

The Strength of Rubble Pile Asteroids

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This talk will introduce current theories on the possible non-zero cohesive strength that rubble pile asteroids may have.

Rubble pile asteroids have been frequently characterized as being cohesionless, gravitating aggregates of boulders and grains. This picture has motivated many of the geophysical theories for how these bodies evolve in the solar system, and regarding what assumptions can be made concerning their geophysics, evolution and exploration. However, recent astronomical observations have provided fresh evidence that this picture is incomplete, and indeed that rubble pile asteroids seem to exhibit a degree of cohesion between their components. The net effect of even small amounts of cohesion has significant implications for the evolution of small asteroids in the main belt and in the NEA population. A recent theory by Sanchez and Scheeres provides one hypothesis for how such cohesive strength could exist in gravitationally attracting aggregates — through weak van der Waals attractive forces between the finest grains in a rubble pile. This theory has several additional implications for the asteroid environment that have specific predictions that can be probed with both ground-based observations and with spacecraft rendezvous missions such as Hayabusa II.