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Effects of Disk Photoevaporation on Planet Migration

The final locations of planets may be influenced by turning points in their migration tracks called "planet traps" (Hasegawa & Pudritz 2013, 2014). We explore a new planet trap caused by photoevaporation of a protoplanetary disk. Near the end of the lifetime of the gas disk, photoevaporation rates on the inner disk begin to exceed viscous accretion rates, initially resulting in a gap being formed at ~1 AU. Disk material inside the gap is quickly drained and then the gap widens until the gas disk is entirely blown away. Using a combination of analytical calculations and numerical simulations, we show that the variations of disk density resulting from this process can affect the migration tracks of planets. In particular, the initial photoevaporative gap at ~1 AU stops planets from migrating inward from the gap until photoevaporation disperses the remaining disk and the planets lose their primary source of migration. This process may explain the apparent pileup of giant exoplanets around 1 AU seen in radial velocity surveys.