

# Robotic Self-Assembly for Autonomous, Orbital Construction: TESSERAE Platform Approach for Scaling Space Structures

Friday, November 18th, 2022  
12:30 PM

Bowen Hall, Room 222

MAE Seminar Series



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How will we build the coming generations of Space Architecture—the modules, space ships, and space stations that will ensconce our space-faring species?

The future of human habitation in space lies in self-assembling, adaptive, and reconfigurable structures. Rather than transporting fixed, rigid habitation modules and risking astronaut Extravehicular Activities (EVAs) during construction, we can lower payload weight, reduce assembly complexity, and revolutionize space-structure modularity by relying on reconfigurable, self-assembly. We are currently undertaking a multi-year research effort to study, characterize, prototype and test "TESSERAE": Tessellated Electromagnetic Space Structures for the Exploration of Reconfigurable, Adaptive Environments. This talk will present the latest TESSERAE orbital deployments, a digital twin simulation environment for quasi-stochastic self assembly in microgravity, and a brief overview on a related swarm robotics platform developed for NASA.

Dr. Ariel Ekblaw directs the MIT Space Exploration Initiative, a team of 50+ students, faculty and staff building and flying advanced technology for space exploration; Ariel is also the founding CEO of Aurelia Institute, a hybrid space architecture research institute and venture incubation studio. Through this connected ecosystem, she strives to bring humanity's space exploration future to life.

Ariel graduated with a B.S. in Physics, Mathematics and Philosophy from Yale University and designed a novel space architecture habitat for her MIT PhD in autonomously self-assembling space structures. Her research work and the labs she leads build towards future robotic, responsive, and scalable habitats and space stations in orbit around the Earth, Moon, and Mars. Ariel is the author/editor of [Into the Anthropocosmos: A Whole Space Catalog from the MIT Space Exploration Initiative](#) (MIT Press 2021). She serves on the NASA Lunar Surface Innovation Consortium (LSIC) Executive Committee, guiding and shaping the coming decade of burgeoning activity on the moon. Ariel has had the rare honor and pleasure of working directly on space hardware that now operates on the surface of Mars and is leading MIT's return to the moon as robotics mission PI in 2023. Ariel's work has been featured in WIRED (March 2020 cover story), MIT Technology Review, Harvard Business Review, the Wall Street Journal, the BBC, CNN, NPR, PRI's Science Friday, IEEE and AIAA proceedings, and more.