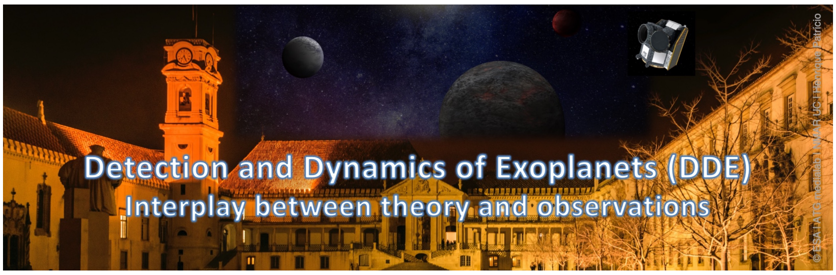
Detection and Dynamics of Exoplanets (DDE): Interplay between theory and observations



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The Impact of Mean Motion Resonances on the Astrometric Detection of Giant planets

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Analogues to the giant planets in our solar system are difficult to detect in the exoplanet context with our current observational methods. However, with new missions based on astrometry, these planets will become a prime population to study. The release of the Gaia DR4 catalogue in 2026, detecting ˜1,000-10,000 giant planets at large orbital separations, will provide the first demographic constraints on these planets'origins. However, performing demographic studies requires an understanding of detection efficiencies. One area that remains poorly explored in astrometric detections is the ability to detect multiple planets. In particular, the impact of an additional planet, that alone would not be detectable, on a detectable planet. There is a prevalence of near resonant systems amongst the close-in planets we have already detected, motivating the exploration of mean motion resonances on astrometric signals. We simulate the astrometric signal from multiple giant planets through N-body integrations for systems close to and far from resonance. By fitting the astrometric signal using nested sampling, which allows a Bayes evidence comparison for single and multiple planet systems as fits the data, I will discuss how resonances generate a regular pattern, allowing for the enhanced detection of close-in giant planets and resonant pairs in the Gaia dataset. Thus, when demographic studies are performed on the GAIA dataset we must account for the ability of astrometric data to distinguish between single and multiple planet solutions close to and far from resonance.

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