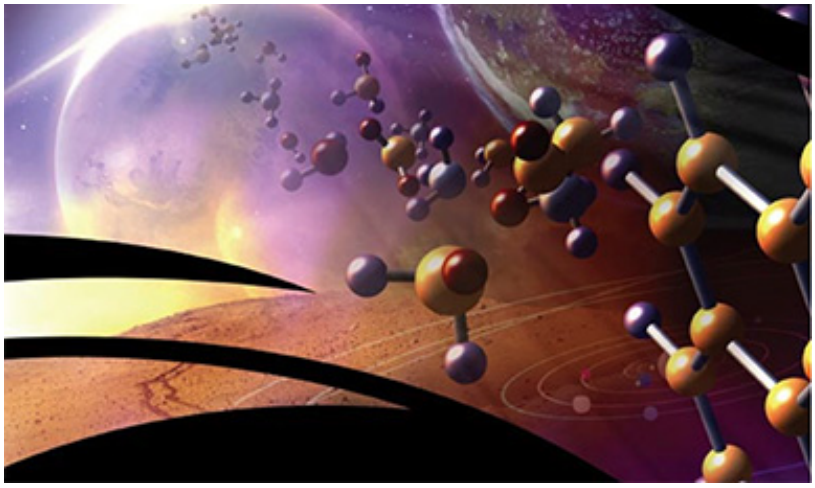
EAPS Planetary lunch Colloquium Series (PICS)

Zhuchang Zhan
Graduate Student
Massachusetts Institute of Technology

Tuesday, April 11th
12:30pm
54-517

All Small Molecules Approach Biosignature Study via Exoplanet Atmosphere Transmission Spectroscopy



Exoplanet studies in the last two decades have expanded our understanding of habitability and set the stage for understanding life beyond Earth. The community anticipates that the combined efforts from TESS and JWST will present an opportunity to discover signs of life via the detection of hundreds of nearby exoplanets and atmospheric characterization for the few that could be habitable. We propose that life on other worlds might produce a wide variety of gases. If a significant quantity of certain volatile molecules accumulates in an exo-Earth atmosphere, the gas could be remotely detected as a biosignature gas.
Traditionally, water, oxygen, ozone, methane, ammonia, carbon dioxide, and nitrous oxide have been considered as the "core" biosignature gases. In this talk I will explore the detectability of less abundant molecules in the context of transit spectroscopy. I will present an atmosphere simulation model designed to study a wide range of gases in a variety of atmospheric scenarios. Due to the complexity of the models and possible atmosphere spectra generated, I will also discuss the future application of computer aided discovery and machine learning methods, like MCMC, to explore the parameter space in which a certain gas is detectable.

For more information, contact John Biersteker (jo22395@mit.edu)

EAPS
Earth, Atmospheric and Planetary Sciences