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Planet dynamics during common envelope evolution of binary star

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Binary stars are common and the number of systems with circumbinary planets is bound to increase with the advent of new missions like TESS, JWST. The indirect inference of planets around post-common envelope (CE) binaries has motivated investigations into their origin and survival in such violent environments. The potential existence of planets raises the question of whether the planets survived the CE stage of the binary or if they were formed from the back-falling material, after the CE has been expelled. We perform 3D global hydrodynamical simulations of the CE phase along with two first-generation planets orbiting the binary star using FLASH code. This allows us to scan the plausible parameter space of CE energy budget by varying its total kinetic, thermal and rotational kinetic energy. We then follow the dynamics of the pre-existing planets in this highly non-linear system and quantify their orbital/kinematic properties to see if they are dragged in or are ejected post-CE. Furthermore, we analyze different stellar mass-loss events obtained and identify whether a disk is formed around the close binary serving as a nursery for formation of second generation planets.

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