LIGHTCURVE ANALYSIS OF 266 ALINE, 664 JUDITH, (16959) 1998 QE17, AND (32910) 1994 TE15

Chrysoula Avdellidou
Aristotle University, Dept. of Physics, Section of Astrophysics
Astronomy and Mechanics
54124, Thessaloniki, GREECE
chavdell@physics.auth.gr

Panagiotis Ioannidis
Aristotle University, Thessaloniki, GREECE

Despoina K. Skoulidou
Aristotle University, Thessaloniki, GREECE

Kleomenis Tsiganis
Aristotle University, Thessaloniki, GREECE

John H. Seiradakis
Aristotle University, Thessaloniki, GREECE

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We present the rotation period of three main-belt asteroids: 266 Aline, (16959) 1998 QE17, and (32910) 1994 TE15. Data were obtained but no period found for 664 Judith. The observations were undertaken at Aristotle University's Astronomical Station and Skinakas Observatory during 2010 and 2011.

The Aristotle University's Astronomical Station was established nine years ago in order to fulfill the educational needs of its students. It is located at Mt. Holomon, Greece. Astronomical observations are undertaken using a fully-equipped telescope, which is a 0.28-m Schmidt-Cassegrain with either an ATIK 4000 or ATIK 11000 CCD camera using an R Bessel filter. The data reduction and photometry were done with *MPO Canopus* software.

266 Aline (a = 2.8 AU, e = 0.157). This asteroid probably belongs to the Gefion family and was observed during four nights in 2010. Its rotation period was found to be P = 13.05 ± 0.07 h with an approximate amplitude A = 0.08 mag. The period is very close to the one reported by Pilcher and Benishek (2011).

664 Judith (a = 3.21 AU, e = 0.22). A probable member of the Themis family, Judith was observed on 2010 August 5. Unfortunately, we were not able to obtain enough data to determine the period.

(16959) 1998 QE17 (a = 2.62 AU, e = 0.3). 1998 QE17 was discovered on 1998 August 17. We extracted the lightcurve and calculated its period, P = 3.227 ± 0.085 h, and amplitude, A = 0.45 mag.

(32910) 1994 TE15 (a = 2.18 AU, e = 0.25). This inner main-belt asteroid was discovered on 1994 October 13. The inner main-belt is very chaotic. This is caused by the mean motion resonances with Mars and three-body resonances, Mars-Jupiter-asteroid, which combine so that the asteroid orbits slowly migrate in eccentricity. This chaotic diffusion leads many bodies to become Mars-crossers. (32910) 1994 TE15 was selected because it has close encounters with Mars. The trajectory of the asteroid was numerically integrated using the *swift_whm* and *swift_rmvs3* routines from the *SWIFT* package (Levison & Duncan 1994). Only the eight major planets were considered in the integrations. As we can understand, from the changes of its semi-major axis versus time, it has close encounters with Mars, but not so strong in order for it to be ejected from the main belt.

It was observed at *Skinakas Observatory* on 2010 August 13, 15-16, using the 1.3-m telescope and an R Johnson-Cousins filter. The amplitude of the lightcurve is A = 0.13 mag and the period was calculated as P = 5.559 ± 0.0249 h.

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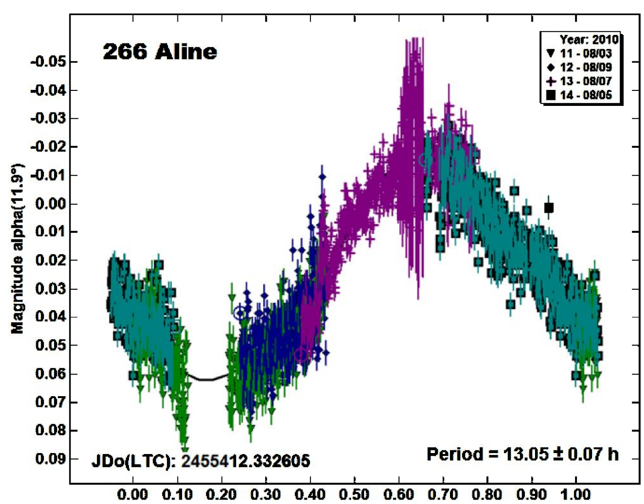

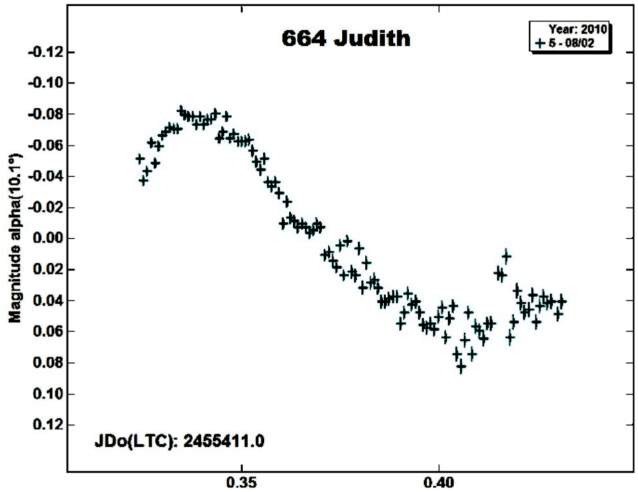

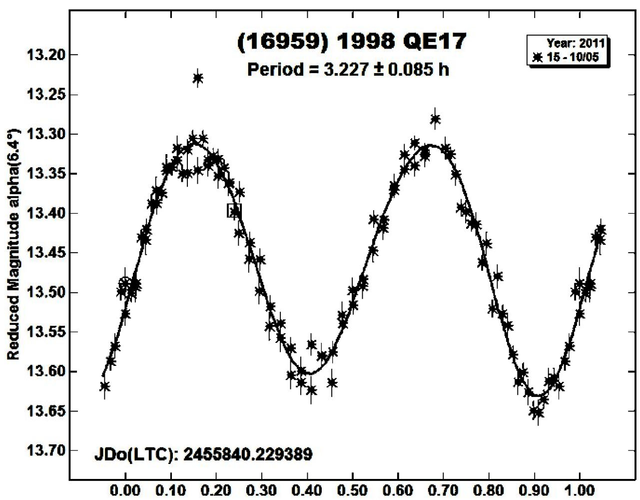

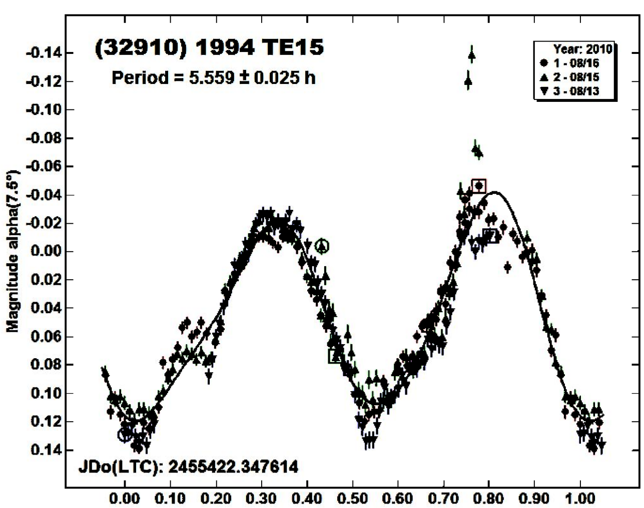

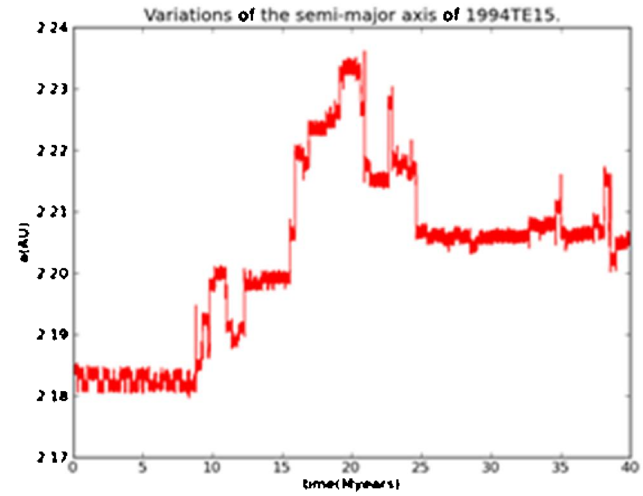

LIGHTCURVE ANALYSIS FOR 3017 PETROVIC

Caroline Odden
Phillips Academy Observatory, I12
180 Main Street
Andover, MA USA 01810
ceodden@andover.edu

David McDonald
Celbridge Observatory, J65
Co. Kildare, Ireland

(Received: 16 February)

The lightcurve for main-belt asteroid 3017 Petrovic was measured from observations during 2012 January 12 through 31. The derived synodic period is P = 4.0804 ± 0.0002 h and amplitude A = 0.60 ± 0.05 mag.

Observations of asteroid 3017 Petrovic were made at the Phillips Academy Observatory with a 0.4-m *f*/8 DFM Engineering telescope using an SBIG 1301-E CCD camera with a 1280x1024 array of 16-micron pixels. The resulting image scale was 1.0 arcsecond per pixel. Exposures were 300 s working primarily at –30° C. All images were dark and flat field corrected, guided, and unbinned. A clear filter was used. Observations at Celbridge Observatory were conducted with a Celestron C14 at *f*/11. Images were captured with an FLI Proline 1001E camera with a 1024x1024 array of 24-micron pixels. The resulting images scale was 1.3 arcseconds per pixel. Exposures were 90 s working at –20° C. All images were dark and flat field corrected, unguided, and unbinned. No filter was used.

Lightcurve images were captured with *Maxim DL* and measured in *MPO Canopus* (Bdw Publishing) with a differential photometry technique. Data merging and period analysis was done with *MPO Canopus* using an implementation of the Fourier analysis algorithm of Harris (Harris *et al.*, 1989). The combined set of 338 data points was analyzed by Odden. According to a geometric argument made by Harris (2012), it is nearly impossible for an asteroid in single axis rotation (i.e., not tumbling) to exhibit other than a bimodal lightcurve, one with two maximums and two minimums, when the phase angle is low and the amplitude exceeds