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The Fate of Circumplanetary Disks in Dynamically Ejected Planetary-Mass Objects

Wednesday, December 17, 2025 10:00 AM (20 minutes)

The James Webb Space Telescope (JWST) has revealed that free-floating planetary-mass objects (FFPMOs) often host substantial dusty disks. A key unanswered question is whether these objects formed in isolation or were dynamically ejected from planetary systems. We test the ejection hypothesis with 3D hydrodynamical simulations of a giant planet, hosting a circumplanetary disk (CPD), ejected via a stellar flyby. We find that the ejection process severely truncates the disk, leaving a remnant that is significantly smaller and less massive than disks around isolated objects. These results provide the first quantitative predictions for disks around ejected planets, creating a critical theoretical framework for interpreting the origin of FFPMOs with JWST.

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