

# Growing binary/multiple star systems as sources of free floating planets and FU Ori outbursts

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We report 3D SPH and 2D fixed grid simulations of massive protoplanetary discs fed by external mass deposition. We find that systems in which catastrophic disc fragmentation is triggered exhibit very complex dynamics of multiple fragments interacting with each other and with the disc. We find these systems to be natural birth places of binary/multiple stellar systems AND of free floating planets (FFPs). The former grow by rapid gas accretion and/or mergers with other fragments; the latter are less massive fragments that are usually ejected from the disc by the most massive secondary object. We show that this scenario for the origin of FFPs can be observationally distinguished from the scenarios advanced in the Core Accretion field through the age, mass function and the velocity dispersion of FFPs. Additionally, the oligarchic growth of protostars in these discs may be a promising framework for FU Ori outbursts in the scenarios where they arise due to super-Jupiter mass fragments being accreted by the growing protostars (e.g., Vorobyov & Basu 2015; Nayakshin, Owen & Elbakyan 2023).

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