



Formation of Massive Rocky Exomoons by Giant Impact

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Formation of planetary moons is a natural by-product of planet formation. Moons of extrasolar planets (exomoons) should be common in extrasolar planetary systems, however, there are no confirmed discoveries. Moons larger than a tenth of an Earth mass should be detectable using current transit techniques, but at present very little is known about how moons of this size might form. In our Solar System, large moons can be formed by collisions between young solid planets. Collisions between young planetary bodies are common during the late stages of terrestrial planet formation. Here, we show that oblique, near-escape velocity collisions between rocky planets of 2 to 7 Earth masses can launch enough material into orbit to create a satellite large enough to be detected in Kepler transit data. Impact velocity is a crucial controlling factor on the mass of orbiting material; this effect has been overlooked in all prior studies of moon formation via planet-scale collisions.