Contribution ID: **30** Type: **not specified**

Astrometric exomoon detection with VLTI/GRAVITY+ and future facilities

Tuesday 8 July 2025 10:00 (15 minutes)

With the publication of Gaia DR4, astrometry will mature from a future prospect to a highly prosperous and efficient method of exoplanet detection. Monitoring the slight orbital wobbles that potential host stars show over long periods of time will reveal the presence of thousands such planets. It is now the time to prepare for taking the astrometric detection method to the next level: for the first time, the novel possibilities offered by the emergent field of NIR interferometry, more precisely the unprecedented astrometric accuracy and precision of VLTI/GRAVITY, allow us to directly monitor the orbital movement of exoplanets with sufficient accuracy to detect the perturbing presence of exomoons. To understand and quantify the exomoon detection capabilities of different present and future instruments we have conducted a suite of blind injection and retrieval studies, simulating astrometric time series data resulting from different star-planet-moon configurations and attempting to identify such parameter spaces where detection is especially favourable. Here, we present these results for the first time, giving detailed sensitivity estimates for different instruments and putting their characteristics into context in the broader search for exomoons as well as their relevance for the future interpretation of prospective biosignature detections. The first bona fide exomoon detections are imminent. Assessing their capabilities today will strengthen the case for leveraging NIR and optical interferometry to astrometrically detect exomoons in the future.

Presenter: WINTERHALDER, Thomas (ESO)

Session Classification: Exomoons, exorings, and trojan systems