

Thomas González Roberts

77 Massachusetts Avenue, 37-360, Cambridge, MA 02139 | thomasgr@mit.edu | thomasgroberts.com

EDUCATION

Massachusetts Institute of Technology (Cambridge, MA)

Ph.D., Aeronautics and Astronautics 2021 – Present
S.M., Aeronautics and Astronautics 2020 – 2021
S.M., Technology and Policy 2019 – 2021

Princeton University (Princeton, NJ)

A.B., Astrophysical Sciences, *with Honors* 2012 – 2016
Certificate, Russian and Eurasian Studies 2012 – 2016

PROFESSIONAL EXPERIENCE

Space Security & Policy **Center for Strategic and International Studies** (Washington, D.C.)
Adjunct Fellow (Non-Resident); Aerospace Security Project (ASP) 2019 – Present
Program Manager and Research Associate; ASP 2018 – 2019
Program Coordinator and Research Assistant; ASP 2016 – 2018

École Polytechnique Fédérale de Lausanne (Lausanne, Switzerland)
Visiting Researcher; EPFL Space Center (eSpace) Summer 2023

Massachusetts Institute of Technology (Cambridge, MA)
Graduate Teaching Assistant; Visiting Prof. David W. Thompson Fall 2019

Space Science & Engineering **Massachusetts Institute of Technology** (Cambridge, MA)
NSF Graduate Research Fellow; Aeronautics and Astronautics (AeroAstro) 2021 – Present
Graduate Research Assistant; AeroAstro 2019 – 2021
Undergraduate Research Supervisor; AeroAstro 2019 – 2020

National Aeronautics and Space Administration (Greenbelt, MD)
Graduate Researcher; Conjunction Assessment and Risk Analysis (CARA) Summer 2022

Planet Labs Inc. (San Francisco, CA)
Matthew Isakowitz Fellow; Orbits Research & Development Summer 2021

Princeton University (Princeton, NJ)
Research Assistant, Department of Astrophysics; Prof. Bruce T. Draine Summer 2014

PUBLICATIONS & RESEARCH

Articles in Refereed Journals [Mitigating Noncooperative RPOs in Geosynchronous Orbit](#). *Ether Journal of Strategic Airpower & Spacepower* 1(4) (January 13, 2023). With Kaitlyn Johnson and Brian Weeden.

[Space-based Sensor Tasking using Deep Reinforcement Learning](#). *Journal of the Astronautical Sciences* (November 11, 2022). With Peng Mun Siew, Daniel Jang, and Richard Linares.

[A Sustainable Geostationary Space Environment Requires New Norms of Behavior](#). *MIT Science Policy Review* 1 (August 20, 2020). With Carson Bullock.

[Why a Space-Based Missile Interceptor System Is Not Viable](#). *The Bulletin of the Atomic Scientists* 74 (July 2, 2018).

Conference Papers

[End-to-End Behavioral Mode Clustering for Geosynchronous Satellites](#). *24th Advanced Maui Optical and Space Surveillance Technologies Conference* (September 19-22, 2023). With Victor Rodriguez-Fernandez, Peng Mun Siew, Haley E. Solera, and Richard Linares. Featured in [Breaking Defense](#).

[AI SSA Challenge Problem: Satellite Pattern-of-Life Characterization Dataset and Benchmark Suite](#). *24th Advanced Maui Optical and Space Surveillance Technologies Conference* (September 19-22, 2023). With Peng Mun Siew, Haley E. Solera, Daniel Jang, Victor Rodriguez-Fernandez, Jonathan P. How, and Richard Linares.

[Geosynchronous Satellite Behavior Classification via Unsupervised Machine Learning](#). *9th International Academy of Astronautics Space Traffic Management Conference* (March 1-2, 2023). With Haley E. Solera and Richard Linares.

[Geosynchronous Satellite Pattern of Life Node Detection and Classification](#). *9th International Academy of Astronautics Space Traffic Management Conference* (March 1-2, 2023). With Haley E. Solera and Richard Linares.

[A Survey of International Telecommunication Union \(ITU\) Space Station License Applications in the Geosynchronous Orbital Regime \(GEO\)](#). *23rd Advanced Maui Optical and Space Surveillance Technologies Conference* (September 27-30, 2022). With Richard Linares.

[Cislunar Space Situational Awareness Sensor Tasking using Deep Reinforcement Learning Agents](#). *23rd Advanced Maui Optical and Space Surveillance Technologies Conference* (September 27-30, 2022). With Peng Mun Siew, Daniel Jang, Richard Linares, and Justin Fletcher.

[A Survey of Longitudinal-Shift Maneuvers Performed by Geosynchronous Satellites from 2010 to 2021](#). *73rd International Astronautical Congress* (September 18-22, 2022). With Richard Linares.

[A Deep Reinforcement Learning Application to Space-based Sensor Tasking for Space Situational Awareness](#). *22nd Advanced Maui Optical and Space Surveillance Technologies Conference* (September 14-17, 2021). With Peng Mun Siew, Daniel Jang, and Richard Linares.

[Geosynchronous Satellite Maneuver Classification via Supervised Machine Learning](#). *22nd Advanced Maui Optical and Space Surveillance Technologies Conference* (September 14-17, 2021). With Richard Linares.

[What could we do with a 20-meter tower on the Lunar South Pole? Applications of the Multifunctional Expandable Lunar Lite & Tall Tower \(MELLTT\)](#). *AIAA ASCEND Conference* (November 16-18, 2020). With Jeff Hoffman, et al.

[Satellite Repositioning Maneuver Detection in Geosynchronous Orbit Using Two-line Element \(TLE\) Data](#). *71st International Astronautical Congress* (October 12-14, 2020). With Richard Linares.

- Pre-prints & Working Papers** [A Method for Assessing Satellite Operators' Compliance with Geosynchronous Orbital Assignments](#). Submitted to *Acta Astronautica* (October 9, 2023). With Richard Linares.
- Who is following the rules in space? Assessing GEO satellite operators' compliance with ITU orbital assignments. *Center for Strategic and International Studies*. Forthcoming.
- Reports** [Lunar Policy Handbook](#). *Moon Dialogs* (March 2023). Edited by Harshita Khera, Héloïse Vertadier, Jessy Kate Schingler, and Christopher Johnson.
- [Boost-Phase Missile Defense: Interrogating the Assumptions](#). *Center for Strategic and International Studies* (June 24, 2022). With Ian Williams, Masao Dahlgren, and Tom Karako.
- [Space Threat Assessment 2020](#). *Center for Strategic and International Studies* (March 30, 2020). With Todd Harrison, Kaitlyn Johnson, Tyler Way, and Makena Young. Featured in [The New York Times](#) and [National Defense Magazine](#).
- [Space Threat Assessment 2019](#). *Center for Strategic and International Studies* (April 4, 2019). With Todd Harrison and Kaitlyn Johnson. Featured in [The Economist](#), [SpaceNews](#), and [Breaking Defense](#).
- [Spaceports of the World](#). *Center for Strategic and International Studies* (March 13, 2019). Featured in [National Geographic](#).
- [Space Threat Assessment 2018](#). *Center for Strategic and International Studies* (April 11, 2018). With Todd Harrison and Kaitlyn Johnson. Featured in [DefenseNews](#) and [The Daily Beast](#).
- [Escalation and Deterrence in the Second Space Age](#). *Center for Strategic and International Studies* (October 3, 2017). With Todd Harrison, Zack Cooper, and Kaitlyn Johnson. Featured in [Breaking Defense](#).
- [Beyond the RD-180](#). *Center for Strategic and International Studies* (March 21, 2017). With Todd Harrison, Andrew Hunter, and Kaitlyn Johnson. Featured in [Defense One](#).
- [Implications of Ultra-Low-Cost Access to Space](#). *Center for Strategic and International Studies* (March 21, 2017). With Todd Harrison, Andrew Hunter, and Kaitlyn Johnson. Featured in [SpaceNews](#) and [Quartz](#).
- Academic Theses** Measuring Compliance to the International Telecommunication Union's Geosynchronous Orbital Assignments. Ph.D. Dissertation, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology. Forthcoming. Advised by Richard Linares, Olivier de Weck, Moriba Jah, and Brian Weeden.
- [Geosynchronous Satellite Maneuver Classification and Orbital Pattern Anomaly Detection via Supervised Machine Learning](#). S.M. Thesis, Technology and Policy Program and Department of Aeronautics and Astronautics, Massachusetts Institute of Technology (June 2021). Advised by Richard Linares.
- [Estimating Encounters: An Assessment of Space Debris Collision Risk in Low-Earth Orbit From 1960 to 2015](#). A.B. Thesis, Department of Astrophysical Sciences, Princeton University (May 2016). Advised by Christopher Chyba.

Popular Articles

[We need to get our space junk problem under control.](#) *The Washington Post* (August 22, 2023).

[What Can 24 Satellites Do for U.S. Missile Defense?](#) *Center for Strategic and International Studies* (October 18, 2018). Featured in [SpaceNews](#).

[Beyond the Glass Ceiling: Why NASA Must Continue to Launch a Diverse Astronaut Corps.](#) *Center for Strategic and International Studies* (July 31, 2018).

[President Trump Wants His Moonshot Without Paying for It.](#) *SpaceNews* (February 15, 2018).

[Deterrence in the Last Sanctuary.](#) *War on the Rocks* (January 2, 2018). With Zack Cooper.

[Bad Idea: Space-based Missile Interceptors.](#) *Defense360* (December 19, 2017). Featured in [SpaceNews](#) and [Voice of America](#).

[Why We Should Be Worried about a War in Space.](#) *The Atlantic* (December 15, 2017).

[The Evolution of Space as a Contested Domain.](#) *SpaceNews Magazine* (October 10, 2017). With Todd Harrison, Zack Cooper, and Kaitlyn Johnson.

Multimedia

[Satellite Dashboard.](#) Interactive data repository. *Secure World Foundation, Center for Strategic and International Studies, and the University of Texas at Austin* (2021).

[Unusual Behavior in GEO: Olymp-K and SJ-17.](#) Interactive data repositories. *Center for Strategic and International Studies* (April 4, 2019). Featured in [Breaking Defense](#).

[Moonstruck.](#) Podcast miniseries. *DraftHouse Media*. Featured in [The New York Times](#), [The Irish Times](#), and Apple iTunes Top 3 Science Podcasts (July 2019).

1. [Space is Dangerous](#) (March 21, 2018), featuring Todd Harrison;
2. [Bodies in Orbit](#) (April 4, 2018), featuring Kris Lehnhardt;
3. [Space Germs](#) (April 25, 2018), featuring John C. Stonesifer;
4. [The Privilege to Fly](#) (May 23, 2018), featuring Margaret Weitekamp and Jeanette Epps;
5. [Disaster Strikes](#) (September 19, 2018), featuring Sean O'Keefe; and
6. [The Hand-Me-Down Space Suit](#) (October 10, 2018), featuring Luca Parmitano and Dava Newman.

[Space-Based Missile Defense: How Much is Enough?](#) Interactive data repository. *Center for Strategic and International Studies* (July 2, 2018). Featured in [The Verge](#) and [National Defense Magazine](#).

Databases & Repositories

[ITU Compliance Assessment Monitor](#) (ITU-CAM). GitHub repository. *Massachusetts Institute of Technology* (June 14, 2023).

[Space Launch to Low Earth Orbit: How Much Does It Cost?](#) Interactive data repository. *Center for Strategic and International Studies* (September 2, 2020). Featured in [Bloomberg](#).

[Spaceports of the World.](#) Interactive data repository. *Center for Strategic and International Studies* (August 22, 2018). Featured in [National Geographic](#).

[History of the NASA Budget.](#) Interactive data repository. *Center for Strategic and International Studies* (February 12, 2018).

AWARDS & GRANTS

- 2024 [Forbes 30 Under 30 in Science](#), *Forbes Magazine*. In recognition of early-career leadership in science.
- 2023 [Prize for Innovation in Global Security](#), *Geneva Centre for Security Policy*. In recognition of scholars' innovative approaches to addressing international security challenges.
- [Prize for Open Data](#), *MIT School of Science and the MIT Libraries*. In recognition of the creation, use, and dissemination of open-access datasets in early-career research at MIT.
- [International Strategy Forum PhD Research Fellowship](#), *Schmidt Futures*. In support of field research at the intersection of technology and foreign policy in Switzerland, Austria, and the Czech Republic.
- [ThinkSwiss Research Scholarship](#), *Switzerland State Secretariat for Education, Research and Innovation*. In support of a visiting researcher position at the EPFL Space Center in Lausanne, Switzerland.
- [MIT-Switzerland Travel Grant](#), *MIT International Science and Technology Initiatives (MISTI)*. In support of field research at the International Telecommunication Union in Geneva, Switzerland.
- 2022 [Graduate Student Council \(GSC\) Conference Grant](#), *Massachusetts Institute of Technology*. In support of participation in the International Academy of Astronautics' Space Traffic Management Conference.
- Excellent Reviewer, *American Institute of Aeronautics and Astronautics*. In recognition of peer review service to the [Journal of Guidance, Control, and Dynamics](#).
- 2021 [National Science Foundation Graduate Research Fellowship \(NSF GRFP\)](#), *National Science Foundation*. In recognition of academic achievement and graduate research potential.
- Matthew Isakowitz Fellowship, [Matthew Isakowitz Fellowship Program](#). In recognition of leadership potential in the commercial spaceflight industry.
- [Ford Foundation Predoctoral Fellowship](#) Honorable Mention, *National Academies of Sciences, Engineering, and Medicine*. In recognition of academic achievement and graduate research potential.
- [Graduate Student Council \(GSC\) Conference Grant](#), *Massachusetts Institute of Technology*. In support of participation in the Adv. Maui Optical and Space Surveillance Technologies (AMOS) Conference.
- 2019 Baumgartner Employee Achievement Award, *Center for Strategic and International Studies*. In recognition of employee achievement beyond one's typical duties at CSIS.
- 2015 [Harry S. Truman Scholarship](#), *Harry S. Truman Scholarship Foundation*. In recognition of undergraduate academic achievement, leadership potential, and dedication to public service.
- 2014 Undergraduate Research Grant, *National Science Foundation*. In support of participation in Princeton's [Undergraduate Summer Research Program](#) for astrophysics.
- 2013 [Fred Fox Award](#), *Princeton University*. In support of participation in the [Princeton in St. Petersburg Program](#) for intensive Russian language study.

PRESENTATIONS

Invited Lectures

Who is Following the Rules in Space? Assessing GEO Satellite Operators' Compliance with ITU Orbital Assignments.

- [Sam Nunn School of International Affairs](#), Georgia Institute of Technology, Atlanta, GA (January 30, 2024).
- [Radiocommunication Bureau](#), International Telecommunication Union, Geneva, Switzerland (January 9, 2024).
- [European Space Policy Institute](#), Vienna, Austria (January 8, 2024).
- [United Nations Office for Outer Space Affairs](#), Vienna, Austria (January 8, 2024).
- [Astronomical Inst. of the Czech Academy of Sciences](#), Prague, Czech Republic (January 3, 2024).
- [Outer Space Institute](#), University of British Columbia, Vancouver, Canada (November 21, 2023).
- [Space Enterprise Initiative](#), RAND Corporation, Santa Monica, CA (October 27, 2023).
- [Open Data @ MIT](#), MIT Libraries, Cambridge, MA (October 24, 2023).
- [Future Leaders in Aerospace Symposium](#), MIT Department of Aeronautics and Astronautics, Cambridge, MA (October 12, 2023).
- *eSpace Seminar*, [EPFL Space Center](#), Lausanne, Switzerland (July 5, 2023).
- [Space Sustainability Rating Working Group](#), MIT Media Lab, Cambridge, MA (April 19, 2023).

Threats to Space Systems.

- [The Future of Outer Space Security](#), Geneva Centre for Security Policy, Geneva, Switzerland (October 19, 2022).
- *Center for Space Policy and Strategy Seminar Series*, The Aerospace Corporation, Crystal City, VA (July 26, 2022).
- [The Future of Outer Space Security](#), Geneva Centre for Security Policy, Geneva, Switzerland (September 1, 2021).
- *The Ultimate High Ground: U.S. Special Operations and Space*, Joint Special Operations University, MacDill AFB, FL (February 20, 2020). With Kaitlyn Johnson.
- *Space Systems Laboratory Seminar*, Massachusetts Institute of Technology, Cambridge, MA (September 30, 2019).
- [The Future of Outer Space Security](#), Geneva Centre for Security Policy, Geneva, Switzerland (June 12, 2019).
- [Sam Nunn Security Program](#), Georgia Institute of Technology, Washington, D.C. (March 19, 2019).
- [Understanding National Security Space](#), Center for Strategic and International Studies, Washington D.C. (November 7, 2018). With Kaitlyn Johnson.
- [The Future of Outer Space Security](#), Geneva Centre for Security Policy, Geneva, Switzerland (June 20, 2018).

Technological Innovations in Space. [Innovation Day 2022](#), Geneva Centre for Security Policy, Geneva, Switzerland (November 23, 2022).

Satellite Orbits: Popular Orbits, Orbital Elements, and TLEs. *Space Situational Awareness and Artificial Intelligence Undergraduate Research Opportunities Program*, Massachusetts Institute of Technology, Cambridge, MA (September 26, 2019).

Diversity in the NASA Astronaut Corps. [D.C. to Houston: Aerospace Technology and Space Exploration](#), *The New York Times Student Journeys*, Washington, D.C. (June 26, 2019).

**Panel
Discussions**

AI for Peace and Security in Space. *SpaceTech*, Massachusetts Institute of Technology, Cambridge, MA (April 3, 2024). With Kaitlyn Johnson, Brian Weeden, and Jessica West.

The Global Nature of Space Traffic Management. *10th International Academy of Astronautics Space Traffic Management Conference* (February 28, 2024). With Rosa Ma. Ramírez de Arellan y Haro, Nathaniel D. Dailey, Deigo Guerra, Doug Ligor, and Daniel Porras.

Artificial Intelligence for Space. *9th International Academy of Astronautics Space Traffic Management Conference* (March 2, 2023). With Benjamin Fugee-Miller and Haley E. Solera.

Space Situational Awareness Technology Policy. *23rd Advanced Maui Optical and Space Surveillance Technologies* (September 28, 2022). With Nathaniel Dailey, Lauren Hale, and Ewan Wright.

[Threats, Challenges, and Opportunities in Space](#). *Center for Strategic and Int'l Studies*, Washington, D.C. (April 6, 2020). With Kaitlyn Johnson, Victoria Samson, Brian Weeden, and Makena Young.

[Evaluating the Global Counterspace Landscape](#). *Center for Strategic and International Studies*, Washington, D.C. (April 23, 2019). With Victoria Samson, Brian Weeden, and Kaitlyn Johnson.

The Space Industry's Next Big Thing. [Space Generation Fusion Forum 2019](#), *Space Generation Advisory Council*, Colorado Springs, CO (April 6, 2019). With Jamie Morin and Alice Bunn.

Charting the Landscape: Markets, Financing, and Policy. *Bechtel Space Forum & Workshop*, [Bechtel Corporation](#), Reston, VA (March 26, 2019). With Jamie Morin, Mike French, and Ron Epstein.

[Assessing Threats to Space Systems](#). *Center for Strategic and International Studies*, Washington, D.C. (June 5, 2018). With Todd Harrison, Victoria Samson, Brian Weeden, and Kaitlyn Johnson.

**Workshops &
Conference
Presentations**

Looking into the Future of Earth-Space Sustainability: Three Scenarios by 2030. [Space Capacity Allocation for the Sustainability of Space Activities](#), *Politecnico di Milano*, Milan, Italy, (June 8, 2023). With Xiao-Shan Yap, Emmanuelle David, and Adrien Saada.

Improving the Transparency of Rendezvous and Proximity Operations in GEO. [AMOS Dialogue](#), *Secure World Foundation*, Maui, HI (September 16, 2021). With Brian Weeden.

Implications of Low-Cost Space Launch for Space-Based Missile Defense. Workshop. *Missile Defense Project*, *Center for Strategic and International Studies*, Washington, D.C. (January 13, 2021).

Reorganizing U.S. Military Space. Workshop. [The Future of Outer Space Security](#), *Geneva Centre for Security Policy*, Geneva, Switzerland (June 12, 2019).

Spaceports of the World.

- *International Space Development Conference*, Arlington, VA (June 6, 2019).
- *Office of Commercial Space Transportation*, *Federal Aviation Administration*, Washington, D.C. (April 15, 2019).
- *Bechtel Space Forum & Workshop 2019*, [Bechtel Corporation](#), Reston, VA (March 26, 2019).

GPS Spoofing and Jamming. Workshop. [The Future of Outer Space Security](#), *Geneva Centre for Security Policy*, Geneva, Switzerland (June 20, 2018).

Escalation and Deterrence in the Second Space Age.

- *Strategic Multilayer Assessment (SMA) Annual Conference*, Washington, D.C. (December 20, 2017). With Todd Harrison and Kaitlyn Johnson.
- [DuPont Summit on Science, Technology, and Environmental Policy](#), Washington, D.C. (December 1, 2017). With Kaitlyn Johnson.

Anti-Satellite Weapons in the United States, the Soviet Union, and China. *Washington Summer Institute, Harry S. Truman Scholarship Foundation*, Washington, D.C. (July 25, 2016).

Effect of Grain Shape on FIR Polarization Efficiencies. [Undergraduate Summer Research Program](#), *Department of Astrophysics, Princeton University*, Princeton, NJ (August 7, 2014).

SERVICE & MEMBERSHIPS

Harry S. Truman Scholarship Foundation (Washington, D.C.)

Member, MIT Nomination Committee	2019 – Present
Senior Scholar, Truman Scholars Leadership Week	Beginning 2024
Truman-Albright Fellow	2016 – 2019
Member, Georgetown University Nomination Committee	2017 – 2019
Member, Princeton University Nomination Committee	2015 – 2016

MIT Career Advising & Professional Development (Cambridge, MA)

Member, Distinguished Fellowships Committee	2021 – Present
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MIT AeroAstro Latin-American Students (Cambridge, MA)

Co-Founder	2023 – Present
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MIT Division of Student Life (Cambridge, MA)

Graduate Resident Advisor, Simmons Hall	2021 – Present
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Harvard College Russian-Speaking Students Association (Cambridge, MA)

Member	2023 – Present
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Matthew Isakowitz Fellowship Program (Santa Monica, CA)

Mentor	2022 – Present
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Smithsonian National Air and Space Museum (Washington, D.C.)

Volunteer Docent	2016 – 2019
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Alumni Association, Princeton University (Washington, D.C.)

Admissions Interviewer	2018 – 2019
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Sigma Xi Scientific Research Society

Associate Member	2016 – Present
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SKILLS

Foreign Language

Spanish: heritage speaker.

Russian: advanced working proficiency.

- Princeton University, 8 semesters (Certificate of Proficiency, 2016);

- Derzhavin Institute, 1 semester (Princeton-in-Petersburg Program, 2013); and
- Harvard University, 5 semesters (Bronze Medal, National Post-Secondary Russian Essay Contest, *American Council of Teachers of Russian*, 2023).

Programming **Data analysis and management:** *Python, Mathematica, MATLAB, SQL.*

Mapping and data visualization: *QGIS, Tableau, AGI Systems Tool Kit, Highcharts, Carto.*

Print and design: *LaTeX, Adobe Creative Suite, Microsoft Office, Apple iWork.*

REFERENCES

Academic [Richard Linares](#). Associate Professor of Aeronautics and Astronautics, *Massachusetts Institute of Technology*.

[Moriba K. Jah](#). Associate Professor of Aerospace Engineering and Engineering Mechanics, *The University of Texas at Austin*.

[Olivier de Weck](#). Professor of Astronautics and Engineering Systems, *Massachusetts Institute of Technology*.

Professional [Brian Weeden](#). Director of Program Planning, *Secure World Foundation*.

[Todd Harrison](#). Senior Fellow, *American Enterprise Institute*.

[Kaitlyn Johnson](#). Deputy Director, Chief of Space Operations' Strategic Initiatives Group, *United States Space Force*.

Contact information available upon request.