BOSTON UNIVERSITY

Boston University College of Arts & Sciences
Institute for Astrophysical Research

2022—2023 ASTROPHYSICS SEMINAR SERIES

A Deep Dive into Hot-Jupiter Atmospheres: What High-Resolution Spectroscopy Can Teach Us About Their Formation and Evolution

Hot Jupiters are gas giant planets like Jupiter, yet orbit their host stars significantly closer than Mercury orbits the Sun. Because of the small orbital distances these planets are extremely hot and have puffy, extended atmospheres, making them the most amenable planets to atmospheric characterization. Detailed studies of the atmospheres through transmission and emission spectroscopy can give clues as to how hot Jupiters formed and evolved into what we observe today. In this talk, I will show how high-resolution spectroscopic observations can be used to detect and determine precise chemical abundances of a range of atoms, ions and molecules, which can in turn help us to constrain the planet's formation location and accretion history. Furthermore, high-resolution spectroscopy can uniquely resolve the velocity shifts that are caused by winds and atmospheric dynamics in the planets' atmospheres. Most hot Jupiters are tidally locked, and so understanding how winds and rotational jets help to redistribute stellar radiation is important for understanding the atmospheric dynamics in all tidally locked planets. Finally, I will discuss how combining these high-spectral resolution observations with lower -spectral resolution JWST atmospheric observations will allow us to constrain chemical abundances, planet structure, and atmospheric dynamics in unprecedented detail.

Monday, September 12th

3:30 - 4:30 p.m.

725 Commonwealth Ave | Room 502

Aurora Kesseli

California Institute of Technology