BOSTON UNIVERSITY

Boston University College of Arts & Sciences
Center for Space Physics

2021—2022 SPACE PHYSICS SEMINAR SERIES

Building an in-flight calibration toolbox for a spacecraft magnetometer

The Psyche mission, slated to launch in 2022, will arrive at the asteroid (16) Psyche in 2026 with the goal of determining whether it was once a planetary core. The Magnetometry investigation has been designed to help answer that question by constraining the asteroids remanent magnetization.

As with many spacecraft investigations, we expect that stray fields generated by the flight system will be the most significant source of uncertainty in the Psyche Magnetometer measurements. As a result, accurate measurements of ambient planetary and interplanetary magnetic fields using spacecraft magnetometers require accounting for and removing magnetic fields generated by flight-system components. The impact of these stray fields can be mitigated by placing the magnetic field sensors on a boom that stands off from the spacecraft bus and by implementing magnetic cleanliness requirements and best practices. However, even with these mitigations, the sensitivity of modern magnetic field sensors is typically lower than the magnitude of the flight system-generated fields observed at the sensors.

Flight system fields come in a wide variety of frequencies, intensities and durations, and their power spectra can change over the duration of a mission. An in-flight calibration toolbox is necessary in order to identify, characterize and remove these many different flight system field contributions for the duration of a mission. I will discuss some of the considerations that go into preparing for magnetic field in-flight calibration, and the tools we have developed to identify and remove flight system magnetic fields for the Psyche Magnetometry Investigation.

Thursday, October 14th

4:00-5:00 p.m.

725 Commonwealth Ave | Room 502

Jodie Ream

Massachusetts Institute of Technology