Violating the Spin Barrier

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Asteroids that are larger than 200 meters are usually rubble piles, consisting of rocks and ice held together by gravity. If they rotate faster than about ten times per day, they will spin apart. A large “monolithic” asteroid consisting of a single piece of rock and ice, could rotate much faster without breaking apart. 2001 OE84 is the only known large asteroid that has a rotation rate faster than ten times per day, and therefore likely belongs to this latter category. The purpose of this research was to search for large asteroids that may spin faster than the breakup limit, known as the spin barrier, of ten rotations per day. The asteroids chosen for this project were larger than 200 meters and maintained a possibility of rotating faster than the breakup limit, since their rotation rate had not been accurately measured. A series of images were taken of the selected targets using telescopes from the Las Cumbres Observatory Global Telescope Network (LCOGT). This series of images allows the brightness to be measured, and gives the length of time the object was observed. Plotting the measured brightness of the object versus time on a graph allows the light curve to be analyzed. By measuring the period shown by the light curve, it is possible to determine the rotation rate of the asteroid. None of the objects observed had a rotation rate faster than ten times per day, but the possibility that other large asteroids may rotate faster than the limit remains because the sample size for this project was limited.

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