

HOW TIDALLY DISRUPTED ASTEROIDS POLLUTE WHITE DWARFS

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More than a quarter of the white dwarfs (WDs) have metal lines in their spectra and accretion of asteroids is deemed the culprit. Here we model how an asteroid, under the scattering of a planet, is accreted onto a WD. On entering the Roche lobe, the asteroid is disrupted and a stream of tidal fragments forms. The fragments then evolve under the perturbation by the planet, the WD radiation force, and their mutual collisions. We find that if the asteroid is sizeable (e.g., $\gtrsim 100$ km), large numbers of tidal fragments are created. Then mutual collisions quickly grind them down into smaller and smaller collisional fragments. Subsequently, the radiation force shrinks and circularises the orbits of sub-dm fragments efficiently and a circum-WD disc results. On the other hand, if the asteroid is small, mutual-fragment collisions will not be activated as planet scattering disperses the fragments more quickly. In this case, the fragments will accrete onto the WD without the formation of a close-in disc. Full results of this work are available in Li, Mustill & Davies 2021, arXiv: 2106.00441.