Paula do Vale Pereira, Ph.D.

Incoming Assistant Professor – Aerospace Engineering

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Interests: Space Exploration, Satellite Engineering, Thermomechanical Engineering, R&D.
Starting as an Assistant Professor at the **Florida Institute of Technology** in August 2022.

Work Experience

Aug 2021 – April 2022 — Pasadena, CA - USA
Visiting Researcher
NASA Jet Propulsion Lab
Working in section 394 (Mission Systems Engineering), developing probes for the exploration of Europa (moon of Jupiter).

May 2018 – May 2022 — Cambridge, MA - USA
Graduate Research Assistant
Space Telecomms, Astronomy and Radiation Lab
Developing, assembling, testing, and operating small spacecraft; modeling and experimentally studying probes for Europa (Jupiter).

May 2020 – Aug. 2020 — Northridge, CA - USA
Optical and Satellite Systems Intern
Facebook Connectivity Labs
Optimized design of radio unit enclosures for thermal dissipation; designed efficient, low-cost radio mount for large scale manufacturing.

Jan. 2019 – May 2020 — Cambridge, MA - USA
Graduate Research Assistant
Media Lab Space Exploration Initiative
Led the technical side of the Climate CubeSat Co-build (C3), teaching satellite engineering to children from underrepresented minorities.

Aug. 2019 – Oct. 2019 — Northridge, CA - USA
Optical and Satellite Systems Intern
Facebook Connectivity Labs
Tested and analyzed the thermal effects of laser beams on fast steering mirrors; improved and prototyped structure of Wi-Fi units.

May 2018 – Aug. 2018 — Austin, TX - USA
Graduate Summer Researcher
Stone Aerospace
Advanced the strategy of ice penetration; designed probe components; developed radiation hardening test strategies.

Feb. 2014 – Aug. 2017 — Florianopolis, Brazil
Graduate Research Student
POLO – Research Laboratories
Modeled and experimentally studied the formation of frost on airplane windows. Developed mitigation strategies.

Aug. 2013 – Feb. 2014 — Giengen, Germany
Refrigeration R&D Intern
Bosch and Siemens Home Appliances
Optimized the efficiency and minimized the power consumption of household refrigerators with parallel evaporators.

June 2010 – Aug. 2013 — Florianopolis, Brazil
Undergrad Research Student
POLO – Research Laboratories
Performed theoretical and experimental research on state-of-the-art refrigeration systems.

Jan. 2012 – July 2012 — London, England
Visiting Research Student
Imperial College London
Developed new graphene-based nanocomposite materials; characterized and optimized the designed materials.

Education

Sep. 2019 – May 2022 — GPA 5.0 / 5.0
Ph.D. in Aeronautics and Astronautics
Massachusetts Institute of Technology
Thesis: An Experimental Approach to Melt Probes for Europan Cryogenic Ice. Advisor: Prof. Kerri Cahoy.

May 2020 – July 2020 — Thermal Lead
Planetary Science Summer School
NASA Jet Propulsion Lab, Team X
PhD students learn to develop hypothesis-driven space exploration missions with concurrent engineering.

Sep. 2017 – June 2019 — GPA 5.0 / 5.0
Master's Degree in Aeronautics & Astronautics
Massachusetts Institute of Technology
Thesis: Folded lightweight actuated position system for CubeSat deployables. Advisor: Prof. Kerri Cahoy.

Mar. 2014 – March 2017
Master's Degree in Mechanical Engineering
Federal University of Santa Catarina (Brazil)
Thesis: Theoretical and experimental analysis of the water vapor deposition process on aircraft windows. Advisors: Prof. Claudio Melo (*in mem.*) and Prof. Jader Riso Barbosa Jr.

Mar. 2009 – Aug. 2015 — Cum laude
Bachelor's Degree in Business & Management
State University of Santa Catarina (Brazil)

Mar. 2009 – Feb. 2014 — Summa cum laude
Bachelor's Degree in Mechanical Engineering
Federal University of Santa Catarina (Brazil)

Awarded NASA Proposals

NASA Scientific Exploration Subsurface Access Mechanism for Europa (SESAME)
- Collaborated on the proposal writing of "Prometheus". This award funds my PhD project.

NASA Early-Stage Innovations
- Collaborated on the proposal writing of the "Miniature Optical Steered Antenna for for Intersatellite Communication".

NASA CubeSat Launch Initiative
- Collaborated on the proposals of BeaverCube 1 and BeaverCube 2 and currently working on those projects.

NASA Breakthrough, Innovative and Game-changing Idea Challenge
- Collaborated on the proposal of a multifunctional lunar tower, which is competing for a launch in the Artemis Program.

NASA Revolutionary Aerospace Systems Concepts Academic Linkage – Special Edition
- Collaborated on the proposal of a drill-heater rig for extraction of water on Mars and currently working on the project.

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Published Journal Papers

1. R. E. Morgan, E. S. Douglas, G. Allan, **P. do Vale Pereira**, J. N. Gubner, C. Haughwout, T. Murphy, J. Merk, M. Egan, G. Furesz, D. Roascio, Y. Xin, K. Cahoy. "Optical calibration and first light for the Deformable Mirror Demonstration Mission CubeSat (DeMi)", *Journal of Astronomical Telescopes, Instruments*, and Systems, 2021, 7, 2.
2. E. S. Douglas, G. Alla, R. Morgan, B. G. Holden, J. Gubner, C. Haughwout, **P. do Vale Pereira**, Y. Xin, J. Merk, K. Cahoy. "Small Mirrors for Small Satellites: Design of the Deformable Mirror Demonstration Mission CubeSat (DeMi) Payload", *Frontiers in Astronomy and Space Sciences*, 2021, 8, 126.
3. E. M. Spiers, J. M. Weber, C. Venigalla, A. M. Annex, C. P. Chen, C. Lerr, P. C. Gray, K. J. McIntyre, J. R. Berdis, S. R. Carberry Mgan, **P. do Vale Pereira**, S. Kumar, W. O'Neill, E. A. Czajka, P. E. Johnson, A. Pascuzzo, S. Tallapragada, D. Phillips, K. Mitchell, A. Nash, J. Scully, L. Lowes. "Tiger: Concept Study for a New Frontiers Enceladus Habitability Mission", *The Planetary Science Journal*, 2021, 2, 195.
4. **P. do Vale Pereira**, M. T. Hunwardsen, and K. Cahoy. "Characterization of Laser Thermal Loading on Microelectromechanical Systems-Based Fast Steering Mirror in Vacuum", Optical Engineering, 2020, 59, 5.
5. **P. do Vale Pereira** and C. Melo. "A Methodology to measure the rates of air infiltration into refrigerated compartments", *International Journal of Refrigeration*, 2019, 97, 88-96.
6. R. E. Morgan, E. S. Douglas, G. Allan, P. Bierden, S. Chakrabarti, T. Cook, M. Egan, G. Furesz, J. N. Gubner, T. Groff, C. A. Haughwout, B. G. Holden, C. B. Mendillo, M. Ouellet, **P. do Vale Pereira**, A. J. Stein, S. Thibault, X. Wu, Y. Xin, and K. Cahoy. "MEMS Deformable Mirrors for Space-Based High-Contrast Imaging", *Micromachines*, 2019, 10, 6.
7. S. Barg, F. M. Perez, N. Ni, **P. do Vale Pereira**, R. C. Maher, E. Garcia-Tuñon, S. Eslava, S. Agnoli, C. Mattevi, E. Saiz. "Mesoscale assembly of Chemically modified graphene into complex cellular networks", *Nature Communications*, 2014, 5:4328.
8. L. L. C. Wong, S. Barg, A. Menner, **P. do Vale Pereira**, G. Eda, M. Chowalla, E. Saiz, A. Bismarck. "Macroporous polymer nanocomposites synthesised from high internal phase emulsion templates stabilised by reduced graphene oxide", *Polymer*, 2014, 55, 395-402.
9. C. Melo, F. T. Knabben, **P. do Vale Pereira**. "An experimental study on defrost heaters applied to frost-free household refrigerators", *Applied Thermal Engineering*, 2013, 51, 239-245.

Patent

1. K. Cahoy, C. Haughwout, J. Clark, **P. do Vale Pereira**. "Liquid-lens Based Optical Steering System for Free-Space Laser Communication", *Patent US10,826,609*.

Journal Papers in Preparation

1. **P. do Vale Pereira**, M. Durka, B. P. Hogan, K. Richmond, M. W. Smith, D. P. Winebrenner, T. W. Elam, B. J. Hockman, A. Lopez, N. Tanner, J. Moor, J. Ralston, W. Zimmerman, N. Flannery, W. Kuhl, K. Cahoy, T. A. Cwik, W. C. Stone. "Experimental Validation of Cryobot Thermal Models for the Exploration of Ocean Worlds", submitted to *The Planetary Science Journal* on April 15th.
2. M. W. Smith, **P. do Vale Pereira**, S. Howell. "Likelihood of Time to Reach the Ocean of Europa", to be submitted to *Acta Astronautica*.
3. **P. do Vale Pereira**, K. G. Rosa, L. F. Back, J. R. BarbosaJr , C. Melo. "Frost formation on airplane windows – Part A: Numerical Approach", to be submitted to the *International Journal of Heat and Mass Transfer*.
4. **P. do Vale Pereira**, L. F. Back, K. G. Rosa, J. R. Barbosa Jr, C. Melo. "Frost formation on airplane windows – Part B: Experimental Approach", to be submitted to the *International Journal of Heat and Mass Transfer*.

Book Chapters

1. **P. do Vale Pereira**, K. Chun, M. Contreras, C. Lindsay, S. Kacker, C. Houghwout, K. Cahoy. "FLAPS". "Into the Anthropocosmos: A Whole Space Catalog from the MIT Space Exploration Initiative", edited by A. Ekblaw, *The MIT Press*, 2021.
2. A. Normandin, D. Najjar, **P. do Vale Pereira**, M. Sarang, S. Stickley, T. SabellShavit, F. Santos, R. Freedline, R. Kundargi, "Climate CubeSat Co-Build (C3)". "Into the Anthropocosmos: A Whole Space Catalog from the MIT Space Exploration Initiative", edited by A. Ekblaw, *The MIT Press*, 2021.

Conference Papers

1. P. C. Serra, H. Tomio, O. Cierny, W. Kammerer, P. Grenfell, G. Gunnison, J. Kusters, C. Payne, **P. do Vale Pereira**, D. Mayer, J. Stupl, J. Hanson, S. Barke, M. Clark, T. Ritz, D. Coogan, J. Conklin, K. Cahoy. "CubeSat laser infrared crosslink mission status", International Conference on Space Optics, 2021.
2. E. M. Spiers, J. M. Weber, C. Venigalla, A. M. Annex, J. Berdis, C. P. Chen, C. Lee, A. C. Pascuzzo, E. Czajka, **P. do Vale Pereira**, P. Gray, S. Kumar, K. J. McIntyre, D. Phillips, S. Tallapragada, S. R. Carberry Mogan, P. Johnson, W. O'Neill, K. L. Mitchell, A. E. Nash, J. E. Scully. "TIGER: JPL PSSS Architecture and Feasibility Study for a New Frontiers 5 Mission Concept to Enceladus", Lunar and Planetary Science Conference, 2021.

[Continues next page]

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Conference Papers (Cont'd)

3. **P. do Vale Pereira**, B. Holden, R. Morgan, J. Gubner, T. J. Murphy, C. Haughwout, G. Allan, Y. Xin, W. Kammerer, K. Cahoy, E. Douglas, J. Merk, M. Egan, and G. Furesz. "Thermomechanical Design and Testing of the Deformable Mirror Demonstration Mission (DeMi) CubeSat", 34th Small Satellite Annual Conference, 2020.
4. **P. do Vale Pereira**, M. Garcia, M. Schroeder, H. Caldelas, C. Lindsay, A. Choi, K. Pfrang, A. Gagnon, P. McKeen, J. Clark, T. J. Murphy, C. Haughwout, and K. Cahoy. "BeaverCube: Coastal Imaging with VIS/LWIR CubeSats", 34th Small Satellite Annual Conference, 2020.
5. O. Cierny, P. Serra, W. Kammerer, P. Grenfell, G. Gunnison, J. Kusters, C. Payne, **P. do Vale Pereira**, K. Cahoy, T. Ritz, J. Conklin, D. Mayer, J. Stupl, and J. Hanson. "Testing of the CubeSat Laser Infrared Crosslink (CLICK-A) Payload", 34th Small Satellite Annual Conference, 2020.
6. G. C. Lordos, C. Amy, B. Browder, M. Chan, C. Dawson, **P. do Vale Pereira**, S. I. Dolan, T. Hank, E. D. Hinterman, B. Martell, A. Miller, C. O'Neill, N. Stamler, J. Todd, N. Wang, M.-A. Begin, V. T. Padia, D. J. Newman, O. L. de Weck, J. Hoffman. "Autonomously Deployable Tower Infrastructure for Exploration and Communication in Lunar Permanently Shadowed Regions", AIAA ASCEND Conference, 2020.
7. F. Fogle, O. Cierny, **P. do Vale Pereira**, W. Kammerer, and K. Cahoy. "Miniature Optical Steerable Antenna for Intersatellite Communications Liquid Lens Characterization", IEEE Aerospace Conference, 2020.
8. M. T. Hunwardsen, **P. do Vale Pereira**, and K. Cahoy. "Characterization of Laser Thermal Loading on a MEMS FSM in Vacuum", IEEE International Conference on Space Optical Systems and Applications, 2019.
9. **P. do Vale Pereira**, K. S. Chun, M. M. Contreras, C. Lindsay, S. Kacker, R. Huffman, C. Haughwout, and K. Cahoy. "Folded Lightweight Actuator Positioning System (FLAPS)", 33rd Small Satellite Annual Conference, 2019.
10. B. Holden, R. Morgan, G. Allan, **P. do Vale Pereira**, W. Grunwald, J. Gubner, C. Haughwout, A. Stein, Y. Xin, K. Cahoy, E. Douglas, J. Merk, M. Egan, and G. Furesz. "Calibration and Testing of the Deformable Mirror Demonstration Mission (DeMi) CubeSat Payload", 33rd Small Satellite Annual Conference, 2019.
11. P. Serra, O. Cierny, R. Diez, P. Grenfell, G. Gunnison, W. Kammerer, J. Kusters, C. Payne, T. J. Murphy, T. Sevigny, **P. do Vale Pereira**, L. Yenchesky, and K. Cahoy. "Optical Communications Crosslink Payload Prototype Development for the CubeSat Laser Infrared Crosslink (CLICK) Mission", 33rd Small Satellite Annual Conference, 2019.
12. L. Yenchesky, O. Cierny, P. Grenfell, W. Kammerer, **P. do Vale Pereira**, T. Sevigny, and K. Cahoy. "Optomechanical Design and Analysis for Nanosatellite Laser Communications", 33rd Small Satellite Annual Conference, 2019.
13. R. Morgan, G. Allan, E. Douglas, **P. do Vale Pereira**, M. Egan, G. Furesz, J. Gubner, C. Haughwout, B. Holden, J. Merk, T. J. Murphy, A. Stein, Y. Xin, and K. Cahoy. "Optical Modeling and Testing of the Deformable Mirror Demonstration Mission (DeMi) CubeSat Payload", Astronomical Optics Conference: Design, Manufacture, and Test of the Space and Ground Systems II, 2019.
14. G. Allan, E. S. Douglas, D. Barnes, M. Egan, G. Furesz, W. Grunwald, J. Gubner, C. Haughwout, B. G. Holden, **P. do Vale Pereira**, A. J. Stein, and K. Cahoy. "The Deformable Mirror Demonstration Mission (DeMi) CubeSat: Optomechanical Design Validation and Laboratory Calibration", Space Telescopes and Instrumentation Conference: Optical, Infrared, and Millimeter Wave, 2018.
15. **P. do Vale Pereira**, A. Sgrott, L. F. Back, D. T. Kohara, and C. Melo. "A Methodology to measure the rates of air infiltration into refrigerated compartments", International Refrigeration and Air Conditioning Conference, 2016.

Teaching Experience

Class mentor, MIT 16.83 & 16.831, 2019-2020
- Helped students with the mechanical design of a CubeSat.

Teaching Assistant, MIT 2.00A, 2018
- Led laboratory sessions and notebook evaluations under Prof. Dan Frey. Teaching evaluation: 6.9 out of 7.0.

High School Teacher, Space Exploration, 2018
- Taught after-hours classes at the Cambridge Rindge and Latin School through the Innovation League program.

Substitute Lecturer, Thermodynamics, 2016-2017
- Lectured approx. 10 classes to undergraduate sophomores.

High School Teacher, Mathematics, 2015-2016
- Volunteer teacher to underrepresented students for passing university entrance exams.

Teaching Assistant, Fluid Mechanics, 2012
- Led office hours and exam evaluations.

Students Mentored

Refrigeration and Air Conditioning Research
- Andre Sgrott, Debora Kohara, Luiz F. Medeiros

Airplane Frosting Research
- Matheus Cé, Lucas Back, Kaio G. da Rosa

Spacecraft and Mechanisms Design Research
- Mario Contreras, Charles Lindsay, Shreeyam Kacker, Ethan Sit, Ronak Roy, Joe Ward, Tim Grazier, Alex Choi

Space Exploration Probes Research
- William Kuhl, Sandra Li, Max Thomsen

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Selected Honors & Awards

First Place & Most Water Collected, NASA, 2021
- For extraction of water under regolith (RASC-AL SE Challenge).

AAS Molly K. Macauley Award, 2021
- As a future space industry leader.

MIT OGE TVML Fellow, 2021/22
- For strong academic, research, and community involvement.

Rising Star in Aerospace, 2021
- Hosted at MIT, organized by UC Boulder, Stanford & MIT.

Best Path to Flight Award, NASA, 2020
- For innovative tower for lunar infrastructure (BIG Idea).

Rising Star in Mechanical Engineering, 2020
- Hosted at UC Berkeley, organized by UC B., Stanford, & MIT.

MIT AeroAstro Student Leadership Award, 2020
- For commitment to student support during the pandemic.

AIAA/Aviation Week 20 Twenties, 2020
- 20 tomorrow's technologies leaders, all STEM students.

Líderes Estudar Fellowship, 2019
- Among the 40 finalists selected from over 50,000 applicants.

Amelia Earhart Fellow, 2019/20
- 30 women w/ superior academic record in aerospace.

MIT Graduate Woman of Excellence, 2019
- For dedication on improvement in student experience.

AIAA Achievement Award, 2018
- For designing and building a wind tunnel for outreach.

Summa cum Laude, 2014
- Undergrad in Mechanical Eng., Fed. Univ. Santa Catarina.

SAE AeroDesign International Competition, 2013
- Third place overall Micro Class, Best Payload Fraction.

SAE AeroDesign National Competition, 2012
- First place overall Micro Class.

State Univ. Santa Catarina Entrance Exam, 2008
- First place of 11,837 contestants.

Federal Univ. Santa Catarina Entrance Exam, 2008
- First place of 30,854 contestants.

Summa cum Laude, 2008
- High school: Curso e Colégio Energia.

Summa cum Laude & Valedictorian, 2005
- Middle school: Educandário Imaculada Conceição.

Regional Math. Olympiad Gold Medal, 2005
- First place of middle school students in the state.

Licenses & Certificates

Graduate Certificate in Aerospace Innovation, 2022
- By MIT AeroAstro & MIT Innovation Initiative.

CPR (Cardiopulmonary Resuscitation), 2022
- By the American Heart Association.

NASA Space Mission Operator, 2021
- By Teaching Science and Technology, Inc.

Graduate Certificate in Technical Leadership, 2021
- By MIT Gordon Engineering Leadership Program.

Amateur Radio Technician Operator License, 2018
- By the US Federal Communications Commission (FCC).

Selected Service

AIAA Small Satellite Technical Committee
- Subcommittee on Technical Affairs, Subcommittee on Communications.

MIT Institute Committees
- Presidential Advisory Cabinet, Ad Hoc Committee on Graduate Advising and Mentoring.

Conference and Journal Reviewer
- Journal of Small Satellites, AIAA ASCEND Conference, AIAA SciTech Conference.

Technical Judge
- NASA TechRise Future Engineers, Imperial College Aerospace Hackathon.

Selected Invited Talks

TEDx Boca Raton
- "Why should we keep looking for alien life?" Jan. 29th, 2022.

Innovalab 2020
- "What I've learned by putting a satellite into space and why it matters". June 20th, 2020.

IEEE Geoscience and Remote Sensing Society
- "Overview of the MIT Space Telecommunications, Astronomy, and Radiation Laboratory". Nov. 22nd, 2019.

Selected Volunteer Work

The Innovation League: High-School Teacher
- Teach space exploration to underprivileged students, 2018

English Debate Society Floripa: Co-founder
- Help undergrads develop argumentation skills in English, 2017

NGO Brasil Cursinhos: Partnerships Coordinator
- Help financially maintain the education-focused NGO, 2017

NGO Einstein Floripa: High-School Teacher
- Teach mathematics to underprivileged students, 2015 & 2016

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Satellites in Space

Deformable Mirror Demonstration Mission

- Designed, modelled, and iterated on payload structure;
- Made detailed CAD models and drawings for fabrication;
- Worked on satellite manufacturing, integration, and testing;
- Launched on February 15th, 2020; deployed on July 13th, 2020;
- Currently in the ground command team, uplinking commands and downlinking telemetry and data packets.

BeaverCube 1 & 2

- Designed, modeled, and iterated on satellite structure;
- Made detailed CAD models and drawings for fabrication;
- Currently leading assembly, integration and testing;
- To be launched in mid 2022.

CLICK A, B/C

- Tested mirror thermomechanical integrity under heating;
- Supported the mechanical design of the payload;
- Worked on the optical fiber routing in the payload;
- CLICK A to be launched in 2022, B/C to be launched in 2023.

Folded Lightweight Actuation Positioning System

- Designed preliminary payload and guided final design;
- To be launched in 2022 onboard Slingshot (Aerospace Corp).

Selected Student Groups

HYDRATION II – NASA RASC-AL SE Challenge

- Drilling and water collection subsystem; Oct. 2019 – On going

MELLTT – NASA BIG Idea Challenge

- Ideation, payload mech. design, testing; Oct. 2019 – Jan 2021

MIT Maker Works Machine Shop

- Mentor & 3D Printer Team Member, Jan. 2018 – On going

Graduate Women of Aerospace Engineering

- Mentoring and Outreach Director, Sept. 2017 – On going

Céu Azul Aerodesign Competition Team

- Leader of the aerodynamics team, Dec. 2011– Aug. 2013

Skills & Competences

Space Systems, Thermomechanical Engineering, Satellite Engineering, Heat Transfer, CAD, CAM, FEA, Matlab, STK, Python.

References

Prof. Kerri Cahoy

Associate Prof. of Aeronautics and Astronautics; Bisplinghoff Faculty Fellow; Small Satellite Center Co-director

Massachusetts Institute of Technology

kcahoy@mit.edu

Prof. Olivier de Weck

Apollo Program Prof. of Astronautics and Engineering Systems; Small Satellite Center Co-director; GEL Program Co-director

Massachusetts Institute of Technology

deweck@mit.edu

Prof. Daniel Frey

Prof. of Mechanical Engineering; D-Lab Director

Massachusetts Institute of Technology

danfrey@mit.edu

Prof. Daniel Hastings

Cecil and Ida Green Education Professor; AeroAstro Department Head; Associate Dean of Engineering for Diversity, Equity, and Inclusion

Massachusetts Institute of Technology

hastings@mit.edu

Prof. Paula Hammond

Institute Professor; Chemical Engineering Department Head

Massachusetts Institute of Technology

hammond@mit.edu