

Habitable Planet Formation in Multiple-Star Systems

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Nearly a quarter of all known extrasolar giant planets orbit stars that are members of binary or multiple-star systems. This surprising result has contributed to the growing uncertainty over the mechanism by which giant planets form. While this important debate is ongoing, another question comes to mind with perhaps far greater implications: What is the frequency of terrestrial planet formation in binary and multiple-star systems? A recent investigation of the effects of massive secondary companions on planetesimal dynamics led to the identification of a previously unrecognized mode of planetesimal accretion (*Kortenkamp et al.*, 2001). This new mode of growth indicates that formation of terrestrial planets may actually be facilitated by the gravitational perturbations of massive companions. This alternative mode of accretion (dubbed Type II runaway growth) suggests that planet formation can occur in much more compact binary-star systems than previously thought possible. We are currently following-up on this intriguing possibility by studying multiple-star systems already known to possess giant planets. Our objective is to develop constraints on system parameters (stellar companion masses, separations, eccentricity) that will be consistent with the formation of Earth-like terrestrial planets in the habitable zones around the stars in these systems.

[a] Kortenkamp, S.J., Wetherill, G.W., and Inaba, S., Runaway Growth of Planetary Embryos Facilitated by Massive Bodies in a Protoplanetary Disk, *Science*, **293**, 1127–1129, 2001.

