

Monday Evening, January 16

Each One Teach One: Building a Better and Stronger Astrodynamics Community

5:15-6:15PM: Panel Discussion in the Onyx Ballroom

6:15-7:15: Reception in the Onyx Ballroom

To celebrate Martin Luther King, Jr. Day as a day of national service, we will have a special panel discussion on the role of mentorship and service in strengthening our Astrodynamics community. We have a panel of distinguished academic, NASA and private aerospace representatives who will share their own experiences and join together in a larger discussion.

Panel Moderator



Dr. Powtawche Valerino works at the NASA-Marshall Space Flight Center in the Guidance, Navigation, and Mission Analysis Branch. She supports NASA's Space Launch System, Human Landing System, and Artemis Campaign Development Programs. Prior to her current position she was a flight path control analyst at JPL for over 13 years and was on the navigation teams for the Cassini-Huygens, Europa Clipper, and Parker Solar Probe missions. Powtawche holds a bachelor's degree in mechanical engineering from Stanford University, and a master's and doctoral degree in mechanical engineering with a specialty in aero-astronautics from Rice University.

Panel Participants



Prof. Kathleen Howell is the Hsu Lo Distinguished Professor at Purdue University in the School of Aeronautics and Astronautics. She is known for her contributions to dynamical systems theory applied to spacecraft trajectory design which led to the use of halo orbits in multiple NASA space missions. She is a member of the National Academy of Engineering, a Member of the International Academy of Astronautics, and a Fellow of the AAS and AIAA. In acknowledgment of her many achievements, Discover magazine recognized her in 2002 as one of the 50 most important women in science.



Ms. Heather Koehler currently serves as the NASA Technical Fellow for Flight Mechanics. Her background includes developing guidance, navigation and control flight software for the Space Shuttle Program including real-time operational support to many Shuttle missions. She has supported payload software development and testing for the ISS and developed the Agency's first directional sporadic meteoroid model. Ms. Koehler has served as the Vehicle Management Discipline Lead for the SLS and as Branch Chief in the Guidance, Navigation and Mission Analysis Branch including details at the Flight Mechanics Division level.



Mr. Amalaye Oyake is Senior Flight Software Engineer at Blue Origin working on flight software for Orbital Reef. His prior work at NASA JPL included 'Space Internet' standards, CCSDS working groups, the Mars Exploration Rover, Mars Science Laboratory, and payloads for the International Space Station.



Dr. Hanspeter Schaub is chair of the University of Colorado aerospace engineering sciences department and holds the Schaden leadership chair. His research interests are in astrodynamics, relative motion dynamics, charged spacecraft motion as well as spacecraft autonomy. Dr. Schaub has been the ADCS lead in the CICERO mission and the ADCS algorithm lead on a Mars mission. He is a fellow of AIAA and AAS, and has won the AIAA/ASEE Atwood Educator award, AIAA Mechanics and Control of Flight award, as well as the Collegiate Educator of the Year for the AIAA Rocky Mountain section.

Tuesday Afternoon, January 17

Canadian Space Agency Overview

Dr. Isabelle Jean (CSA)

1:00-1:30PM: Onyx 2/3

Canada pioneered space utilization because of the need to communicate throughout its territory and observe its great land, most of which is hard to reach and far in the North. Did you know that it is also involved in space exploration, Earth observation and space science? Canada found its own way to be involved in the greatest space endeavors throughout the years, and also in future big projects like the Lunar Gateway. This presentation is about a few CSA/Canada space facts, the projects CSA is involved in or is leading and what it is like to work there.



Isabelle Jean completed a Bachelor and Master Degree in Electrical Engineering at the Université de Sherbrooke in 2004, specializing in the control of Low Earth Orbit for low thrust spacecraft. She then worked for more than ten years at the Canadian Space Agency as a Payload Operations Engineer for the International Space Station before starting a PhD at McGill University in Mechanical Engineering, which she completed in May 2020. There, she studied the dynamics of spacecraft in a binary asteroid environment. She now works as a Systems Engineer for Earth observation missions at the Canadian Space Agency.

Tuesday Evening, January 17

DART: Navigating to Obliteration

Dr. Julie Bellerose (JPL)
Onyx Ballroom

5:15-6:00PM: DART Talk

6:00-6:15PM: Breakwell Student Travel Awards

6:15-7:15: Reception in the Onyx Ballroom

DART is NASA's demonstration of an asteroid deflection using a kinetic impactor. The spacecraft launched aboard a SpaceX's Falcon 9 on November 24th 2021, on a direct collision with the binary asteroid system Didymos planned for September 26th 2022. By impacting the small moon, Dimorphos, DART's objective was to alter the moon's orbit about the larger asteroid by several minutes.

The navigation of a ballistic mission is usually relatively simple. Other than heading to a violent demise, this mission had a number of unconventional aspects which gave the navigation team interesting challenges: a tight propellant budget for part of the mission, no reaction wheels which resulted in a noisy spacecraft with the Nav team having to rely heavily on Delta Differential One-way Ranging measurements to identify off line-of-sight delta-V, and critical operations in the last 30 days of the mission under a new thrusting control mode regime. Optical navigation was a critical element in the success of this mission, contributing to the determination of the spacecraft and target ephemerides for refined targeting maneuvers. After strategic decisions in the final weeks of the missions, DART could have comfortably hit the larger asteroid, Didymos, which increased the probability of impact with its moon Dimorphos.



Dr. Julie Bellerose graduated with a BEng in Mechanical engineering from McGill University and a PhD in Aerospace engineering from the University of Michigan. She is based at the Jet Propulsion Lab since 2013, and has supported navigation of Cassini, Hayabusa2, Rosetta, and Osiris-Rex. Julie was the DART Navigation lead, which hit the asteroid Dimorphos in September 2022 as a planetary defense demonstration mission.