References

ALCDEF (2020). Asteroid Lightcurve Data Exchange Format database. *http://www.alcdef.org/*

Chang, C.-K.; Ip, W.-H.; Lin, H.-W.; Cheng, Y.-C.; Ngeow, C.-C.; Yang, T.-C.; Waszczak, A.; Kulkarni, S.R.; Levitan, D.; Sesar, B.; Laher, R.; Surace, J.; Price, T.A. and the PTF Team (2014). "313 New Asteroid Rotation Periods from Palomar Transient Factory Observations." *Ap. J.,* **788**, id 17.

Gradie J.; Tedesco E. (1982). "Compositional structure of the asteroid belt." *Science Reprint Series* **216**, 1405-1407.

Harris, A.W.; Young, J.W.; Scaltriti, F.; Zappala, V. (1984). "Lightcurves and phase relations of the asteroids 82 Alkmene and 444 Gyptis." *Icarus* **57**, 251-258.

JPL (2021). Small-Body Database Browser. *http://ssd.jpl.nasa.gov/sbdb.cgi#top*

MPC (2021). MPC Database. *http://www.minorplanetcenter.net/db_search/*

Shevchenko, V.G.; Lupishko, D.F. (1998). "Optical Properties of Asteroids from Photometric Data." *Solar System Research* **32**, 220.

Warner, B.D. (2006). *A Practical Guide to Lightcurve Photometry and Analysis (2nd edition)*. Springer, New York.

Warner, B.D.; Harris, A.W.; Pravec, P. (2009). "The Asteroid Lightcurve Database." *Icarus* **202**, 134-146. Updated 2018 June. *http://www.minorplanet.info/lightcurvedatabase.html*

Warner, B.D. (2017). MPO Software, MPO Canopus v10.7.7.0. Bdw Publishing. *http://minorplanetobserver.com*

Waszczak, A.; Chang, C.-K.; Ofek, E.O.; Laher, R.; Masci, F.; Levitan, D.; Surace, J.; Cheng, Y.-C.; Ip, W.-H.; Kinoshita, D.; Helou, G.; Prince, T.A.; Kulkarni, S. (2015). "Asteroid Light Curves from the Palomar Transient Factory Survey: Rotation Periods and Phase Functions from Sparse Photometry." *A. J.* **150**, A75.

## ROTATION PERIOD FOR ASTEROID (125072) 2001 UG

Stephen C. Percy
The Studios Observatory (Z52)
Grantham, U.K.
mail@opussoftware.co.uk

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CMOS photometric observations of asteroid (125072) 2001 UG were performed by the author at The Studios Observatory in January 2022. The synodic rotation period was determined as 9.27 ± 0.01 h with amplitude 0.68 ± 0.04 mag.

Asteroid (125072) 2001 UG (=1985 YO1 = 1998 WU33) is in a Mars crossing orbit. It was discovered at Socorro on 2001 October 16 by LINEAR. A search of the asteroid lightcurve database (LCDB, Warner et al., 2009) indicates no previous reported rotation period for this asteroid.

We report observations performed at The Studios Observatory, Grantham, U.K. (Z52) using a Meade 14" (0.36 m) LX200 ACF OTA operating at f/10 with a Takahashi FS-102 4" f/8 refractor as guide scope. The OTAs are mounted on a Paramount MEII robotic mount. The 14" OTA is equipped with Moonlite CSL 2.5-inch large format motorized focuser and a QHY600M cooled CMOS camera (binned 2×2). A Chroma 50mm square Clear filter was used for all observations. All guiding was carried out using a ZWO ASI1600M-Cooled CMOS camera binned 2×2. The main imaging QHY600M camera is based on a 36mm × 24mm Sony IMX455 sensor with 3.76um pixels. The image scale, after 2×2 binning, was 0.448 arcsecs per pixel.

*Sequence Generator Pro* was used for all image centering, capture, and focusing. *PHD2* was used for all guiding. *TheSkyX Professional* software was used for all telescope control and initial focusing. *TheSkyX Professional* was also used to calibrate all science images using bias, dark, dark-for-flat, and flat-field frames. All flat-field images were obtained using a wall-mounted whiteboard illuminated by an A4-size electroluminescent (EL) panel. A recent library of bias, dark and dark-for-flat frames was used in the calibration process, no scaling of dark frames was necessary.

All data processing of the calibrated images and subsequent period analysis was performed using *MPO Canopus* (BDW Publishing 2018). Differential photometry measurements were performed using the Comp Star Selector (CSS) and Star-B-Gone procedures of *MPO Canopus*. Unless otherwise stated the asteroid and five solar-like stars were used for all photometric comparisons. The Sony IMX455 sensor has a peak spectral response in the green visual band so V band magnitudes and V-R colour indexes were used throughout the data processing.

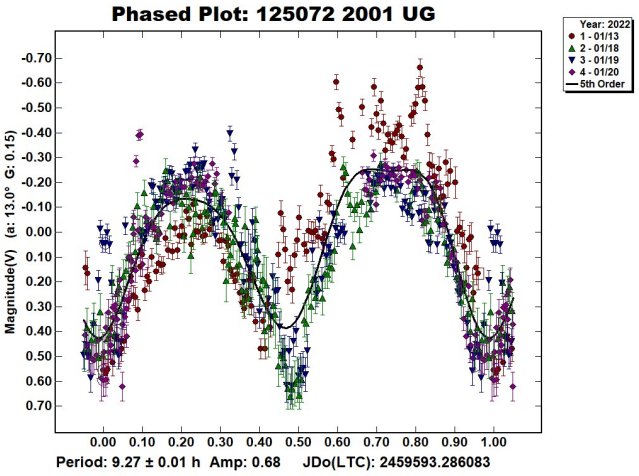
The asteroid's magnitude ranged from 16.2 V to 16.3 V during the observing period. Period analysis was performed using the Fourier analysis algorithm (FALC) of *MPO Canopus* developed by Alan Harris (Harris et al., 1989). All likely periods from 1 hour onwards were examined.

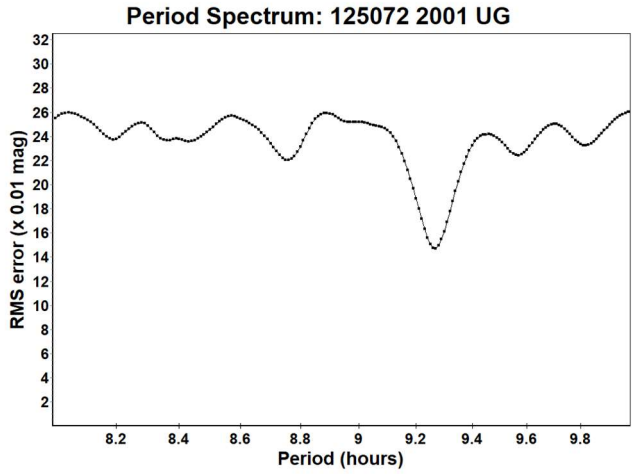
| Number | Name | 2022 mm/dd | Phase | $L_{PAB}$ | $B_{PAB}$ | Period(h) | P.E. | Amp | A.E. | Grp |
|---|---|---|---|---|---|---|---|---|---|---|
| 125072 | 2001 UG | 01/13-01/20 | 13.0,18.1 | 102 | 6.5 | 9.27 | 0.01 | 0.68 | 0.04 | MC |

Table 1. Observing circumstances and results. The phase angle is given for the first and last date. If preceded by an asterisk, the phase angle reached an extrema during the period. $L_{PAB}$ and $B_{PAB}$ are the approximate phase angle bisector longitude/latitude at mid-date range (see Harris et al., 1984). Grp is the asteroid family/group (Warner et al., 2009).

A total of 39 h 58 m of observations were performed over a four-night period from 2022 January 13-20. A total of 571 data points were used in the period analysis.

The observing schedule for this project and calibrated data are summarized in Table 1. All new data have been deposited in the ALCDEF database. The resulting phased plot and period spectrum are illustrated below.

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*https://www.minorplanetcenter.net/iau/mpc.html*

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References

Harris, A.W.; Young, J.W.; Scaltriti, F.; Zappala, V. (1984). "Lightcurves and phase relations of the asteroids 82 Alkmene and 444 Gyptis." *Icarus* **57**, 251-258.

Harris, A.W.; Young, J.W.; Contreiras, L.; Dockweiler, T.; Belkora, L.; Salo, H.; Harris, W.D.; Bowell, E.; Poutanen, M.; Binzel, R.P.; Tholen, D.J.; Wang, S. (1989). "Phase relations of high albedo asteroids: The unusual opposition brightening of 44 Nysa and 64 Angelina." *Icarus* **81**, 365-374.

Warner, B.D.; Harris, A.W.; Pravec, P. (2009). "The Asteroid Lightcurve Database." *Icarus* **202**, 134-146. Updated 2016 Sep. *https://www.minorplanet.info/php/alcdef.php*

Warner, B.D. (2018). MPO Software, MPO Canopus v10.7.11.3. BDW Publishing. *http://www.minorplanetobserver.com/MPOSoftware/MPOCanopus.htm*

Software Bisque TheSkyX Professional software website. *https://www.bisque.com/product-category/software/*

Sequence Generator Pro by Main Sequence Software. *https://www.sequencegeneratorpro.com/*

PHD2 by Open PHD Guiding. *https://openphdguiding.org/*