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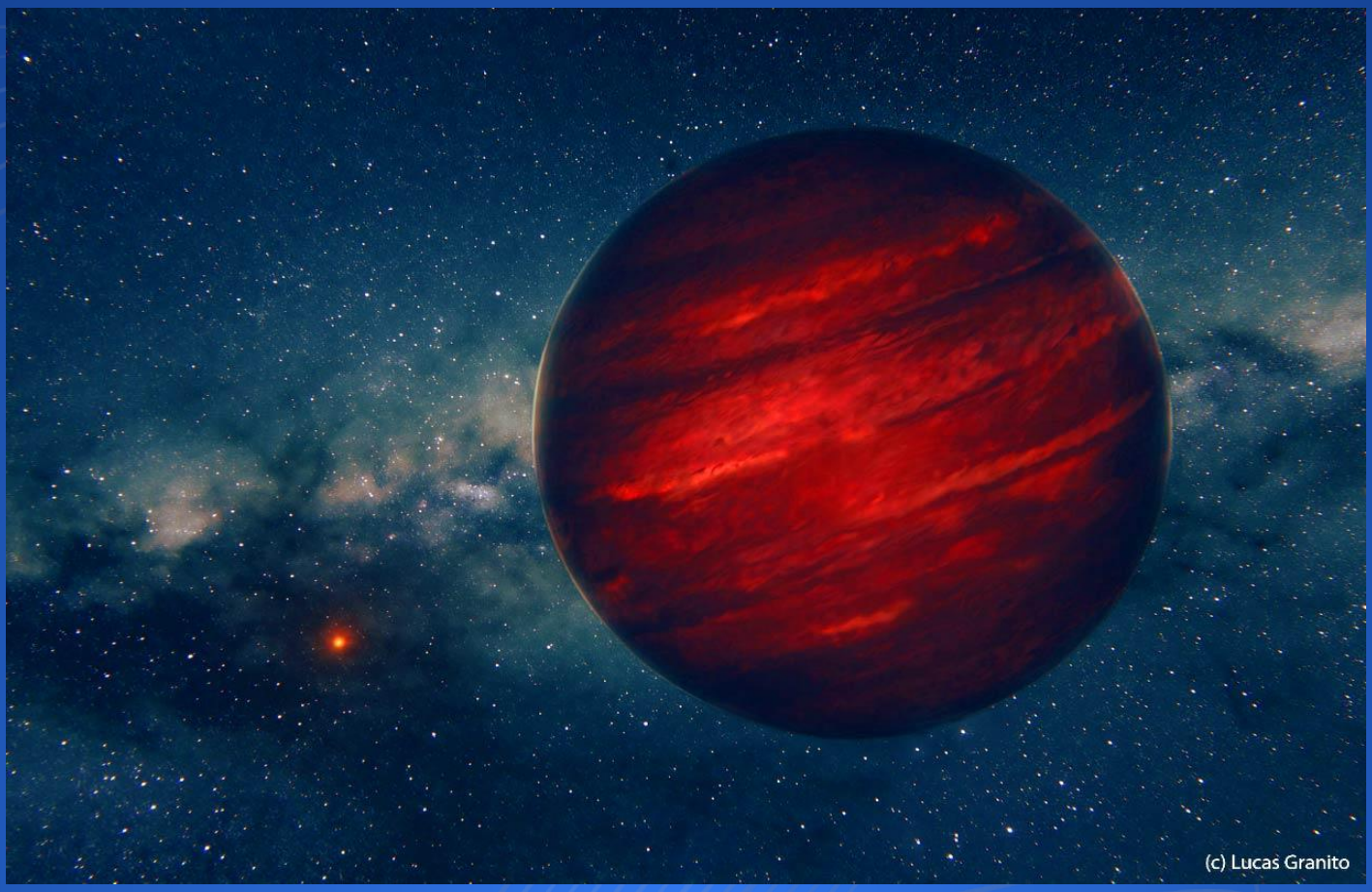

Exo Jupiters: The Movers and Shakers of Planetary Systems

Marta Bryan | *University of Toronto*

Understanding what formation processes produce the extraordinary diversity of planetary systems that we see today is one of the driving questions in the field. Of all the new planets that have been discovered, gas giants are the easiest ones for us to find – they are bigger, brighter, and more massive than any other kind of planet. This means that they are ideal targets for characterization techniques that can tell us about the planet formation process, and they are so massive that they dominate the dynamics of their systems, impacting the formation of other planets. Gas giants are an obvious place for us to start if we want to learn about the physics of planet formation. In this talk I will describe my work using multiple observational techniques to explore the formation and evolution of gas giants.

I will discuss how targeting directly imaged planets with high-resolution spectroscopy enables measurements of new planetary properties like rotation rates, obliquities, and detailed atmospheric abundances. These provide fundamental insights into the physics of gas giant formation, such as the evolution of planetary angular momentum. I will describe how leveraging high-contrast imaging techniques to look for planets in their infancy rules out gravitational scattering as the origin of wide-separation gas giants, and constrains the timing of gas giant formation and migration. I will also talk about how radial velocity and astrometry searches for Jupiter analogs in systems with known inner planets reveal the impact gas giants have on the inner architectures of planetary systems, and are a key step in the search for life on other planets. Finally, I will highlight the important role that the Gemini telescopes and the next-generation Thirty Meter Telescope will have in extending these high-resolution spectroscopy measurements to directly imaged ice giant and terrestrials worlds, opening new windows into their formation histories and enabling searches for biosignatures in their atmospheres.

21 MAR 2023 **3:30 PM EST** **BELL ROOM**