THE UNIVERSITY OF HONG KONG

DEPARTMENT OF PHYSICS
SEMINAR

Taking A Tour to Understand Photochemical Hazes in Exoplanets: Implications for Habitability, Chemistry, JWST Observations, and Future Flagship Missions

Dr. Mei Ting MAK

University of Oxford

Abstract:

Hazes, solid-state photochemical product, are expected to be a common occurrence in planetary atmospheres, from the early Earth to a wide range of exoplanets. However, the lack of comprehensive, self-consistent studies hinders our understanding of their impact on atmospheric dynamics and the interpretation of observations, potentially introducing significant biases in retrieved atmospheric properties. Developing a coherent picture of how hazes influence both climate and observables is essential for maximising the scientific return of current facilities and preparing for future flagship missions. I will present results from 3D simulations of planetary atmospheres including treatment of the dynamic, chemical and radiative impact of hazes for both rocky planets and gas giants using the UK Met Office Unified Model. First, I reveal that haze can enhance the habitability of rocky planets, and explore implications for future missions e.g., the Habitable World Observatory and Large Interferometer for Exoplanets. Second, I demonstrate the impact of hazes on the dynamical and chemical structure of hot Jupiter atmospheres, and how these shape observations, including asymmetries between limbs, comparing to existing, and ongoing JWST programmes I am involved in. Finally, I introduce a novel framework for diagnosing the presence of hazes in hot Jupiters using limb asymmetry, offering a computationally efficient alternative to full 3D simulations in planning of observations.

Monday, June 8, 2026, 3:00pm

Room 522, 5/F, Chong Yuet Ming Physics Building, The University of Hong Kong

Department of Physics, Chong Yuet Ming Physics Building, The University of Hong Kong

Phone: 39172360 Fax: 25599152.

Anyone interested is welcome to attend.