetary Materials,* From disks to planets: formation and early evolution, Academia Sinica, Taipei Taiwan

Miles McNall, Hailey Becker, Ahnalee Brincks, Diane Doberneck, Andrew George, **Allison Pease**. *Exploring Impact Identities to Build Relationships with Communities*, Panel Discussion, Engagement Scholarship Consortium Conference

Jack Piper, **Allison Pease**, Susannah M. Dorfman. *Experimental Measurements of the Structure of Liquid Iron Nitrogen Alloys*, poster, Mid-Michigan symposium for undergraduate research experience (Mid-Sure)

Allison Pease, Mario Cueva Calderón, Stella Chariton, Vitali Prakapenka and Susannah M. Dorfman. *Stability of Mn-rich Perovskites at High Pressures and Temperatures Implications for Hot Regions of the Mantle,* Gordon Research Conference-Interior of the Earth (GRC)

Allison Pease, Mario Cueva Calderón, Stella Chariton, Vitali Prakapenka and Susannah M. Dorfman. *Structural Variation in Silicate Perovskites in the Mn-Fe-Ca-Mg System,* poster, Geological Society of America (GSA)

Allison Pease, Mingda Lv, Jiachao Liu, Benjamin Brugman, Stella Chariton, Vitali Prakapenka, Yuming Xiao, Changyong Park, Dmitry Popov, and Susannah M. Dorfman *Nitride Spin Transition Under Nonhydrostatic Compression and the Strength of Fe Nitrides*, poster, Stewardship Science Academic Programs Symposium (SSAP)

2022

Allison Pease, Mario Cueva Calderón, Stella Chariton, Vitali Prakapenka and Susannah M. Dorfman. *Structural Variation in Silicate Perovskites in the Mn-Fe-Ca-Mg System,* poster, IUCr High-Pressure Workshop-Advanced Crystallography

Allison Pease, Mario Cueva Calderón, Stella Chariton, Vitali Prakapenka and Susannah M. Dorfman. *Structural Variation in Silicate Perovskites Facilitated by Differences in Composition and Oxidation State,* poster, Understanding Oxygen fugacity in Geoscience International School

Allison Pease, Mingda Lyu, Heidi Krauss, Jiachao Liu, Benjamin Brugman, Yuming Xiao, Changyong Park, Dmitry Popov, and Susannah M. Dorfman*, Broadening of Fe-Nitride Spin Transitions Under Nonhydrostatic Compression and Impacts on the Strength of Fe-Nitrides,* Oral Presentation, Consortium of Materials Properties Research in Earth Sciences (COMPRES)

Allison Pease, Mingda Lv, Jiachao Liu, Benjamin Brugman, Stella Chariton, Vitali Prakapenka, Yuming Xiao, Changyong Park, Dmitry Popov, and Susannah M. Dorfman, *Deformation of Iron Nitrides and Implications for Planetary Cores*, poster, Gordon Research Conference-High Pressure (GRC)

2021

Allison Pease, Mingda Lv, Jiachao Liu, Benjamin Brugman, Dmitry Popov, Yue Meng, Stella Chariton, Vitali Prakapenka, and Susannah M. Dorfman, *Deformation of Iron Nitrides*, Oral Presentation, Consortium of Materials Properties Research in Earth Sciences (COMPRES)

Allison Pease, Mingda Lv, Jiachao Liu, Benjamin Brugman, Dmitry Popov, Yue Meng, Stella Chariton, Vitali Prakapenka, and Susannah M. Dorfman, *Deformation of Iron Nitrides*, poster, Stewardship Science Academic Programs Symposium (SSAP) and American Geophysical Union (AGU)

2019

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Allison Pease and Jie Li, *Liquidus Curves of the Fe-S System, Implications for Planetary Core Solidification*, poster, Consortium of Materials Properties Research in Earth Sciences (COMPRES)

2018

Allison Pease and Jie Li, *Liquidus Determination of the Fe-S and (Fe, Ni)-S System at 24 GPa with Implications for Planetary Cores*, Oral Presentation, American Geophysical Union (AGU)

Allison Pease, and Stephen Gramsch, *A Comparison of the Raman Spectra of the Humite Mineral Group at High Pressures,* poster, Geological Society of America (GSA)

2017

Allison Pease and Stephen Gramsch, A Comparison of the Raman Spectra and Crystal Chemistry of Norbergite and Clinohumite at High Pressure, poster, American Geophysical Union (AGU)

2016

Allison Pease and James Davis*, Sea Level Budget for the East Coast of North America*, poster, American Geophysical Union (AGU)

BEAMTIME ALLOCATIONS AS PI/EXPERIMENTAL LEAD

National Lab	Sector - Beamline	Cycle	# of 8-hour shifts awarded
Berkeley	12.2.2	2024 – 2	3
Brookhaven	4 – BM	2024 – 2	9
Berkeley	12.2.2	2023 – 2	6
Berkeley	12.2.2	2023 – 1	9
Argonne	16 – IDB	2023 – 1	6
Argonne	13 – IDD	2023 – 1	3
Argonne	16 – IDD	2022 – 3	12
Argonne	13 – IDD	2022 – 3	2
Argonne	16 – IDB	2022 – 3	6
Argonne	16 – IDB	2022 – 2	6
Argonne	13 – IDD	2022 – 2	3
Argonne	16 – IDD	2022 – 2	9
Argonne	16 – IDD	2022 – 1	12
Argonne	16 – BMD	2022 – 1	2
Argonne	13 – IDD	2022 – 1	3
Argonne	16 – IDB	2022 – 1	3
Argonne	13 – IDD	2021 – 3	2
Argonne	16 – IDB	2020 – 1	6

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Argonne	13 – IDD	2020 – 1	3

SERVICE

AGU Session Proposed 2025
DI09. Mantle Phase Transitions and their Impact on Convection, Evolution, and Interior Structure

NC-NE-GSA Session Chair 2025
T7. Outer Space Rocks! Enhancing the Understanding of our Planetary Neighbors

AGU Session Convener 2023
DI13-Exploring Earth's Mantle Heterogeneities through Imaging, Modeling, Geochemistry, and Experiments

NC-GSA Session Chair 2023
T31. The Origin of Compositional and Thermal Heterogeneity within Earth's Interior

Peer Reviewer of Research Articles Submitted to:
American Minerologist
Physics and Chemistry of Minerals

STEM Ambassador 2022–2023

Michigan State University, Science Festival Presenter
"Salt Science: Why Crystals Form Perfect Cubes" Spring 2025
"The Magic of Mineral-Based Paint" Spring 2024
"Testing the Electrical Conductivity of Minerals" Spring 2024
"Let's Grow Bismuth Crystals" Spring 2023
"What is in the box?" Spring 2023
"How rocks flow like water" Spring 2022

Michigan State University, Graduate Student Organization, Department of Earth and Environmental Science Department 2020–2025
Treasurer (2024–2025)
Student Representative to Faculty (2022–2024)
Symposium planning committee (2022–2024)
Organizer of the incoming graduate student camping trip

Advancement for Women in Science (AWIS) 2019–2020
Member, Outreach volunteer

University of Michigan, Society for Advancement of Hispanics/Chicanos and Native Americans in Science (SACNAS) 2018
Outreach volunteer

Let's Rock at Longfellow Elementary 2018
Presented hands-on earth science concepts to 3rd–5th graders

Sigma Gamma Epsilon, Honor Society 2017–2018
President (2017–2018)

Epsilon Sigma Alpha, Service Sorority 2014–2018

Member

Augustana College, Planetarium and Geology Museum Outreach Volunteer 2014–2018

Augustana College, Udden Geology Club 2014–2018
President (2017–2018)
Activities Coordinator (2016–2017)

Augustana College, Physics and Engineering Society 2014–2018
Member, Outreach volunteer

STUDENTS TRAINED OR MENTORED AT MSU

Student on Sapphire Track within GEMs Program, 2023
Mentored a senior external to MSU applying to graduate school and submitting the NSF-GRFP

Student on Ruby Track within GEMs Program 2023
Mentored a junior external to MSU learning about graduate school and research opportunities

Devika Padmakumar 2023–2024
Trained to perform diamond anvil cell experiments

Jack Piper 2022–2024
Mentored undergraduate at MSU on a research project: presentation, data analysis, literature review

Haozhe Wang 2022–2023
Trained to perform diamond anvil cell experiments

Jose Jimenez Gonzalez 2022–2023
Trained to perform diamond anvil cell experiments

Luisa Fernanda Chavarria Chavarria 2022–2023
Trained to perform diamond anvil cell experiments

SUMMARY of RESEARCH SKILLS

High-pressure-temperature devices: diamond anvil cells (symmetric, panoramic, laser-heated panoramic, mini-bx80, bx-90, modified bx-90, Diacell One20DAC, toroidal), multi-anvil apparatus (Walker), Paris Edinburgh cell, cold-seal vessels, gas mixing furnace.

Analysis Techniques: radial X-ray diffraction, axial X-ray diffraction, energy dispersive X-ray diffraction, Raman spectroscopy, scanning electron microscope (SEM/EDS), x-ray emission spectroscopy (XES), electron microprobe analyzer (EPMA), focused ion beam (FIB), Auger electron spectroscopy (AES), X-ray Absorption Near Edge Spectroscopy (XANES).

Software used: MAUD, CrysAlis, GSAS-II, Igor, PeakPo, GULP, MATLAB, Python, HeFESTo, aEDXD, Glassure

Synchrotrons used: APS (sector 16), APS (sector 13), ALS (sector 12), NSLS-II (sector 4)