

LIGHTCURVES AND ROTATION PERIODS OF 57 MNEMOSYNE, 645 AGRIPPINA, AND 987 WALLIA

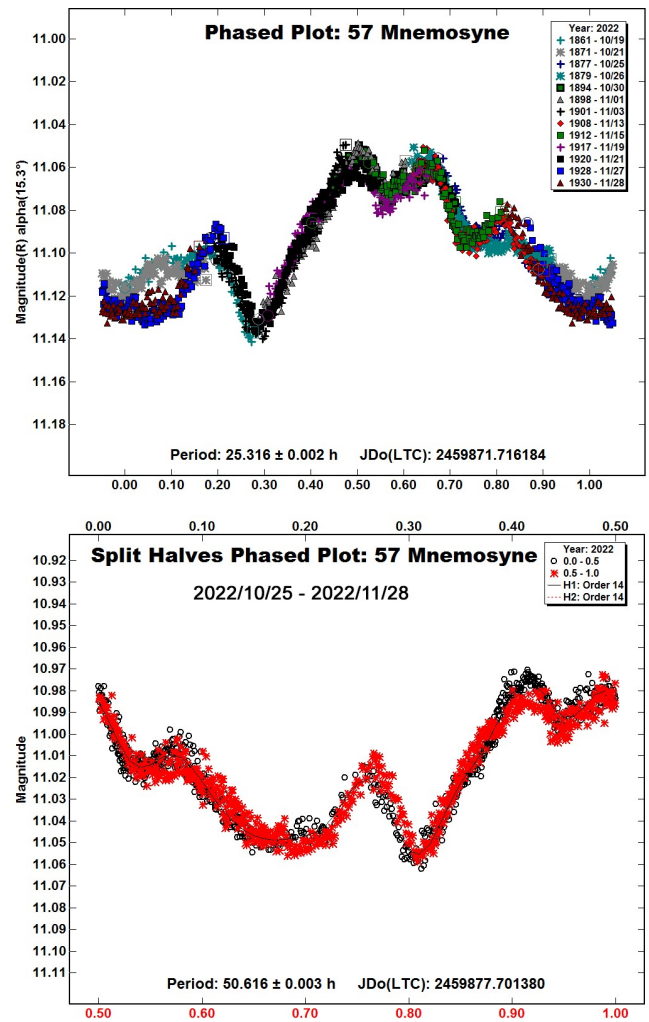
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Synodic rotation periods and amplitudes are found for 57 Mnemosyne 25.316 ± 0.002 h, 0.08 ± 0.01 mag; 645 Agrippina 53.436 ± 0.004 h, 0.18 ± 0.01 mag; 987 Wallia 10.085 ± 0.001 h, 0.14 ± 0.01 mag.

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, 20 to 30 second exposures for 57 Mnemosyne, 60 second exposures for 645 Agrippina and 987 Wallia, unguided, clear filter. Image measurement and lightcurve construction were with *MPO Canopus* software with calibration star magnitudes for solar colored stars from the CMC15 catalog reduced to the Cousins R band. Zero-point adjustments of a few $\times 0.01$ magnitude were made for best fit. 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 maximum time difference 5 minutes.

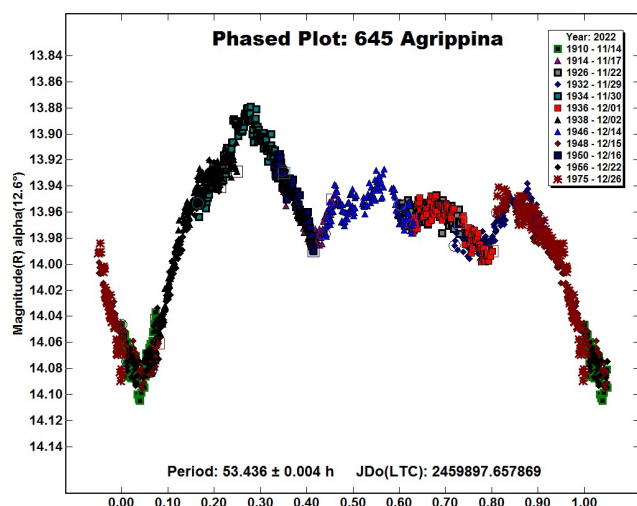
57 Mnemosyne. Earlier published periods are by Harris et al. (1992), 12.463 hours; Ditteon and Hawkins (2007), 12.66 hours; Behrend (2016web), 12.64 hours; Behrend (2020web), 12.648 hours. This author (Pilcher, 2019) was unable to fit a lightcurve to a period near 12.5 hours and found a synodic period 25.324 hours with one maximum and minimum per cycle near celestial longitude 197° . This author obtained additional sets of observations (Pilcher, 2020) near celestial longitude 258° , synodic period 25.281 hours with a complex lightcurve; and (Pilcher, 2022) near celestial longitude 331° , synodic period 25.308 hours, again with a complex shape. New observations on 14 nights 2022 Oct. 19 - Nov. 28 provide a fit to an irregular lightcurve with period 25.316 ± 0.002 hours, amplitude 0.08 ± 0.01 magnitudes. A change in the lightcurve shape near rotational phase 0.1 occurred between Oct. 19 and 21 near phase angle 15° and Nov. 27 and 28 near phase angle 6° . A split halves lightcurve for the double period including observations from Oct. 25 to Nov. 28 shows that the two halves are almost identical and rules out the double period. The observations in years 2019, 2020, 2021, and 2022, respectively, indicate consistent rotation periods but very different lightcurve shapes. The differing shapes indicate that the observations were made at different astero-centric latitudes and should be helpful toward future LI modeling.



645 Agrippina. Periods published many years ago are by Behrend (2004web), 34.39 h; and Binzel (1987), 32.6 h. Recently published periods are much longer: Pál et al. (2020), 53.7893 h; and Polakis (2019), 54.13 h. New observations on twelve nights 2022 Nov. 14 - Dec. 26 provide a good fit to an irregular lightcurve with period 53.436 ± 0.004 hours, amplitude 0.18 ± 0.01 magnitudes. This value is consistent with the recent publications by Pál et al. and by Polakis. Periods lower than 35 hours can now be definitively ruled out.

Number	Name	2022/mm/dd	Phase	LPAB	BPAB	Period(h)	P.E	Amp	A.E.
57	Mnemosyne	10/19-11/28	15.2, 5.9	66	-13	25.316	0.002	0.08	0.01
645	Agrippina	11/14-12/26	*12.6, 6.1	83	9	53.436	0.004	0.18	0.01
987	Wallia	07/19-08/16	15.2, 3.4	329	0	10.085	0.001	0.14	0.01

Table I. Observing circumstances and results. Pts is the number of data points. The phase angle is given for the first and last date, except that a * denotes a minimum was reached between these dates. LPAB and BPAB are the approximate phase angle bisector longitude and latitude at mid-date range (see Harris et al., 1984).



987 Wallia. Previously published periods are by Lagerkvist (1979), >10 h; Cieza et al. (1999), 10.523 h; Behrend (2008web), 10.08 h; Behrend (2011web), 10.0813 h; and Ferrero (2012), 10.082 h. New observations on five nights 2022 July 19 - Aug. 16 provide a good fit to a lightcurve with four unequal maxima and minima per rotational cycle, rotation period 10.085 ± 0.001 hours, amplitude 0.14 ± 0.01 magnitudes, consistent with previously published values.

