

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



Contribution ID: 122

Type: **not specified**

Imaging and characterising forming exoplanets in their birth environment

Thursday 10 July 2025 11:45 (15 minutes)

With the ever-growing population of detected exoplanets, the startling variety in planetary configurations remains mostly unexplained. Studying planet formation in young stellar systems is a crucial step in order to truly understand this great diversity in observed exoplanets. To this end, the search for protoplanets is crucial; however, only two of them have been robustly confirmed so far, both in the same system (PDS70). HD 135344B presents a protoplanetary disk with spiral arms and a large cavity depleted of gas and dust. These structures may be due to interactions with an embedded companion, which makes HD 135344B a prime target for the search of protoplanets. We conducted a thorough analysis of archival NACO data, along with multiple SPHERE datasets obtained more recently with the star-hopping observing mode. While direct imaging generally makes use of a coronagraph to block the starlight, the star-hopping observations were captured without one in order to bypass the limitation on the inner-working angle of the coronagraph. These non-coronagraphic non-saturated observations made it possible to reach unprecedented contrasts at small angular separations within the cavity of HD 135344B. Brand new post-processing algorithms, such as IPCA (Juillard et al. 2024) and 4S (Bonse et al. 2024), were also tested on these observations. While no robust detection has been discovered so far, we identify protoplanet candidate signals, showing up in some but not all datasets, and report their significance and photometry. Upper limits on potential planetary companions have also been systematically derived within the cavity. Our observations, spanning roughly 10 years, provide a long enough baseline to study the dynamics of the spirals, as a follow-up to the study of Xie et al. 2024 using polarimetric data, which suggested the existence of a spiral-driving protoplanet on an orbit that coincides with a dust filament observed with ALMA (Casassus et al. 2021). We also present our spectral analysis aiming at identifying any protoplanet embedded within the spirals, using SPHERE-IFS and JWST-NIRCAM data.

Presenter: LATOUR, Justin (University of Liege)

Session Classification: Astrometry and direct imaging