Poster

Splinter Exoplanets

Detectability of Moons Around Extrasolar Planets

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Moons in our solar system serve as tracers of planet formation and evolution. The densities and water contents of the Galilean moons, for example, put observational constraints on the properties of the circum-Jovian accretion disk, in which they formed 4.5 billion years ago; the Uranian satellites store information about the proposed bombardment process that caused the tilt of Uranus' spin axis; and most important for us, the Moon was formed through a giant impact of a Mars-sized object into the proto-Earth, which set the initial conditions for our contemporary astrophysical environment and, hence, for the terrestrial climate and life as we observe it today.

High-accuracy space-based stellar photometry, e.g. from the Kepler space telescope, has now opened the possibility of finding extrasolar moons. We present an overview of the methods that have been proposed to find exomoons, from photometry to spectroscopy and direct imaging. We summarize the current state of exomoon searches and we show new simulations of light curves as they will be obtained with PLATO, set to launch in 2026. In particular, we predict that the transits of large exomoons could be detectable in the wings of the phase-folded planetary transit light curves, an effect known as the orbital sampling effect. Such a historic detection would (i.) offer new constraints on planet formation and migration; (ii.) trigger an innovation push for moon formation theories; (iii.) provide unprecedented tools to measure planetary obliquities; (iv.) offer new means to constrain planetary masses; (v.) deliver novel insights into the wider context of the solar system planets and moons.