

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

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Formation of free-floating planets from CB systems

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In recent years, free floating planets, i.e. those planets not found to be in a planetary system and with no observable companions, have begun to be found in microlensing and direct imaging surveys. Observations have shown that they have a wide variety of masses, ranging from terrestrial-like to giant planets. Microlensing surveys predict that there could be on order tens of free floating planets per star in the Milky Way. How these planets form and arrive on their observed trajectories remains a very open and intriguing question. Whilst there are many mechanisms for forming free floating planets, e.g. ejections from planet-planet interactions or gravitational collapse of gas within molecular clouds, very few models have predicted the properties of free floating planets on a global scale. In this presentation I will present the outcomes of state-of-the-art circumbinary planet formation models, that naturally produce a large abundance free floating planets per system. I will show the resulting mass and velocity distributions arising from the models, which will then be extended to include stellar populations of both single and binary stars, taking into binary fractions, and separations. The population distributions show clear observable features that can be investigated by future missions such as Roman, where evidence of these features will directly point to the specific formation pathways of specific planets, as well as informing on the processes of the planet forming environment in which they originated.

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