

Kate Roberts

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Education

Boston University, Ph.D. in Astronomy Sep 2022 – ~May 2027
Boston University, M.A. in Astronomy Sep 2022 – Nov 2024
Thesis: *Constraining Energy Transfer and Dynamics in Jupiter's Upper Atmosphere Using H_3^+* .
Advisor: Prof. Luke Moore

Kalamazoo College, B.A. in Physics and Studio Art, minor in Applied Math Sep 2018 – Mar 2022
Graduated *summa cum laude* with highest award of *honors* in physics.
Thesis: *The Surface Composition of Anomalous Asteroids as a Window into the Early Solar System*.
Advisors: Prof. Katherine de Kleer (Caltech), Prof. Arthur Cole (Kalamazoo College), Received *honors*.

Positions

Graduate Research Fellow, Boston University May 2023 - ~May 2027
Post-Bacc Research Fellow, California Institute of Technology Mar 2022 - Jun 2022
SURF Student Researcher, California Institute of Technology Jun 2021 - Aug 2021
REU Student Researcher, Michigan State University May 2020 - Jul 2020

Publications

Short-term and localized variability in Jupiter's upper atmosphere.* **K. Roberts, L. Moore, J. O'Donoghue, C. Schmidt, et al. In Prep.

A Global View of Jupiter's Upper Atmosphere Through H_3^+ . **K. Roberts**, L. Moore, J. O'Donoghue, H. Melin, et al. 2026, ApJL, 998 L13.

Spatiotemporal Variations of Temperature in Jupiter's Upper Atmosphere. **K. Roberts**, L. Moore, J. O'Donoghue, H. Melin, et al. 2025, PSJ, 6, 92.

Ionospheric Balance Height at the Giant Planets.* L. Moore, O. Agiwal, I. Mueller-Wodarg, et al. incl. **K. Roberts, In Prep.

Short-Term Variability of Jupiter's Satellite Footprints as Spotted by JWST. K.L. Knowles, H. Melin, T. S. Stallard, et al. incl. **K. Roberts**, 2026, GRL, 53.

JWST Discovers the Vertical Structure of Uranus' Ionosphere. P.I. Tiranti, H. Melin, L. Moore, et al. incl. **K. Roberts**, 2026, GRL, 53.

Photochemistry in Jupiter's ionosphere: insights from simultaneous H_3^+ and electron density observations during Juno perijove 54. L. Moore, H. Melin, et al. incl. **K. Roberts**, 2026, PSJ, 7, 25.

Unraveling Jupiter's Enigmatic Ionosphere: Evidence of Magnetically-Controlled Wind-Driven Dynamics. O. Agiwal, L. Moore, T. Bloch, et al. incl. **K. Roberts**, 2025, GRL, 52.

Pole-to-Pole Vertical Ionospheric Profiles at Jupiter from JWST. P.I. Tiranti, H. Melin, L. Moore, et al. incl. **K. Roberts**, 2025, JGRA, 130.

Magnetic Silhouettes in Jupiter's Non-Auroral Ionosphere. K.L. Knowles, T. S. Stallard, J. O'Donoghue, et al. incl. **K. Roberts**, 2025, JGRA, 130.

Sub-auroral Heating at Jupiter Following a Solar Wind Compression. J. O'Donoghue, L. Moore, H. Melin, et al. incl. **K. Roberts**, 2025, GRL, 52.

Funding

Future Investigators in NASA: Earth, Space Science, and Technology 2023 - 2026
Why are the Giant Planets so Hot? Determining the Dominant Heat Sources in Jupiter's Upper Atmosphere

Student Travel Grant 2023 - 2026

For 2026 Division of Planetary Sciences meeting.

For 2025 joint meeting of the Division of Planetary Sciences and Europlanet Science Congress.

For 2024 American Geophysical Union conference.

For 2023 joint meeting of the Division of Planetary Sciences and Europlanet Science Congress.

Massachusetts Space Grant

Summer 2022, 2023

Why are the Giant Planets so Hot? Determining the Dominant Heat Sources in Jupiter's Upper Atmosphere

Chasing Shadows in Jupiter's Ionosphere

Observing Programs

Keck KSMS Program N166, Co-I

2026B - 2028A

Joint Keck-Juno observations of Jupiter, its moons, and its magnetosphere, 11 nights.

JWST Program #11553, Co-I

Cycles 5-9; 2026-2031

Playing the long game: Observing the long-term temperature trend of Neptune's upper atmosphere.

IRTF Program #994, PI

2025B

Observing short-term variability in Jupiter's upper atmosphere, 12 hours.

JWST Program #8147, Co-I

Cycle 4, 2025

Chasing the Great Red Spot: exploring coupling between Jupiter's atmospheric layers, 15.60 hours.

IRTF Program #054, PI

2025A

'In the Hot Seat': Jupiter's equatorial upper atmosphere, 18 hours.

Keck KSMS Program N174, Co-I

2024A - 2025B

Joint Keck-Juno observations of Jupiter, its moons and its magnetosphere, 14.25 nights.

JWST Program #5308, Co-I

Cycle 3, 2024

Hunting for the source of Saturn's atmospherically driven aurora, 11.64 hours.

Talks & Posters

Dissertation Talk, Division of Planetary Sciences Conference

Oct 2026

Constraining short-term and localized sources of variability in Jupiter's upper atmosphere.

Invited Talk, Conference on Magnetospheres of the Outer Planets

Jul 2026

Global Long-Term Stability and Local Short-Term Variability in Jupiter's Upper Atmosphere.

Invited Talk, Trinity College Dublin

Jul 2026

A Global View of Jupiter's Upper Atmosphere.

Invited Talk, Kalamazoo College Society of Physics Students

Feb 2026

Jupiter's Upper Atmosphere.

Contributed Talk, Boston Area Planetary Science Meeting

Jan 2026

A Global View of Jupiter's Upper Atmosphere.

Contributed Talk, ISSI International Team 23-592

Sep 2025

Short-term Variability in Jupiter's Upper Atmosphere.

Contributed Talk, DPS-EPSC Joint Meeting

Sep 2025

Jupiter's Stable Upper Atmosphere: Mapping Long-term Temperature Trends and Ionospheric Density Structures.

Contributed Talk, Boston Area Planetary Science Meeting

May 2025

Spatiotemporal Variations of Temperature in Jupiter's Upper Atmosphere.

Poster, American Geophysical Union Annual Meeting

Dec 2024

High-Resolution Maps of Magnetically Organized Temperature and Density Structures in Jupiter's Upper Atmosphere.

Poster , Conference on Magnetospheres of the Outer Planets Jupiter's Upper Atmosphere: Observations of Temporal Variations in Temperature. (page 99, Poster A06)	Jul 2024
Contributed Talk , ISSI International Team 23-592 Lat-Long Variations in Temperature & Density via Keck Observations in Jupiter's Upper Atmosphere.	Feb 2024
Poster , DPS-EPSC Joint Meeting Mapping Temporal and Spatial Temperature Variations in Jupiter's Upper Atmosphere.	Oct 2023
Contributed Talk , Kalamazoo Math-Physics-Computer Science SIP Fest The Surface Composition of Anomalous Asteroids as a Window into the Early Solar System.	Apr 2022
Contributed Talk , Caltech Student-Faculty Programs Seminar Day The Surface Composition of Anomalous Asteroids as a Window into the Early Solar System.	Apr 2022
Poster , Division of Nuclear Physics Conference Machine learning for improved resolution and fast predictions in a parallel-plate avalanche counter with optical readout (O-PPAC).	Oct 2020

Experience

US Research Software Sustainability Institute , Summer School Attendee	Aug 2025
Boston University , Graduate Teaching Fellow for two courses (AS100, AS101)	Sep 2022 - May 2023
Kalamazoo College , Teacher's Assistant for 9 courses (PHYS150, PHYS152, PHYS220, PHYS370)	Jan 2020 - Mar 2022
Kalamazoo College , Math & Physics Center Consultant	Sep 2019 - Mar 2022

Service

Boston University , Astronomy Science Nugget Display (Organizer)	2024 - Present
Boston University , Inclusive Astronomy: Astro365 (Volunteer)	2022 - Present
Boston University , Public Open Night at the Observatory (Volunteer)	2022 - Present
Boston University , Astronomy Graduate Student Department Representative	Jul 2023 - Jul 2024
Boston University , Prospective Student Visit Day (Volunteer)	2024 - Present
Kalamazoo College , Department Student Advisor: Physics, 3/2 Engineering	2021 - 2022
Kalamazoo College , ΣΠΣ, the Physics and Astronomy Honors Society (Founder, President)	2021 - 2022
Kalamazoo College , Society of Physics Students (President, VP)	2018 - 2022

Honors & Awards

- Recipient of the 2022 Kalamazoo College John Wesley Hornbeck Prize for Highest Achievement in Advanced Physics as a Senior Major
- Leading Senior Consultant of the Kalamazoo College Math and Physics Center (2021-2022)
- Society of Physics Students Notable Chapter (2020-2021)
- Recipient of the 2019 Kalamazoo College Cooper Prize for Outstanding Work in First Year Physics
- Recipient of the 2019 Kalamazoo College Brian Gougeon Prize for Outstanding Work in First Year Art

Mentoring

Russell Mapaye, Undergraduate Student, Boston University <i>Now a PhD Student at Aberystwyth University</i>	2022 - 2024
Nico McMahon, Undergraduate Student, Boston University <i>Now a PhD Student at Rochester Institute of Technology</i>	2022 - 2024
Jay LoMonaco, Undergraduate Student, Boston University	2022 - 2024
Jonah Beurkens, Undergraduate Student, Kalamazoo College <i>Now a PhD Student at University of California Merced</i>	2021 - 2022
Matthew Nelson, Undergraduate Student, Kalamazoo College <i>Now a PhD Student at University of Illinois Urbana-Champaign</i>	2021 - 2022
Claire Kvande, Undergraduate Student, Kalamazoo College <i>Now a PhD Student at University of Washington</i>	2020 - 2022