and star images merge. Figure 2 shows the final lightcurve after using the star subtraction function. The shape is smoother than the previous curve as the point-to-point noise is reduced. The improved precision in the data yields a rotation period of 2.91 ± 0.02 h. The amplitude in the new lightcurve is 0.52 ± 0.05 mag. The star subtraction function also improved the RMS from Fourier analysis reducing from 5.52384 in Figure 1 to 2.44077 in Figure 2.

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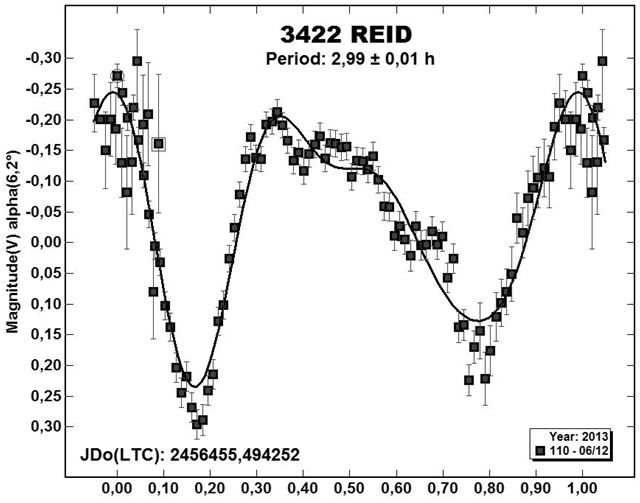

Figure 1: Preliminary lightcurve for 3422 Reid.

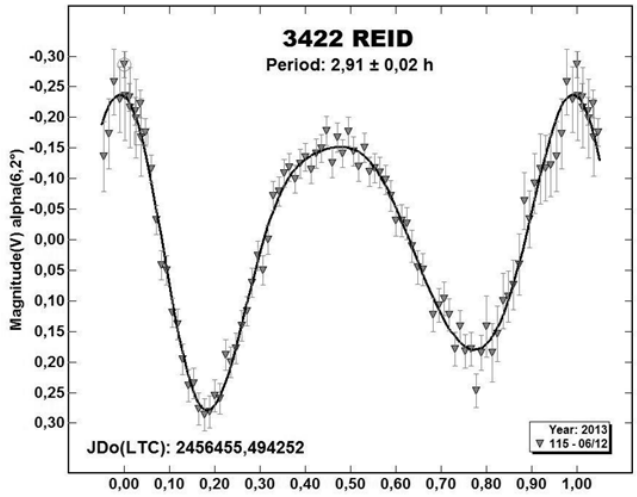

Figure 2: Final lightcurve for 3422 Reid using star subtraction.

ASTEROID LIGHTCURVE ANALYSIS AT ELEPHANT HEAD OBSERVATORY: 2013 APRIL –JULY

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Four main-belt asteroids were observed from Elephant Head Observatory during 2013 April to July: 319 Leona, 806 Gyldenia, 814 Tauris, and 2448 Sholokhov.

The synodic rotation rates for four main-belt asteroids were determined from the analysis of CCD photometric observations. These were conducted with a 0.25-m Schmidt-Cassegrain Telescope on a German Equatorial mount (GEM) using an SBIG STT-8300M CCD camera with 5.4-micron pixels binned at 4x4 with an image scale of 1.67 arcsec per pixel. A clear filter was used for all exposures, which were between 150 and 250 seconds each. All images were dark and flat-field corrected. All lightcurve data were submitted to the ALCDEF website at *http://minorplanetcenter.net/light_curve*.

The images were obtained from an automated routine using *CCDAutopilot* v5. Imaging and plate solving were done with *Maxim DL* v5 and *TheSkyX* v10. Data were reduced in *MPO Canopus* v10 using differential photometry. Comparison stars were chosen for near-solar color index with the "comp star selector" of *MPO Canopus*. Period analysis was completed using *MPO Canopus*, which incorporates the Fourier analysis algorithm (FALC) developed by Harris (Harris *et al.*, 1989). These asteroids were reported as lightcurve opportunities in the *Minor Planet Bulletin*.

319 Leona. A search for previous period determinations of 319 Leona found a value of 9.6 h (Behrend, 2006). New observations were obtained over nine nights in 2013 April. Analysis of the data found a period of 14.9 ± 0.1 h, amplitude 0.10 ± 0.03 mag. The newly determined period differs from that given in the asteroid lightcurve database (Behrend, 2006). The flatness of the lightcurve made it difficult to establish an accurate period. This asteroid needs further work.

806 Gyldenia. A search for previous period determinations of 806 found 14.45 h (Behrend 2005, 2006). New observations were obtained over eight nights in 2013 April. Analysis of the data found a period of 16.846 ± 0.007 h, amplitude 0.14 ± 0.02 mag. The newly determined period differs from that in Behrend of 14.45 h. Both lightcurves are plotted below for reference.

814 Tauris. A search for previous period determinations of 814 Tauris found 35.8 h (Debehogne *et al*., 1983). New observations were obtained over 14 nights from 2013 May to June. Analysis of the data found a period of 35.8 ± 0.1 h, amplitude 0.18 ± 0. The newly determined period is within experimental uncertainty with the Debehogne *et al*. result. This lightcurve did not receive complete coverage of the analyzed period.

2448 Sholokhov. A search for previous period determinations of 2448 Sholokhov found Warner (2005; 10.065 h). New observations were obtained over 11 nights from 2013 May to June. Analysis of the data found a period of 10.061 ± 0.002 h, amplitude

0.21 ± 0.02 mag. The newly determined period is within experimental uncertainty with Warner.

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