

MEASURED LIGHTCURVES AND ROTATIONAL PERIODS OF 1132 HOLLANDIA AND 1184 GAEA

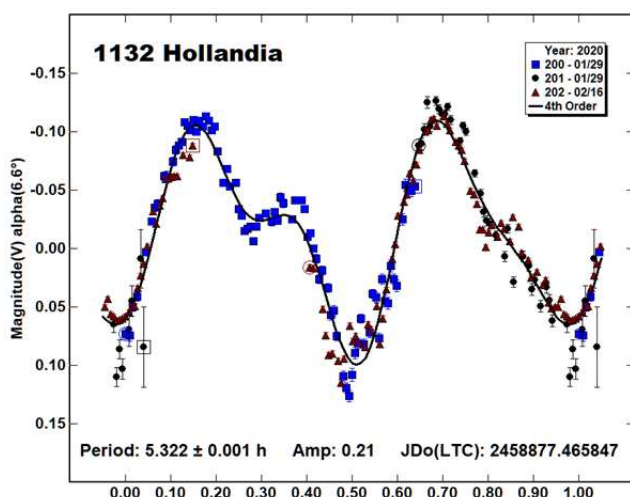
Michael Fauerbach
Florida Gulf Coast University
and SARA Observatories
10501 FGCU Blvd.
Ft. Myers, FL 33965-6565
mfauerba@fgcu.edu

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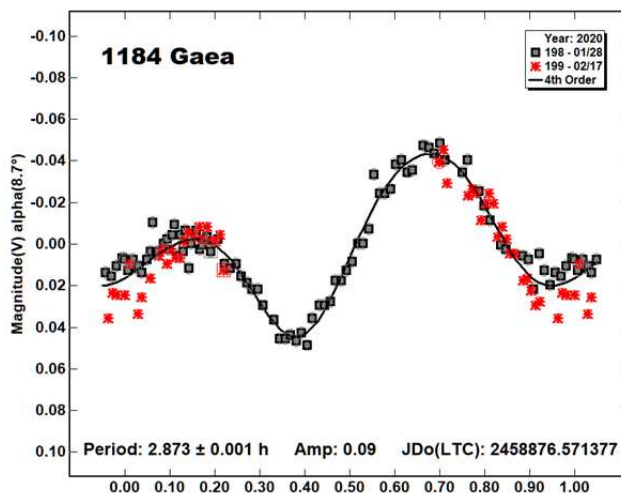
Photometric observations of 1132 Hollandia and 1184 Gaea were obtained on three nights 2020 January 27 to 2020 February 16. The following rotational periods were determined: 1132 Hollandia 5.322 ± 0.001 h; 1184 Gaea 2.873 ± 0.001 h.

Photometric observations obtained with the Southeastern Association for Research in Astronomy (SARA) consortium 1m Jacobus Kapteyn Telescope at the Observatorio del Roque de los Muchachos on the Spanish island of La Palma are presented. The telescope is coupled with an Andor iKon-L series CCD. A detailed description of the instrumentation and setup can be found in Keel et al. (2017). The data were calibrated using MaximDL and photometric analysis was performed using MPO Canopus (Warner, 2017). Due to limited time the target asteroids were selected from a list of previously observed asteroids by FGCU's Asteroid Research Group. This will enable us to perform shape modeling via lightcurve inversion in the future.

1132 Hollandia. This main-belt asteroid was observed during two nights for 5.5 h and 4 h respectively. Our analysis yields a rotational period of 5.322 ± 0.001 h with an amplitude of 0.21 mag. This is in excellent agreement with previous publications by Sauppe et al. (2007, 5.326 h) and Clark (2015, 5.360 h), as well as our previous result (Fauerbach and Brown, 2018, 5.312 h).



1184 Gaea. FGCU's Asteroid Research Group had observed 1184 Gaea in 2017 (Fauerbach and Brown, 2018) and 2018 (Fauerbach and Fauerbach, 2019) and derived periods of 2.871 h and 2.873 h respectively. Observations at the Oakley Southern Sky Observatory (Ditteon and Trent, 2018) derived a period of 2.8735 ± 0.0005 h. Behrend (2011) reported a period of 2.94 ± 0.06 h, which cannot be reproduced by our data. The current observations lead to a period of 2.873 ± 0.001 h with an amplitude of 0.09 mag in excellent agreement with previous measurements.



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Number	Name	yyyy mm/dd	Phase	L _{PAB}	B _{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
1132	Hollandia	2020 01/29,02/16	6.3,2.8	145	7.9	5.322	0.001	0.21	0.02	MB-M
1184	Gaea	2020 01/28,02/17	8.7,2.8	147	7.2	2.873	0.001	0.09	0.01	MB-M

Table I. 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).

Keel, W.C.; Oswalt, T.; Mack, P.; Henson, G.; Hillwig, T.; Batcheldor, D.; Berrington, R.; De Pree, C.; Hartmann, D.; Leake, M.; Licandro, J.; Murphy, B.; Webb, J.; Wood, M.A. (2017). "The Remote Observatories of the Southeastern Association for Research in Astronomy (SARA)." *Publications of the Astronomical Society of the Pacific* 129:015002 (12pp). <http://iopscience.iop.org/article/10.1088/1538-3873/129/971/015002/pdf>

Sauppe, J.; Torno, S.; Lemke-Oliver, R.; Ditteon, R. (2007). "Asteroid Lightcurve Analysis at the Oakley Observatory - March/April 2007." *Minor Planet Bulletin* 34, 119-122.

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LIGHTCURVES AND ROTATION PERIODS OF 50 VIRGINIA, 57 MNEMOSYNE, 58 CONCORDIA, 59 ELPIS, 78 DIANA, AND 529 PREZIOSA

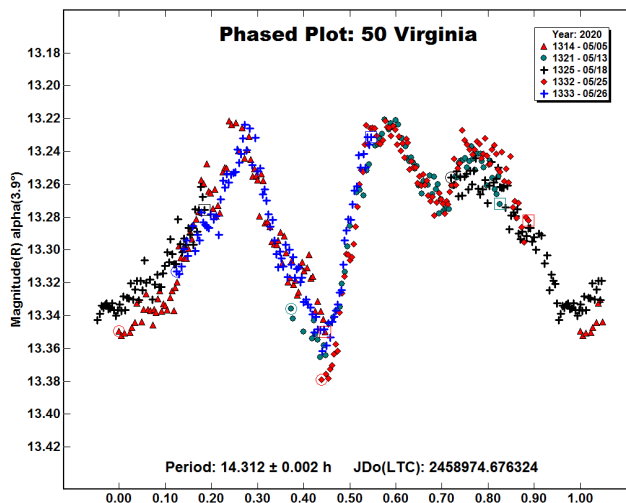
Frederick Pilcher
Organ Mesa Observatory (G50)
4438 Organ Mesa Loop
Las Cruces, NM 88011 USA
fpilcher35@gmail.com

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Synodic rotation periods and amplitudes were found for
50 Virginia: 14.312 ± 0.002 h, 0.14 ± 0.01 mag;
57 Mnemosyne: 25.281 ± 0.002 h, 0.10 ± 0.01 mag;
58 Concordia: 9.899 ± 0.001 h, 0.10 ± 0.01 mag;
59 Elpis: 13.672 ± 0.001 h, 0.16 ± 0.01 mag; 78 Diana:
 7.2929 ± 0.0001 h, 0.06 ± 0.01 mag; 529 Preziosa:
 25.943 ± 0.001 h, 0.30 ± 0.02 mag.

Observations to produce the results reported in this paper were made at the Organ Mesa Observatory with a Meade 35-cm LX200 GPS Schmidt-Cassegrain, SBIG STL-1001E CCD, and 60-second unguided exposures. For the bright targets 59 Elpis and 78 Diana, exposures were through the R filter. For all other targets, exposures were through the clear filter. Image measurement and lightcurve construction were with *MPO Canopus* software with all calibration star magnitudes from the CMC15 catalog reduced to the Cousins R band. To reduce the number of data points on the lightcurves and make them easier to read, data points have been binned in sets of 3 with a maximum time difference of 5 minutes.

50 Virginia. The lightcurve data base (LCDB, Warner et al., 2009; updated 2020 March) lists a period of 14.315 h based on several secure $U = 3$ published periods within 0.005 h of this value. New observations on five nights from 2020 May 5-26 provide a good fit to a lightcurve with a period of 14.312 ± 0.001 h, amplitude 0.14 ± 0.01 mag. This period is consistent with many previously published periods.



57 Mnemosyne. Earlier published periods are by Harris et al. (1992), 12.463 h; Ditteon and Hawkins (2007), 12.66 h; and Behrend (2016), 12.92 h. This author (Pilcher, 2019b) was unable to fit a lightcurve to a period near 12.5 h and found a synodic period of 25.324 h with one maximum and minimum per cycle