Contribution ID: **81** Type: **Poster**

Comparative Analysis of Orbital Angular Momentum and Spin–Orbit Alignment in Circumbinary and Single-Star Planetary Systems

In this work, we perform a comparative analysis of orbital angular momentum ([illegible]) across circumbinary, single-star single-planet, and single-star, multi-planet systems. Using archival data from the NASA Exoplanet Archive, supplemented by Kepler and TESS discoveries, we compile a dataset of well-characterized systems with measured orbital and stellar parameters. For each planet, we compute orbital angular momentum [illegible]. We then generate linear and non-linear plots between [illegible] and difference properties of exoplanets. Our results demonstrate that circumbinary planets consistently exhibit higher orbital angular momentum compared to planets in single-star systems, regardless of planetary mass. In contrast, many planets around single stars, particularly hot Jupiters, leading to substantially lower angular momentum despite their large masses. Furthermore, multi-planet single-star systems tend to occupy an intermediate regime, with a wider spread in angular momentum that reflects their more complex dynamical histories. The comparison also reveals that eccentricity plays a secondary role: circumbinary systems cluster at low eccentricities, while single-star systems display a broader distribution, consistent with dynamical excitation through migration or planet–planet interactions. This work highlights how differences in system architecture fundamentally shape the dynamical properties of planetary orbits and provides an empirical foundation for future studies of spin–orbit alignment and long-term stability in diverse planetary systems.

Author: UPPAL, Thanya

Co-authors: Dr GURUMATH, Shashanka; Dr M.N., Sundar

Presenter: UPPAL, Thanya

Track Classification: Physical Sciences