



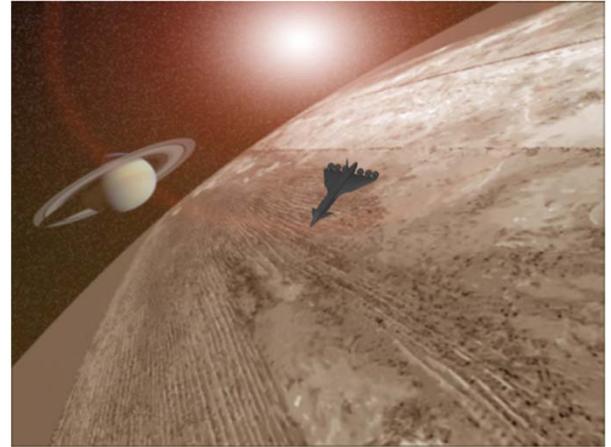
# AIAA

*American Institute of  
Aeronautics and Astronautics  
Dayton-Cincinnati Section*

**Lunch 'n' Learn  
3 March 2023**

## ***Nuclear Fusion Powered Titan Aircraft***

**Guest Speaker:  
Ms. Annie Price, AFRL/RQH**



**Abstract:** Titan is one of the most fascinating objects in the solar system: with a thick atmosphere, surface oceans, and under-ice oceans, its terrain is complex and varied. NASA first explored Titan with the Cassini spacecraft that produced close-up photographs of the planet at both visible and infrared wavelengths. Coming up next, the Dragonfly mission will land a quadcopter on the surface to study one region on Titan. This talk discuss a system for Titan exploration enabled by nuclear fusion power to expand upon the Dragonfly mission. A Direct Fusion Drive (DFD) engine will bring a spacecraft to Titan orbit in less than two years. DFD uses a novel radio-frequency plasma heating system and deuterium-helium-3 fuel. This vehicle will do a powered entry to Titan and then have the capability to fly anywhere on the moon at subsonic speeds. Optimization studies show that the propulsion system is only used at low speeds during entry, hence a distributed propeller system was designed. After its first landing, the aircraft will perform aerial reconnaissance of the surface. The aircraft has the potential to carry multiple payloads including a Titan submarine. The science vehicle will have up to 1MW of available power during its mission. DFD will allow the in-orbit transfer stage to change inclination as needed to cover different areas of the surface. This talk will demonstrate a conceptual design of the system including the transfer vehicle, the nuclear fusion engine, and the Titan aircraft.

**Biography:** Ms. Annie Price is a researcher at the Air Force Institute of Technology, via the Oak Ridge Institute for Science and Education. She works within the High-Speed Systems Division, with a research focus on ramjet inlet design and analysis. She graduated from Princeton University in May of 2022, with a Bachelor of Science in Engineering degree.

**Time:** 11:45 am

**Location:**

*China Garden Buffet  
112 Woodman Dr.  
Dayton, OH 45431*

**Lunch:**

*You will be able to  
purchase the buffet*

