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Titan's gravity and interior structure

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During the nominal mission of Cassini in the Saturnian system, four Titan flybys are devoted to gravity science. The first flyby occurred on February 27, 2006, the second one on December 28, 2006, and the third and fourth ones will occur on June 29 and December 5, 2007, respectively. The objectives of the Gravity Science experiment at Titan are to determine the mass of Titan, the higher order gravity field coefficients (mainly the quadrupole moments), and Titan Love number k2. This determination is possible because the flybys were selected in such a way that two of them occur when Titan is near periapsis, and the other two when Titan is near apoapsis. Radar measurements will also be used to measure the moments of inertia of Titan. This information is necessary to understand the internal structure of the satellite. Preliminary results will be presented. A preview of possible future results and their meaning in terms of interior structure will also be given.