

The formation and long-term evolution of circumbinary planetary systems across the H-R diagram

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Polar discs and circumbinary formation in highly misaligned discs

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Most stars born in dense stellar clusters are part of binary star systems. Circumbinary discs of gas and dust commonly surround binary star systems. Misalignments between the circumbinary disc and the binary orbital plane are widely observed. A misaligned circumbinary disc undergoes nodal precession. For a low initial inclination, the precession is around the binary angular momentum vector, while for a sufficiently high initial inclination, the precession is around the eccentricity vector. Dissipation causes the disc to evolve to align coplanar to the binary orbital plane or perpendicular (i.e., polar) to the binary orbital plane. I present 3-dimensional hydrodynamical simulations and linear theory on the evolution of highly misaligned circumbinary discs. I show that misaligned circumbinary discs are favorable environments for forming misaligned and polar circumbinary planets. The evolution of protoplanetary discs around binary star systems bears important implications for planet formation and the diversity of exoplanets.

Presenter: SMALLWOOD, Jeremy

Session Classification: CB disc properties and planet formation