
Dynamical constraints on extrasolar systems

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The diversity of the hundreds of discovered extrasolar systems puzzles our understanding of the formation and long-term evolution of planetary systems. The detected planetary systems generally suffer from large observational uncertainties. In this talk, I will discuss recent results showing how dynamical studies can be useful to constrain the orbital parameters of tightly packed planetary systems which harbor two-body resonances and/or chains of resonances involving three or more planets. More precisely, I will show how i) periodic orbits can serve as dynamical clues to validate the parametrization of detected systems, ii) TTVs keep track of the migration history of planetary systems and provide signatures of three-body resonances accessible by future monitoring of the systems, and iii) the offsets in resonant chains are shaped by planetary migration and tides raised by the star. Applications to K2-21, K2-24, K2-138, Kepler-9, Kepler-80, Kepler-108, TOI-178, and TRAPPIST-1 will be discussed. This talk aims at illustrating how the interplay between formation, dynamics, and stability can contribute to bridge the gap between observations and theoretical studies. Joint works with E. Agol, K.I. Antoniadou, C. Charalambous, and J. Teyssandier.