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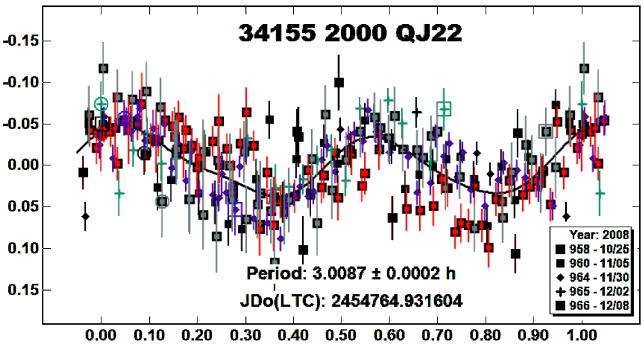

ANALYSIS OF THE LIGHTCURVES OF 198 AMPELLA AND 2008 SV11

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We report on our collaborations to obtain photometric data on two asteroids. 198 Ampella, a main-belt object, was observed to check previously reported periods. We found a synodic period of 20.778 ± 0.003 h, which is double that of the most reliable of those previous results. The near-Earth asteroid 2008 SV11 was observed in support of radar observations. We found a period of 32.4 ± 0.1 h. However, the shape of the lightcurve was very unusual and so the period remains in some doubt. Radar observations indicate a strongly bifurcated body.

Equipment and basic image acquisition methods used by the authors have been previously described (see Stephens, 2006; Warner, 2009). We linked our observations from night-to-night using the 2MASS (Neugebaur and Leighton, 1969) to BVRI conversions developed by Warner (2007) and applied as described by Stephens (2008).

198 Ampella. Despite its relatively large size and brightness, this main belt asteroid had only one previously published lightcurve, that by DeYoung and Schmidt (1993) who reported a period of 10.383 h. The authors observed the asteroid in 2009 April, obtaining data on 13 nights, with the intent of confirming the period and providing data for future shape modeling. Our analysis found a period of 20.778 ± 0.003 h with an amplitude of 0.13 ± 0.01 mag, or double that of DeYoung and Schmidt. The lightcurve shows our data phased to the longer period. When forced to the shorter period, the curve is monomodal and the RMS fit is significantly higher. We note that the observing runs by DeYoung and Schmidt were separated by no less than two days and sometimes a week or more. We believe this led to a "rotational uncertainty" in their solution such that they found the shorter period, which we do not believe to be correct.

2008 SV11. Photometric observations by the authors were made of this near-Earth asteroid in 2009 April to support radar observations at Arecibo by Brozovic, Benner, Nolan, and Howell. As more data became available, the solution changed dramatically, but it finally settled to something around 32 h. This seemed to agree with radar observations (low Doppler shift) that indicated a longer period and also a bifurcated body. Starting on April 19 and continuing for through April 22, the last day the asteroid could be readily observed from our location, the curve suddenly "went flat" and showed only a steady rise within the phased lightcurve. We could find no observational, systematic, or reduction causes and so must presume that the change was due to a combination of the asteroid's shape and changing viewing aspect. Since the aspect did not change dramatically over this short interval, this explanation also has difficulties. Our data have been sent to Howell at Arecibo with the hope that the combination of optical and lightcurve data can resolve the mystery.

We also used the data to determine the absolute magnitude (H) of the asteroid, first by forcing the phase slope parameter (G) to 0.24, the default for type S (Warner et al., 2009), the presumed type of the asteroid. This gave H = 18.4 ± 0.1, the same value assumed by the Minor Planet Center. We then allowed both values to float and H = 18.0 ± 0.2, G = –0.07. We have adopted the first solution as the more likely since it relies on a more likely value for G. If we had been able to obtain data near opposition, phase angles < 3°, it would have been possible to find a more definitive solution.

Acknowledgements

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Asteroid	2009	α	L_{PAB}	B_{PAB}
198 Ampella	04/08-30	11,17	163	-11
2008 SV11	04/03-21	40,16,18	172,199	7,-5

Table I. Observing circumstances. The phase angle column gives the values on the first and last date. For 2008 SV11, the middle date is the minimum phase angle. The phase angle bisector columns give the value for the first and last date of observation.

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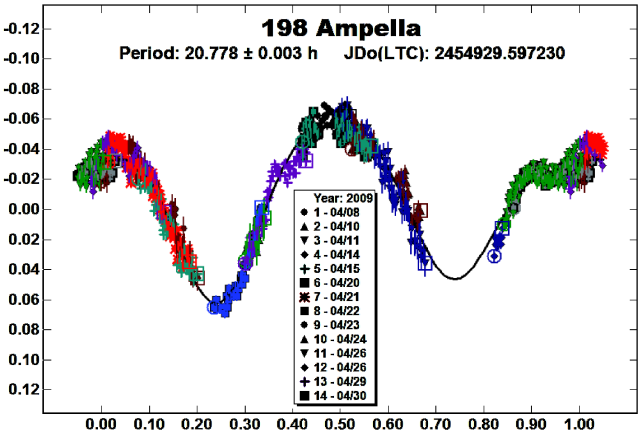

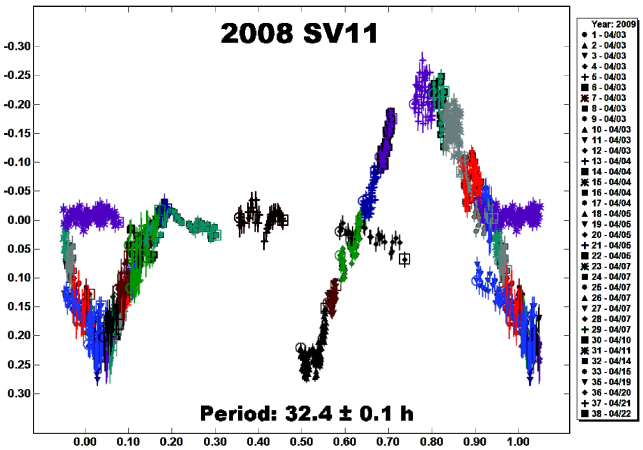

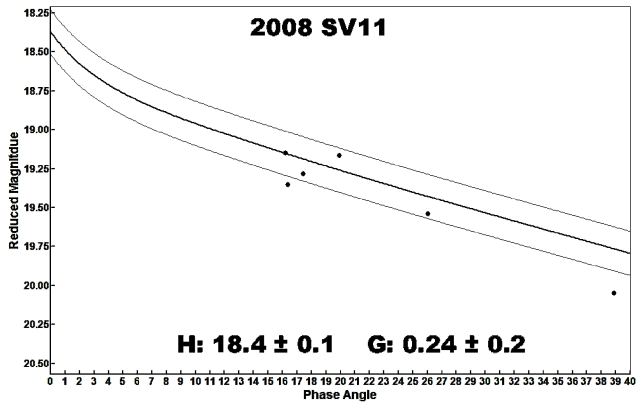

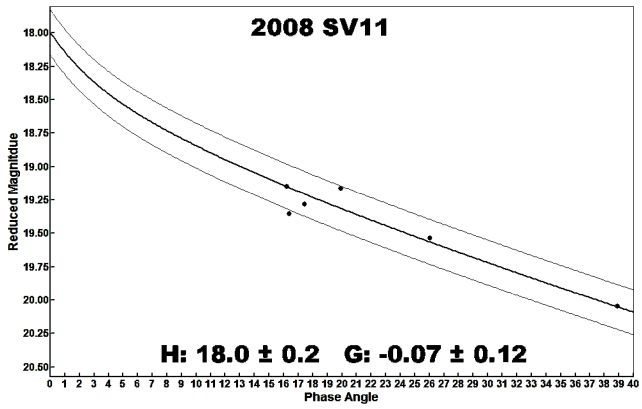

2577 LITVA: A HUNGARIA BINARY

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Observations of the Hungaria asteroid 2577 Litva in 2009 late February to early April show that the asteroid is a binary. The primary period (synodic) is 2.81258 ± 0.00002 h and the orbital period (synodic) is 35.81 ± 0.01 h. The depth of mutual events (occultations and eclipses) indicate a size ratio of *Ds/Dp* (lower limit) = 0.34 ± 0.02. A secondary period of 5.6842 ± 0.0002 h was also found. This is due either to the rotation of the satellite that is not tidally locked with the orbital period or a third body.

Initial observations of the Hungaria asteroid 2577 Litva were made by Warner at the Palmer Divide Observatory (PDO) in late 2009 February as part of an ongoing study of that group/family of asteroids. Wisniewski et al. (1997) worked the asteroid in 1988 and found a period of 5.618 h with an amplitude of 0.36 mag. Stephens (2004) reported a period of 2.82 h and amplitude of 0.30 mag while Behrend (2009) reported a period of 2.81 h and amplitude of 0.14 mag. When the initial data from the 2009 PDO campaign were analyzed, there were unusual aspects with one interpretation being a second period within the data. At this point,

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