Planet formation in triple systems : the case of V892 Tau

Planet formation in multiple systems has been extensively theorized in the recent years. Yet observational biases create a dearth of imaged protoplanetary discs, making constraints challenging to set. V892 Tau is one of the few young triple stellar systems with a circumbinary disc imaged at high resolution with ALMA (Long+2021). This disc exhibits clear substructures (inner cavity, disk-binary misalignment, warp in the outer disk, tentative spirals), betraying ongoing interactions with both the inner binary and/or the outer low-mass companion. The inner binary orbit and the disc parameters are well established, but the orbit of the outer binary has yet to be constrained. Based on V892 Tau known parameters, we run a set of 3D hydrodynamical simulations of triple stellar systems with a circumbinary disc and consider different orbital inclinations and eccentricities of the outer binary. By analyzing which configuration matches best the observed disc features, we derive constraints on the outer binary orbital parameters eccentricity and inclination. Our results indicate that a mildly eccentric and misaligned orbit is preferred to explain the disc size, warp, and spirals. Then, using MCOFST, we produce synthetic images of our models and compare them to observations. To conclude, we take the example of V892 Tau to discuss the main implications of stellar multiplicity for planet formation and architectures.