

# Department of Physics and Astronomy Colloquium Series

**Tuesday January 7, 2025, 2:30pm in PSE 317**

**Speaker:** Steven Vance

**Institution:** Jet Propulsion Laboratory (NASA)

**Title:** Exploring the Habitability of the Solar System's Ocean Worlds using Geophysical Measurements

**Abstract:**

The solar system hosts numerous moons and dwarf planets that likely have, or once had, more liquid water than all of Earth's oceans. Short of placing a submarine in their depths, geophysical sounding offers a way to bound the likely thickness and composition of such oceans. NASA's prior Galileo and Cassini missions demonstrated the application of radar, gravity, and magnetic measurements for these purposes. Innovations in geochemistry, and robust computational methods, make it possible to also constrain the composition of oceans using geophysical methods. Combined with direct measurements of near-surface material compositions by spectroscopic imaging and mass spectrometry, it will be possible to test hypotheses about the pH of existing oceans, their global circulation, and the likely degree of chemical disequilibrium that might support life. Indeed, the goal of NASA's Europa Clipper mission is to "Explore Jupiter's moon Europa to investigate its habitability". I will describe the overall context of ocean worlds with a focus on Europa Clipper, and the application of forward modeling to the joint inversion of geophysical measurements constraining habitability.