Photometric observations of six asteroids at NAO Rozhen in May 2013 – February 2014
Astronomical Observatory.

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Lightcurve analysis is presented for six main belt asteroids, 289 Nenetta, 1270 Datura, 1291 Phryne, 1394 Algoa, 2381 Landi, and 2911 Miahelena, observed at Bulgarian National Astronomical Observatory Rozhen in May 2013 - February 2014. The observations are made by a 50/70 Schmidt telescope with the FLI PL16803 CCD camera and a 60-cm Cassegrain telescope with the FLI PL9000 CCD camera. Aperture photometry of the asteroids and comparison stars was performed using the CCDPHOT software [1]. For the lightcurve analysis, we used the MPO Canopus v10.4 software package [2] that produces composite lightcurves, calculates rotational periods, provides the Fourier analysis procedure, and estimates the amplitude of the lightcurves.

Results of lightcurve analysis: The observations of **289 Nenetta** were carried out in three nights: 6, 17 and 19 May 2013 when the solar phase angle increased from 4.7 to 9.2 deg. Using the published period of 6.914 h [3], we construct a composite lightcurve which covers only 90% of the rotational phase of the asteroid. The shape of the lightcurve is very asymmetrical with an amplitude of 0.17 mag. **1280 Datura** is the largest body of the young family recently dated to only 450,000 years ago [4]. It was observed during two successive nights on 2 and 3 November 2013. The composite lightcurve shows a very asymmetric shape with an amplitude of 0.71 mag. The estimated period is 3.359±0.012 h which is equal to the one published in [3]. This lightcurve taken at very high phase angle of 27.5 deg may be used in the future to refine the spin state and shape derived in [5]. **1291 Phryne** is a member of the Eos family. Using observations from two successive nights on 7 and 8 January 2014, we constructed a composite lightcurve. The estimated period is equal to the one published in [6] with an amplitude of 0.32 mag. A Fourier fit of order 9 reveals a slightly asymmetric shape of the lightcurve with almost equal heights of the peaks but with different sharpness. We have observed Phryne since 2011 during the three previous apparitions and, with few lightcurves expected from the future apparitions, we hope to derive a model for the asteroid and to compare that with the one derived in [7], where the combination of dense (2 lightcurves from one apparition) and sparse data was used. Using observations from two successive nights on 29 and 30 October 2013, we constructed a composite lightcurve for **1394 Algoa**. The estimated period and amplitude are equal to those published in [3]. **2381 Landi** was observed on 13 and 14 December 2013 at the phase angle of 17.6 deg, on 5 January 2014 at the phase angle of 9.2 deg, and on 7 February 2014 at the phase angle of 11.5 deg. The amplitudes of the Fourier fits were, respectively, 0.9 mag, 0.84 mag and 0.93 mag. The only published period is 3.91 h [8], based on less than full coverage of the rotational phase. Our calculated period is 3.986±0.001 h. The lightcurves show a symmetric shape of the asteroid with barely noticeable difference in the sharpness of the peaks. **2911 Miahelena** is an outer-main-belt asteroid and it was observed on 5 nights in 3-31 May 2013. Our composite lightcurve reveals the same shape and period as in [3] but a slightly smaller amplitude although the observations were performed approximately at the same time.

Future work: There is a need to continue the observations of the present asteroids in their future apparitions (with varying observing geometries) in order to determine their global shapes and rotational states. However, there is a large number of asteroids, for which dense lightcurves, in one or two future apparitions only, will be very important for shape modelling in combination with sparse data from photometric asteroid surveys such as Pan-STARRS and Gaia [7].

Acknowledgements: Authors gratefully acknowledge observing grant support from the Institute of Astronomy and Rozhen National Astronomical Observatory, Bulgarian Academy of Sciences.

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