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PHOTOELECTRIC LIGHT CURVES AND PERIOD STUDIES OF CC CASSIOPEIAE AND V448 CYGNI

Photoelectric light curves of CC Cassiopeiae and V448 Cygni were obtained during the latter part of 1978 using an uncooled RCA 1P21 photomultiplier with a standard V filter (Schott GG495) attached to a 32cm f/15 Cassegrain telescope with all measurements being taken directly from a microammeter. Comparison stars used were BD + 34°3876(V448) and SAO 023846(CC Cas). The visual magnitudes of these stars were found to be 9.01 and 7.98 respectively, plus or minus 0.02. The variables were measured differentially with respect to their comparison stars with differential extinction being ignored.

CC Cassiopeiae

Sixty five estimates were made; the light curve is presented in Figure 1. The light curve is a Beta Lyrae type and the eclipses appear to be partial. The tracing paper method shows that the eclipses are occurring at phase .817±.01. Choosing a date near the middle of the observing period corresponding to a phase of .817 we have a time of minimum equal to 2443818.166. Pearce(1927) first discovered CC Cassiopeiae to be a spectroscopic binary. Its eclipsing nature was discovered photoelectrically by Guthnick and Prager(1930). Both papers list elements. The star was later observed photographically by Gaposchkin(1953), although his

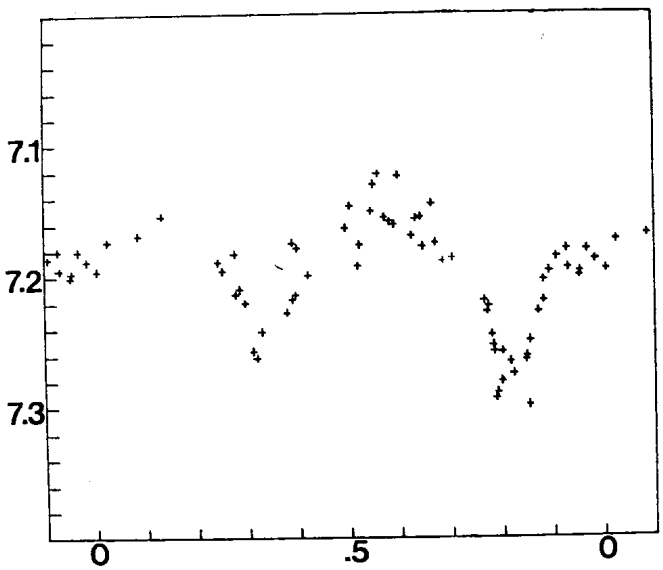

Figure 1: Photoelectric Light Curve of CC Cassiopeiae. Magnitude vs. Phase.

paper seems to be in error as he quotes a time of minimum equivalent to a phase of .77 using Pearce's elements or .69 using Guthnick and Prager's elements, but his published light curve shows primary minimum occurring at phase .27. It is likely that Gaposchkin's time of minimum was secondary and that he used Pearce's elements, implying that the primary minimum occurred .5 phase earlier than listed. If we now construct an O-C graph using the above timings of minimum we obtain Figure 2. A regression line indicates revised elements are:

$$\text{Min(Hel)} = 2443818.166 + 3.369491*E. \quad (1)$$

These elements satisfactorily explain the previous work done on this star with the possible exception of Hilditch and Hill's(1975) work. They published a rough photoelectric light curve which shows minima occurring at about phases .32 and .82. The minimum at phase .32 appears to be slightly deeper, although the sparse coverage of both minima does not preclude an interpretation of primary minimum at .82. A primary minimum at .82 in

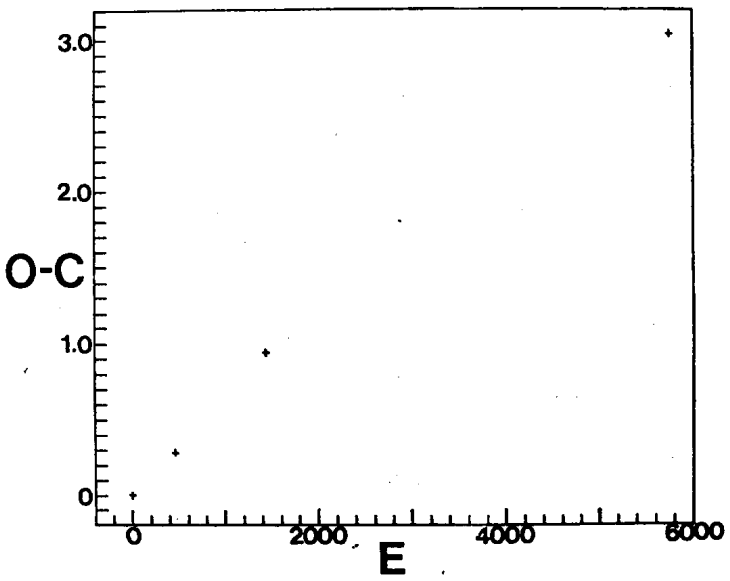

Figure 2: O-C graph for CC Cassiopeiae.
Residuals in Days vs. Elapsed Periods.

1975 is consistent with our elements, whereas a primary minimum at .32 would indicate CC Cassiopeiae has a dynamical period and merits further study.

V448 Cygni

One hundred and five estimates were made; the light curve is plotted in Figure 3. Primary minimum occurs at an O-C value of -.064 day. Choosing a date near the midpoint of the observations we obtain a time of minimum equal to 2443750.409.

V448 Cygni was first discovered to be an eclipsing binary by Wachmann (1939). In the following years, Ashbrook(1942) obtained a photographic light curve, established a Beta Lyrae type variation, and determined a set of period elements. Ashbrook found the eclipses to be total, although the duration of totality was short. A rough photographic light curve was later

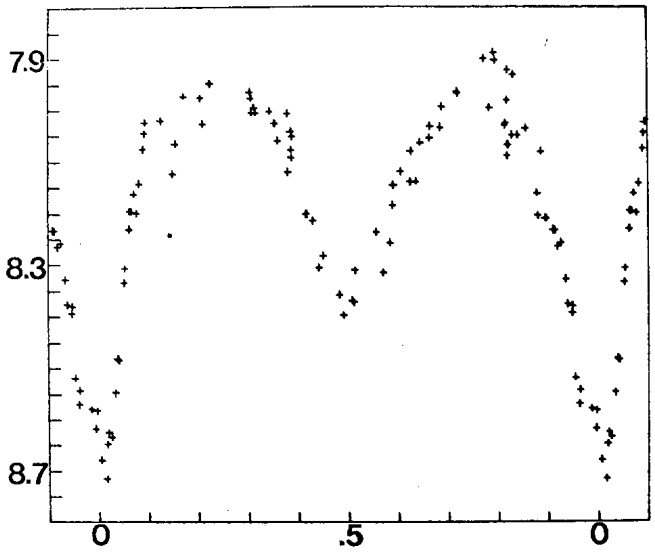

Figure 3: Photoelectric Light Curve of V448 Cygni. Magnitude vs. Phase.

published by Smirnov(1946). Wachmann(1948) obtained four additional times of minimum. The system was observed spectrographically by Petrie(1956) who concluded that the eclipses must be partial if the spectrographic data were to be self consistent. Using Ashbrook's ten photographic timings, Wachmann's four photoelectric timings, and our time of minimum to construct an O-C graph we obtain revised elements:

$$\text{Min(Hel)} = 2416361.107 + 6.5197162*E. \quad (2)$$

It would be unwise to conclude that the eclipses are definitely partial due to the lack of sufficient data at the minima. However, the observations do seem to favor this interpretation.

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