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Photoelectric Photometry Of The Carbon Star V614 Mon

Photometric observations of V614 Mon (HD 52532, BD-03°1685, SAO 134049) were made to more accurately determine its periodicity and amplitude range, as only sparse data regarding these parameters are found in existing literature. V614 Mon is a carbon star of subclass J, with a spectral type of R5 (C4, 5J). The major characteristic of J-class carbon stars is the high strength (50%) of the C-12 C-13 isotopic carbon band at 6168 Angstroms relative to the normal band at 6122 Angstroms (Eggen 1972, Gordon 1971, Yamashita 1966). It is also classified as a SRb semi-regular variable with a period of about 60 days, a varying visual amplitude range from 0.10 to 0.35, and a B-V value of +1.74 (Eggen 1972, GCVS 1985, Sky Catalog 2000).

The observations were made on 31 separate nights from JD 2448209 (14 Nov 90) to JD 2448358 (12 Apr 91) as part of the Small Amplitude Red Variable (SARV) Photoelectric Photometry Program for the AAVSO. The detector was a silicon PIN photodiode in a solid-state SSP-3 photoelectric photometer, which was mated to an f/10 8-inch Schmidt-Cassegrain. The observations were made through a SSP-3 Schott visual filter, with the variable star measurements flanked by the comparison star and sky readings. A check star was observed on 90 percent of the nights. The

Table I: V614 Monocerotis Light Curve Data

JD 244+	Visual Magnitude	JD 244+	Visual Magnitude
8209.767	7.34	8297.606	7.30
8211.731	7.38	8302.575	7.32
8234.705	7.44	8311.533	7.38
8235.702	7.43	8314.620	7.48
8245.677	7.39	8316.530	7.50
8251.660	7.37	8321.514	7.49
8261.619	7.39	8323.517	7.52
8270.627	7.38	8325.527	7.52
8274.620	7.38	8327.529	7.52
8279.680	7.35	8337.540	7.52
8280.716	7.36	8341.524	7.54
8282.610	7.36	8346.530	7.50
8285.598	7.33	8348.528	7.48
8288.583	7.35	8354.533	7.41
8290.583	7.31	8358.536	7.35
8296.595	7.30		

comparison and check stars used were SAO 134133 (V=5.62, B-V=1.29, gK3) and SAO 134031 (V=6.30, B-V=0.57, F8), respectively. The magnitude difference between these two stars varied randomly by only 0.03-0.04 magnitude. The data were reduced by computer programs written by the author, with all comparison and sky readings being interpolated. Also taken into account in the programs were atmospheric extinction, transformation to the standard UBV system, and corrections to heliocentric time. The standard deviation for all of the observations was less than 0.035 magnitude.

The resulting light curve is constructed from the data in Table I and is plotted below. It represents the most complete continuous light curve on this star published to date. Previous sources indicate a maximum visual magnitude of about 7.2, whereas these most recent observations indicate a maximum magnitude of 7.3. Also, it is noted that the maximum amplitude range is 0.24 magnitude, occuring between JD 8297 and JD 8341. This falls within the limits of previously reported amplitude ranges.

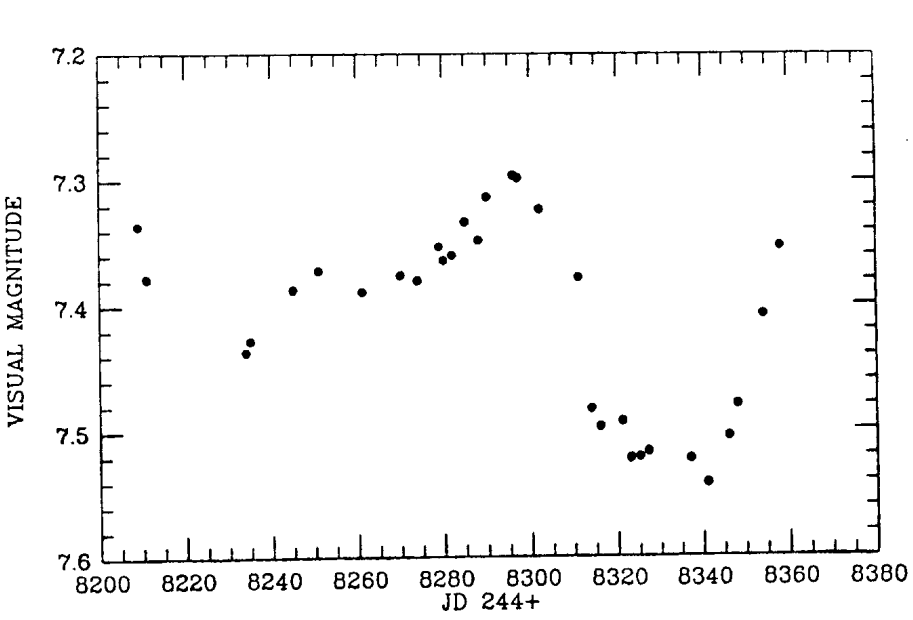

Figure 1

No 60 day period, or any regular period, is easily discernible. If various portions of the light curve are extracted, and some interpolations and extrapolations made, several periods are possible. The possibilities are:

- Peaks occuring just before JD 8205 and around 8297 indicate a period of about 92 days;

- The minima around JD 8222 and 8333 are separated by about 111 days;
- The various extrema around JD 8261, 8297, 8334, and 8370 indicate a half-period of 36-37 days;
- The maxima around HD 8298 and 8370 indicate a period of about 71 days.

Additional observations will be taken to clarify any persistent periodicities. A multiplicity of apparent periods is, of course, a major characteristic of semi-regular SRb variable stars. Thus these observations support the classification of V614 Mon as an SRb variable star with a small amplitude range, but with as yet inaccurately known period(s).

RICK WASATONIC
Computer Sciences Corporation
IUE Observatory
10,000-A Aerospace Road
Lanham-Seabrook, Maryland 20706 USA

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