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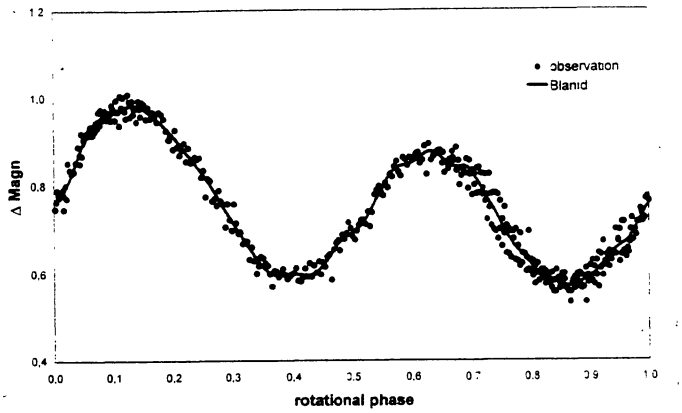

Figure 1: Rotational lightcurve of 201 Penelope obtained from Las Campanas Observatory.

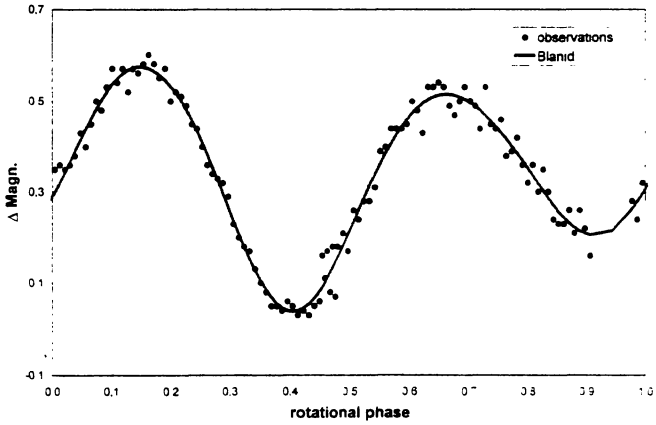

Figure 2: Rotational lightcurve of 201 Penelope obtained from Lumezzane

LIGHTCURVE PARAMETERS FOR 1582 MARTIR

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A lightcurve for 1582 Martir was measured in 2000 May at the Palmer Divide Observatory, located near Colorado Springs, CO. The period was found to be 15.757h ± 0.005h with an amplitude of 0.40m ± 0.03m.

The goal of the Palmer Divide Observatory asteroid photometry program is to measure the lightcurves of as many asteroids as possible. Initial targets are chosen by checking the list of lightcurves maintained by Dr. Alan Harris (Harris 1999). If possible, two targets per night are chosen since the control software allows the telescope to "bounce" between the targets. This maximizes the amount of time that data is being gathered. To help assure the targets remain near the center of the field, the position of each is re-computed before the telescope is moved to it and, approximately every hour, the telescope is moved to a nearby star of magnitude 3 to 7 where an automatic process centers the star and updates the telescope computer's pointing. At least two nights are dedicated to the initial run for every target. Depending on the preliminary analysis of the lightcurve data from those two nights, additional runs are allocated as necessary to assure full coverage of the lightcurve with no significant gaps, if possible. Asteroids with periods approaching and exceeding 24 hours are often, but not always, eliminated from further studies and marked for follow-up at another time or an appeal is made via the Collaborative Asteroid Lightcurve Link (http://www.MinorPlanetObserver.com/astlc/default.htm) to have other observing stations take part in a joint effort.

Commercially available software, Canopus, is used to measure the images. This program semi-automatically measures the magnitudes of comparison stars and the asteroid for each image and then stores the data for use in a Fourier analysis program. The original FORTRAN code of this program was supplied by Dr. Alan Harris (Harris et al, 1989) and converted to Delphi Pascal. If the data from a single night appears to cover at least a quarter of the period or more, an "eyeball estimate" based on a plot of the raw data is used to help narrow the possibilities when using data from two or more nights.

In Canopus, several stars of higher accuracy photometry, such as those from the LONEOS catalog from Lowell Observatory (Skiff), are measured to establish a relationship between the total pixel intensity of a given star vs. its catalog magnitude. The LONEOS catalog is not a set of standard stars but they are of higher accuracy and includes magnitudes in several common bands, thus allowing stars of near solar (and asteroid) color to be used. The LONEOS field is selected to be as near as possible to the target field.

In some cases, stars within the target field are used to establish this relationship. The difficulty here is that it is not usually easy to determine the color of stars in the field since the information is not in the Hubble Guide Star and USNO A2.0 catalogs. While the results under these circumstances are usually similar to when using a LONEOS or like set of stars, a preferred method would be to

shoot the target field in both V and B or R to establish which stars are solar colored and should be used to set the relationship. Afterwards, if necessary or desired, observations can be made without filters to improve the signal-to-noise ratio of the data. Once the proper filters have been acquired, this method will be used for future observations at the Palmer Divide Observatory.

The observations for the accompanying lightcurve were obtained with a 0.5m f/8.1 Richey-Chretien telescope. A common focal reducer used on commercial Schmidt-Cassegrain telescopes was used to bring the f-ratio down to f/4.6. The lenses from the reducer were placed in a custom-built mount that allowed the separation between the optics and CCD chip to be nearer the 105mm required for maximum reduction With the SBIG ST-8 used for imaging, this provided a field of approximately 19x13 arcminutes. The CCD was operated at 2x2 binning, or 18um pixels, yielding a resolution of 1.5 arcseconds per pixel. The temperature was set to –10°C. The camera could have been run colder but this setting can be obtained year around, and so is chosen to keep some consistency in the program images. Dark frames and flat fields were applied before the images were measured to reduce the effects of noise, pixel-to-pixel variations and, as a result of the reducer, significant vignetting. Exposures were unguided, forty seconds in duration, and taken at regular three minute intervals.

1582 Martir

Martir is an asteroid of approximately 37km size whose spectral classification has not been determined. The asteroid was discovered by M. Itzigsohn at La Plata on 1950 June 15. It is a main-belt asteroid, favoring the outer reaches with a semi-major axis of 3.16 AU, eccentricity of 0.12, and inclination of 11.6°. Approximately 200 observations were acquired over three nights, 2000 May 5, 10, and 21. The period was found to be 15.757h ± 0.005h with an amplitude of 0.40m ± 0.03m. The 16-day period between the first and last sessions represents approximately 24 revolutions, thus allowing a slightly better than usual precision to be reported.

Acknowledgements

Thanks go to Dr. Alan Harris of the Jet Propulsion Laboratory for making available the source code to his Fourier analysis program.

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ftp://ftp.lowell.edu
Login Name: anonymous
Password: <your e-mail address>
cd pub/bas/starcats
get loneos.phot.gz
```

Be sure to set the mode to Binary.

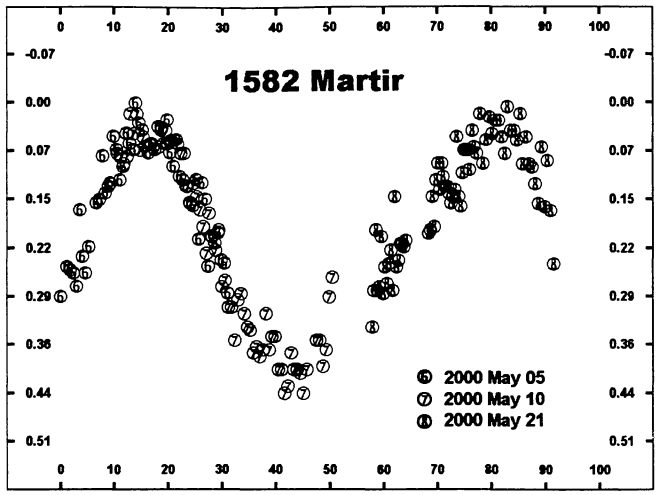

Figure 1. The phased lightcurve for 1582 Martir. The magnitudes are against a reduced common "zero point". The period was found to be 15.757h ± 0.005h with an amplitude of 0.40m ± 0.03m

ROTATIONAL PERIODS AND LIGHTCURVES OF 891 GUNHILD AND 1017 JACQUELINE

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As part of a lightcurve photometry program, the lightcurves of two main belt asteroids were measured at Santana Observatory. 891 Gunhild was determined to have a rotational period of 7.93 ± 0.01 hours and an amplitude of 0.18 magnitude. 1017 Jacqueline was determined to have a rotational period of 7.87 ± 0.01 hours and an amplitude of 0.7 magnitude.

Observations of 891 Gunhild and 1017 Jacqueline were made at Santana Observatory in Rancho Cucamonga, California. The observatory has a 28cm (11 inch) Schmidt-Cassegrain telescope combined with a focal reducer providing a F/7 focal length. The instrument attached is a SBIG ST-9E CCD camera.

Telescope and camera control was done using BDW Publishing's Connections 2000 program. This program controls the GOTO functions, tracking, synchronizing on nearby SAO stars, and automatic focusing necessary for the system to run unattended.

Minor Planets are sometimes selected for observation by referring to "Asteroid Photometry Opportunities" published each quarter in the Minor Planet Bulletin. Targets are selected within the limiting magnitude of the system, considering asteroids for which lightcurves have already been determined according to the list maintained by Dr. Alan Harris.

Data reductions and lightcurves were prepared using BDW Publishing's Canopus program, which was developed from Dr. Alan Harris' Fourier Analysis program (Harris et al, 1989).