Manwei Chan

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EDUCATION

Massachusetts Institute of Technology (MIT)

PhD Candidate in Aeronautics and Astronautics, Draper Fellow, NSF Fellow, Matthew Isakowitz Fellow

May 2019, Master of Science in Aeronautics and Astronautics (GPA: 3.9)

Thesis: "Guidance Algorithm for Docking with a Tumbling Satellite in GEO"

The Johns Hopkins University

May 2016, Bachelor of Science in Physics and Math (Double Major) (GPA: 3.92), Phi Beta Kappa

May 2016, Master of Science in Physics (Master's and Bachelor's done concurrently) (GPA: 3.92)

Phillips Academy Andover

May 2011 (Cum Laude Society, Tang Scholar)

EXPERIENCE

PhD Research   Cambridge, MA (2019-present)

NSF Fellow

— Developing simulator, planner, and scheduler to reduce response time of Earth observation satellite constellations using Python (Poliastro library), AGI's Systems Tool Kit (STK), and the Lincoln Labs High-Performance Computing system.
— Develop visualizer using CesiumJS
— TA for graduate space policy course (16.891) under Professors Dan Hastings and Dava Newman

E-Space   Beverly, MA (2019-2021)

Space Systems Engineer

— Designed, manufactured, and tested a PCB to interface with the Novatel GPS receiver using KiCAD.
— Performed constellation analysis for multi-plane launch deployment in-plane dispersions using differential drag
— Wrote and tested C++ flight software (API and state machine) to interface with COTS ADCS system
— Built and tested a 400 MHz tape spring antenna and an Attitude, Determination, and Control system.

Multifunctional Expandable Lunar Lightweight Tall Tower   Cambridge, MA (2020-2021)

Mechanical Engineer for the Leveler Subsystem

— Designed the leveling system hardware, including linear actuators, joint interfaces, and platform plate.
— Performed stress/strain analysis on the platform plate using SolidWorks Simulation.
— Manufactured components using mill, lathe, CNC, and water jet machines. 3D-printed prototyping.

Robotic Servicing of Geosynchronous Satellites (RSGS)   Cambridge, MA (2017-2020)

Draper Fellow working in Guidance Navigation and Control

— Developed guidance algorithm for rendezvous and proximity operations for an uncontrolled tumbling satellite; analyzed trajectories to determine compliance with mission requirements.
— Simulated satellite co-location strategies in GEO, using Monte Carlo Simulations.

NanoRacks   Washington DC (2019)

Matthew Isakowitz Fellow on NanoRacks Advanced Development Programs Team

— Led proposal effort for a million-dollar grant for NASA's International Space Station commercial allocation policy.
— Led response to NASA request for information on overall NASA commercial and pricing policy.
— Developed a proposal on potential markets for a $4M dollar grant to pursue bio/pharma hardware aboard the ISS.

Cosmology Large Angular Scale Surveyor   Baltimore, MD and San Pedro de Atacama (2013-2017)

Senior Research Technician for telescope studying the gravitational waves possibly created during inflation

— Maintained and improved telescope functionality and operation in San Pedro de Atacama, Chile.
— Fixed diesel generators and implemented structural supports to change resonant frequency of telescope mount.
— Performed experiments to determine optical properties of telescope/mount system.
— Installed cryostat thermometry and detector wiring. Led cooldown and field preparation of cryostat.
— Operated Fourier Transform Spectrometer to determine effectiveness of telescope lens materials.

KWISP (Subatomic Particle Detection Laboratory at CERN)   Switzerland (2015)

Research assistant for detector studying hypothetical chameleon particles

— Determined beam parameters of a 532nm laser to optimize experiment efficiency.
— Calculated lens position for optimal radius of curvature using the reZonator software.

Johns Hopkins Applied Physics Laboratory   Laurel, MD (2014)

Technical Aide (Secret clearance)

— Simulated sonar propagation using the CASS software and simulated sperm whale movements using the Marine Mammal Movement and Behavior software, determining interference generated by whales.

SOCIETIES AND VOLUNTEERING

Journal of Spacecraft and Rockets   2022-Present

— Paper reviewer

Space Generation Fusion Forum Organizing Team, Space Generation Advisory Council   2017-Present

— 2022: Organized virtual day keynote with Tony Antonelli as well as Climate Change Panel
— 2021: Planned events, transportation, and marketing projects to ensure event ran smoothly.
— 2020: Organized panel with SMEs Debra Facktor, Brett Alexander, Joe Landon, and Janet Kavandi.

Founder and Lead of MIT Satellite Constellation Working Group   2021-Present

— Identified and assembled experts in the field, establishing a nascent premier satellite constellation think-tank.
— Establishing a common code-base and conglomerating relevant satellite constellation research.

President of MIT Students for the Exploration and Development of Space (SEDS)   2017-2020

— Led business team: Pitched a commercial space station able to support various gravity loads (2nd place national).
— Led satellite servicing design team: Designed a servicing architecture and business model (2nd place international).
— Ran MIT Space Seminar, bringing speakers from various space related disciplines to MIT. Past speakers include CEOs such as Natalya Bailey (Accion) and Andrew Rush (Made in Space) and industry veterans such as Pete Worden (Chairman of the Breakthrough Prize Foundation).

— Led outreach initiatives: coordinated with the society of women engineers to build dry ice rockets for middle school girls, hosted the Eagle X Robotics Team from the Monterrey Institute of Technology in Mexico, and coordinated with the MIT Human Systems Lab to give a tour to members of the First Lego League, a middle school team of underrepresented minorities solving space related problems.

SPACE Observatory (Chile) 2016-2017
— Conducted astronomy tours for tourists from all over the world to explain the beauty of our night sky.

JHU Outdoor Pursuits 2012-2016
— Managed $150,000 budget. Restructured recertification program, saving organization $15,000.
— Led 8-12 participants on day and overnight canoeing and whitewater kayaking trips.

IN THE MEDIA

— Space Talent Spotlight: https://www.spacetalent.org/resources/space-talent-spotlight-manwei-chan
— SSPI Making Leaders Podcast: https://www.sspi.org/articles/making-leaders-manwei-chan-project-manager-of-the-second-place-winning-mit-team-in-the-2018-sspi-seds-competition
— SSPI Space Tug Competition Winner: https://www.sspi.org/articles/mit-teams-spacetug-design-takes-second-place-in-2018-sspiseds-usa-competition

Skills: Python, Matlab, C++, STK, Root (C++ based), Mathematica, UNIX environment, R, SQL, HTML, CSS; Working proficiency in French, Mandarin, Cantonese, Spanish. Wilderness First Responder (WFR). HAM Radio Technician.

Extended International Stays: Thali, Nepal (3 months in 2011); Beijing, China (6 months in 2012); Geneva, Switzerland (6 months in 2015); San Pedro de Atacama, Chile (1 year 2016-2017);

Publications (First Author)

Manwei Chan and Russell Sargent, "Rendezvous Approach Guidance for Uncooperative Tumbling Satellites," Proceedings of 2020 IEEE Aerospace Conference. Big Sky, Montana. (2020).

Manwei Chan, Warren Grunwald, Matthew Stoeckle, Russell Sargent, and Kerri Cahoy. "Constraint Analysis for Servicing Co-located Satellites," Proceedings of International Astronautical Congress. Washington DC. (2019).

Manwei Chan, James Bultitude, Daniel Faber, Dean Hawes. "Productization of CubeSat Rendezvous and Docking Solutions," Proceedings of the AIAA/USU Conference on Small Satellites. Utah State University. (2019).

Manwei Chan. "Statistical Simulation of Whale Vocalizations with Application to Sonar," JHU/APL Technical Memorandum (FPS-T-14-0338), July 31, (2014).

Other Publications (Aerospace)

George C. Lordos, Caleb Amy, Becca Browder, Manwei Chan, Charles Dawson, Paula do Vale Pereira, Sydney I. Dolan, Travis Hank, Eric D. Hinterman, Benjamin Martell, Alex Miller, Cormac O'Neill, Natasha Stamler, Jessica Todd, Nieky Wang, Marc-André Begin, Vineet T. Padia, Dava J. Newman, Olivier L. De Weck and Jeffrey Hoffman. "Autonomously Deployable Tower Infrastructure for Exploration and Communication in Lunar Permanently Shadowed Regions," AIAA 2020-4109. ASCEND 2020. November 2020.

Posters (Aerospace)

Manwei Chan, Mary Grace Kalnay, Joshua Shertz, "Facilitating the Development of Innovative Mission Architectures by Connecting the Global Community," Small Satellite Conference 2020, Logan Utah. July 2020.

Manwei Chan, James Bultitude, Daniel Faber, Dean Hawes. "Productization of CubeSat Rendezvous and Docking Solutions," Pre-Conference Poster Session II at AIAA/USU Conference on Small Satellites. Utah State University. (2019).

Other Publications (Cosmology)

K. Harrington, R. Datta, K. Osumi, A. Ali, J. W. Appel, C. Bennett, M. Brewer, R. Bustos, M. Chan, D. Chuss, J. Cleary, J. Couto, S. Dahal, R. Dünner, J. Eimer, T. Essinger-Hileman, J. Hubmayr, I. Espinoza, R. Francisco, J. Iuliano, J. Karakla, Y. Li, T. Marriage, N. Miller, C. Núñez, I. Padilla, L. Parker, M. Petroff, B. Pradenas Márquez, R. Reeves, P. Fluxá Rojas, K. Rostem, D. Nunes Valle, D. Watts, J. Weiland, E. Wollack, Z. Xu., "Two Year Cosmology Large Angular Scale Surveyor (CLASS) Observations: Long Timescale Stability Achieved with a Front-End Variable-delay Polarization Modulator at 40 GHz," *arXive e-prints*, Submitted to ApJ (2021)

S. Dahal, M. K. Brewer, J. W. Appel, A. Ali, C. L. Bennett, R. Bustos, M. Chan, D. T. Chuss, J. Cleary, J. D. Couto, R. Datta, K. L. Denis, J. Eimer, F. Espinoza, T. Essinger-Hileman, D. Gothe, K. Harrington, J. Iuliano, J. Karakla, T. A. Marriage, S. Novack, C. Núñez, I. L. Padilla, L. Parker, M. A. Petroff, R. Reeves, G. Rhoades, K. Rostem, D. A. N. Valle, D. J. Watts, J. L. Weiland, E. J. Wollack, Z. Xu, "Venus Observations at 40 and 90 GHz with CLASS," *The Planetary Science Journal*, 2:71 (6pp) (2021)

M. Petroff, J. W. Appel, C. L. Bennett, M. K. Brewer, M. Chan, D. T. Chuss, J. Cleary, J. D. Couto, S. Dahal, J. R. Eimer, T. Essinger-Hileman, P. F. Rojas, K. Harrington, J. Iuliano, T. A. Marriage, N. J. Miller, D. Valle, D. J. Watts, Z. Xu, "Control and systems software for the Cosmology Large Angular Scale Surveyor (CLASS)," Proc. SPIE 11452, Software and Cyberinfrastructure for Astronomy VI, 114521O (2020).

Z. Xu, M. K. Brewer, P. F. Rojas, Y. Li, K. Osumi, B. Pradenas, A. Ali, J. W. Appel, C. L. Bennett, R. Bustos, M. Chan, D. T. Chuss, J. Cleary, J. Denes Couto, S. Dahal, R. Datta, K. L. Denis, R. Dünner, J. R. Eimer, T. Essinger-Hileman, D. Gothe, K. Harrington, J. Iuliano, J. Karakla, T. A. Marriage, N. J. Miller, C. Núñez, I. L. Padilla, L. Parker, M. A. Petroff, R. Reeves, K. Rostem, D. Valle, D. J. Watts, J. Weiland, E. J. Wollack, "Two-year Cosmology Large Angular Scale Surveyor (CLASS) Observations: 40 GHz Telescope Pointing,

Beam Profile, Window Function, and Polarization Performance," *The Astrophysical Journal*, 891:134 (25pp) (2020)

M. A. Petroff, J. R. Eimer, K. Harrington, A. Ali, J. W. Appel, C. L. Bennett, M. K. Brewer, R. Bustos, M. Chan, D. T. Chuss, J. Cleary, J. D. Couto, S. Dahal, R. Dünner, T. Essinger-Hileman, P. F. Rojas, D. Gothe, J. Iuliano, T. A. Marriage, N. J. Miller, C. Núñez, I. L. Padilla, L. Parker, R. Reeves, K. Rostem, D. A. Valle, D. J. Watts, J. L. Weiland, E. J. Wollack, Z. Xu, "Two-year Cosmology Large Angular Scale Surveyor (CLASS) Observations: A First Detection of Atmospheric Circular Polarization at Q Band," *The Astrophysical Journal* 889:120 (2020).

I. L. Padilla, J. R. Eimer, Y. Li, G. E. Addison, A. Ali, J. W. Appel, C. L. Bennett, R. Bustos, M. K. Brewer, M. Chan, D. T. Chuss, J. Cleary, J. Couto, S. Dahal, K. Denis, R. Dünner, T. Essinger-Hileman, P. Fluxá, S. K. Haridas, K. Harrington, J. Iuliano, J. Karakla, T. A. Marriage, N. J. Miller, C. Núñez, L. Parker, M. A. Petroff, R. Reeves, K. Rostem, R. W. Stevens, D. A. Valle, D. J. Watts, J. L. Weiland, E. J. Wollack, Z. Xu, "Two-year Cosmology Large Angular Scale Surveyor (CLASS) Observations: A Measurement of Circular Polarization at 40 GHz," *The Astrophysical Journal* 889:105 (2020)

J. W. Appel, Z. Xu, I. L. Padilla, K. Harrington, B. Pradenas Marquez, A. Ali, C. L. Bennett, M. K. Brewer, R. Bustos, M. Chan, D. T. Chuss, J. Cleary, J. Cuoto, S. Dahal, K. Denis, R. Dünner, J. R. Eimer, T. Essinger-Hileman, P. Fluxa, D. Gothe, G. C. Hilton, J. Hubmayr, J. Iuliano, J. Karakla, T. A. Marriage, N. J. Miller, C. Núñez, L. Parker, M. Petroff, C. D. Reintsema, K. Rostem, R. W. Stevens, D. A. Nunes Valle, B. Wang, D. J. Watts, E. J. Wollack, and L. Zeng 2019. "On-Sky Performance of the CLASS Q-Band Telescope." *The Astrophysical Journal* 876 (2): 126. https://doi.org/10.3847/1538-4357/ab1652. (2019)

S. Dahal, A. Ali, J. W. Appel, T. Essinger-Hileman, C. Bennett, M. Brewer, R. Bustos, M. Chan, D. T. Chuss, J. Cleary, F. Colazo, J. Couto, K. Denis, R. Dünner, J. Eimer, T. Engelhoven, P. Fluxa, M. Halpern, K. Harrington, K. Helson, G. Hilton, G. Hinshaw, J. Hubmayr, J. Iuliano, J. Karakla, T. Marriage, J. McMahon, N. Miller, C. Nuñez, I. Padilla, G. Palma, L. Parker, M. Petroff, B. Pradenas, R. Reeves, C. Reintsema, K. Rostem, M. Sagliocca, K. U-Yen, D. Valle, B. Wang, Q. Wang, D. Watts, J. Weiland, E. Wollack, Z. Xu, Z. Yan, L. Zeng, "Design and characterization of the Cosmology Large Angular Scale Surveyor (CLASS) 93 GHz focal plane," Proc. SPIE 10708, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy IX, 107081Y (9 July 2018);

K. Harrington, J. Eimer, D. T. Chuss, M. Petroff, J. Cleary, M. DeGeorge, T. W. Grunberg, A. Ali, J. W. Appel, C. L. Bennett, M. Brewer, R. Bustos, M. Chan, J. Couto, S. Dahal, K. Denis, R. Dünner, T. Essinger-Hileman, P. Fluxa, M. Halpern, G. Hilton, G. F. Hinshaw, J. Hubmayr, J. Iuliano, J. Karakla, T. Marriage, J. McMahon, N. J. Miller, C. Nuñez, I. Padilla, G. Palma, L. Parker, B. Pradenas Marquez, R. Reeves, C. Reintsema, K. Rostem, D. Augusto Nunes Valle, T. Van Engelhoven, B. Wang, Q. Wang, D. Watts, J. Weiland, E. Wollack, Z. Xu, Z. Yan, and L. Zeng.. "Variable-delay Polarization Modulators for the CLASS Telescopes" Proceedings of the SPIE: Instrumentation and Methods for Astrophysics (2018).

K. Harrington, T. A. Marriage, A. Ali, J. W. Appel, C. L. Bennett, F. Boone, M. Brewer, M. Chan, D. T. Chuss, F. Colazo, S. Dahal, K. Denis, R. Dünner, J. Eimer, T. Essinger-Hileman, P. Fluxa, M. Halpern, G. Hilton, G. F. Hinshaw, J. Hubmayr, J. Iuliano, J. Karakla, J. McMahon, N. T. Miller, S. H. Moseley, G. Palma, L. Parker, M. Petroff, B. Pradenas, K. Rostem, M. Sagliocca, D. Valle, D. Watts, E. Wollack, Z. Xu, and L. Zeng. "The Cosmology Large Angle Scale Surveyor," Proceedings of the SPIE, Volume 9914, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy VIII, pp. 99141K (2016).

J. W. Appel, A. Ali, M. Amiri, D. Araujo, C. L. Bennet, F. Boone, M. Chan, H.-M. Cho, D. T Chuss, F. Colazo, E. Crowe, K. Denis, R. Dünner, J. Eimer, T. Essinger-Hileman, D. Gothe, M. Halpern, K. Harrington, G. Hilton, G. F. Hinshaw, C. Huang, K. Irwin, G. Jones, J. Karakula, A. J. Kogut, D. Larson, M. Limon, L. Lowry, T.

Marriage, N. Mehrle, A. D. Miller, N. Miller, S. H. Moseley, G. Novak, C. Reintsema, K. Rostem, T. Stevenson, D. Towner, K. U-Yen, E. Wagner, D. Watts, E. Wollack, Z. Xu, and L. Zeng. "The Cosmology Large Angular Scale Surveyor (CLASS): 38 Ghz detector array of bolometric parameters." Proceedings of the SPIE, Volume 9153, id. 91531J 15 pp. (2014).

T. Essinger-Hileman, A. Ali, M. Amiri, J.W. Appel, D. Araujo, C. L. Bennett, F. Boone, M. Chan, H. M. Cho, D. T. Chuss, F. Colazo, E. Crowe, K. Denis, R. Dünner, J. Eimer, D. Gothe, M. Halpern, K. Harrington, G. C. Hilton, G. F. Hinshaw, C. Huang, K. Irwin, G. Jones, J. Karakla, A. J. Kogut, D. Larson, M. Limon, L. Lowry, T. Marriage, N. Mehrle, A. D. Miller, N. Miller, S. H. Moseley, G. Novak, C. Reintsema, K. Rostem, T. Stevenson, D. Towner, K. UYen, E. Wagner, D. Watts, E. J. Wollack, Z. Xu, and L. Zeng. "CLASS: the cosmology large angular scale surveyor". Proceedings of the SPIE, Volume 9153, id. 91531I 23 pp. (2014).