Contribution ID: **7** Type: **not specified**

Kinematic signatures of circumbinary disks

Tuesday 14 January 2025 15:10 (35 minutes)

Systems where two gravitationally bound masses (the primary mass and its binary companion) interact with the surrounding gas and dust are extremely common in the Universe and encompassing a wide variety of different astrophysical systems, from stars and planets to black holes. Extensive theoretical and numerical work from the late 1970s revealed that the material in the surroundings of binaries forms a disc structure around the binary, called "circumbinary disc". The perturbative effects from the companion produce a variety of features in such discs, each carrying distinct kinematic signatures. The great advancements during the past decade in our observational capabilities allowed us for the first time to observe such features in protostellar discs, providing us with spatially resolved kinematic maps of protostellar discs, triggering extensive theoretical work aimed at interpreting the data. In this talk, after a general overview of binary-disc interaction theory, I will present the ongoing efforts to model the kinematics of protostellar discs when companions (massive planets or stellar binaries) are present. I will discuss the current progress and highlight some open issues that still require to be addressed. In particular, I will focus on the growth of disc eccentricity and inclination as characteristic features of circumbinary discs, and how their measurement could be in principle used for detecting unseen binaries. I will discuss the kinematic appearance of disc orbital eccentricity and inclination through the eyes of ALMA, and present an analytical model for their characterisation benchmarked against numerical hydro+MCRT numerical simulations. In the light of the results presented, I will finally stress the importance of moving beyond circular coplanar disc models for the interpretation of protostellar discs kinematics in general.

Presenter: RAGUSA, Enrico

Session Classification: CB disc properties and planet formation