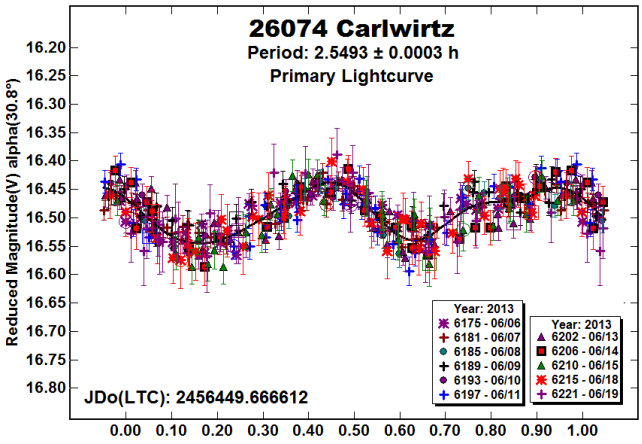

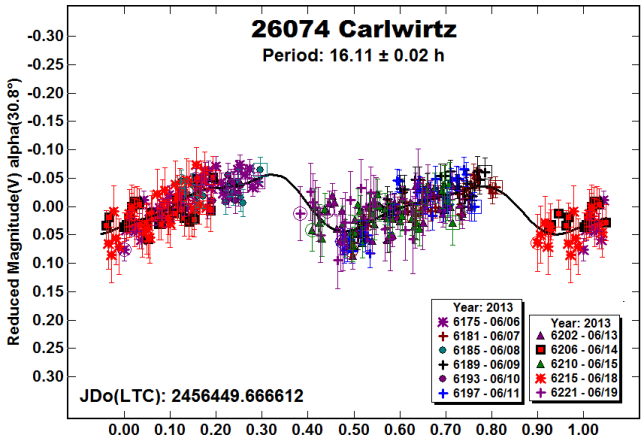

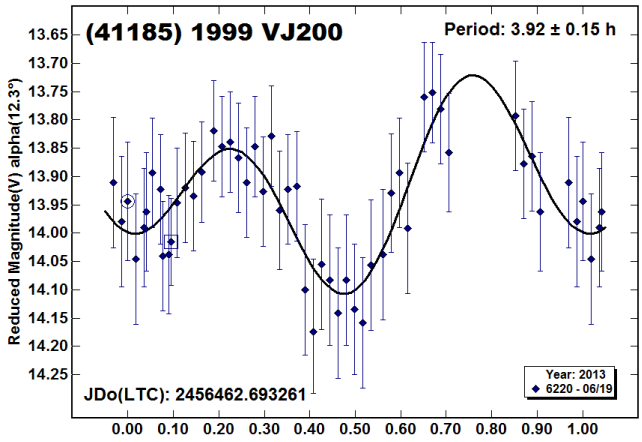

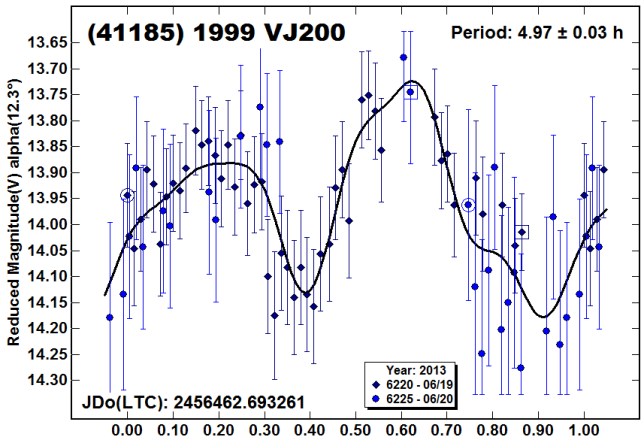

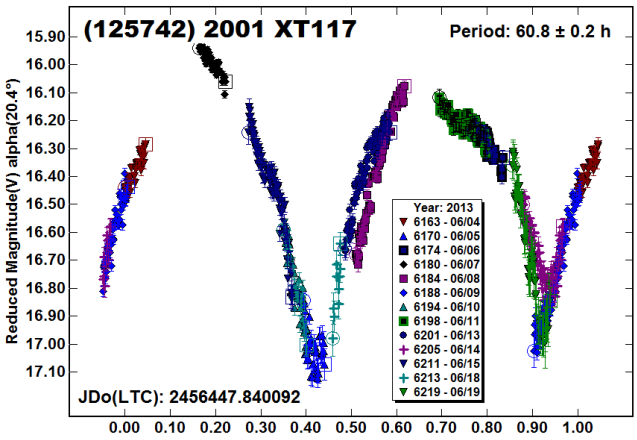

PHOTOMETRIC STUDY OF FOUR ASTEROIDS AT TEXAS A&M COMMERCE OBSERVATORY

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Lightcurves for four asteroids were measured at the Texas A&M University-Commerce Observatory from 2011 through 2013. The asteroids were: 1175 Margo, 2566 Kirghizia, 4106 Nada and (19977) 1989 TQ.

Photometric data was obtained at the Texas A&M University-Commerce Observatory using a 0.41-m Meade LX-200 telescope on a Paramount German equatorial mount. Images were taken with an SBIG STL-11000 CCD Camera. Images were 5 minutes each through a clear filter and the telescope was guided using an external CCD camera connected to a piggybacked refractor. The image scale was 0.424 arc-seconds per pixel.

Dark frames of equal length exposures were subtracted from each image as they were taken. Image calibration was done using *Maxim DL*. Flat field images were obtained nightly through the same clear filter using an LED panel placed in front of the telescope. The images were all calibrated and aligned before using the *MPO Canopus* v10.2.1.0 program for the photometric measurements (Warner, 2011). Standard stars were all chosen on the images with high (>200) S/N ratios. When the target asteroid passed near background stars the observations were deleted. Star subtraction methods did not provide high enough quality photometry.

1175 Margo. Observations of the asteroid were obtained on the following two nights in 2011; November 29 and December 1. The total number of observations was 109. The period determined was 6.01 ± 0.02 h and the peak amplitude variation was 0.32 magnitudes. These values agree to within the errors with 6.015 ±

0.001 found by Brinsfield (2010). However, Oliver et al. (2008) determined a period of 11.99 ± 0.03 h. Since the period of Margo is an integer value of the Earth's 24 hour period it is difficult to distinguish which period is correct. This asteroid needs more observations before the period is convincingly determined.

2566 Kirghizia. Observations of the asteroid were obtained on the following three nights in 2013: February 14, 15 and 19. The total number of observations was 104. The period determined was 4.451 ± 0.006 h and the peak amplitude variation was 0.55 magnitudes. A search of the Astrophysics Data System and the Asteroid Lightcurve Database did not find any previously reported lightcurve results.

4106 Nada. Observations of the asteroid were obtained on the following five nights in 2012: April 17, 18, 19, 24 and 25. The total number of observations was 147. The period determined was 5.832 ± 0.006 h and the peak amplitude variation was 0.48 magnitudes. These values agree to within the errors with both Owings (2013) who reported 5.8330 ± 0.0001 h and Stephens (2012) who reported 5.832 ± 0.002 h.

(19977) 1989 TQ. Observations of the asteroid were obtained on the following seven nights in 2012: August 23, September 7, 11, 12, 13, 19 and 20. The total number of observations was 237. The period determined was 8.566 ± 0.004 h and the peak amplitude variation was 1.33 magnitudes. A search of the Astrophysics Data System and the Asteroid Lightcurve Database did not find any previously reported results.

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