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TIME OF ECLIPSE FOR THE BINARY SYSTEM PV Cas

We observed an eclipse of the binary system PV Cassiopeiae (1950: RA=23<sup>h</sup>07<sup>m</sup>53<sup>s</sup>, dec = +58° 08') on 27 August 1989, UT. Our observations were made with the 24-inch (0.6 m) Cassegrain telescope at Jet Propulsion Lab's Table Mountain Observatory in the San Gabriel Mountains near Wrightwood, California, U.S.A. Measurements of brightness were made through wide-band U, B, and V filters. Unfiltered brightness measurements were also obtained. We used a single-channel photometer containing a dry-ice cooled (-78°C) RCA 1P-21 photomultiplier tube. Each of our measurements of program star, comparison stars, and sky brightness was made with a five-second integration through a 20" aperture.

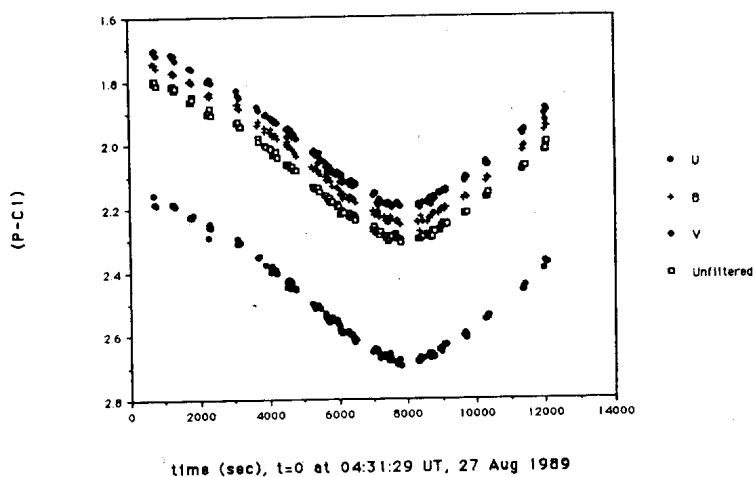
Figure (1) is the light curve of PV Cas obtained on 27 August 1989. It shows the difference in magnitude between PV Cas and our first comparison star, SAO 035187, on the vertical axis. The scale on the horizontal axis is time, in seconds, after 04:31:29 UT. We note from Figure (1) that the light curves in each color are of approximately the same depth and shape. Figures (2a)-(2d) show plots of the difference in magnitude between our second comparison star, SAO 035190, and SAO 035187 versus time, in seconds, after 04:31:29 UT. The noise-level fluctuations in the comparison stars are, for the most part, less than 0.05 magnitude. (Values of (P-C1) and (C2-C1) were calculated by subtracting a second order polynomial fitted to the

TABLE 1

("time" is in seconds after 04:31:29, 27 August 1989, UT)

time U(P-C1)	time B(P-C1)	time V(P-C1)	time Open(P-C1)
7705 2.687	7712 2.241	7719 2.184	7725 2.297
7732 2.687	7739 2.249	7746 2.186	7752 2.299
7766 2.676	7773 2.251	7780 2.197	7786 2.304
7793 2.699	7800 2.256	7807 2.197	7813 2.311
8284 2.681	8291 2.245	8298 2.189	8304 2.299
8311 2.685	8318 2.247	8325 2.196	8331 2.297
8339 2.680	8346 2.246	8353 2.191	8359 2.300

Figure (1)



data of sky-brightness-corrected C1 magnitudes versus time from the sky-brightness-corrected magnitudes measured for P and C2.)

We are primarily interested in the time of minimum for PV Cas. Table (1) shows a section of our data around the point of minimum on 27 Aug 1989. From this data we get the time of minimum as 7800 seconds after our reference time, 04:31:29 UT. The uncertainty in this number is less than 60 seconds, but due to a clock drift of 1 millisecond per second in our computer, we will assign the uncertainty an upper limit of  $\pm 60$  seconds.

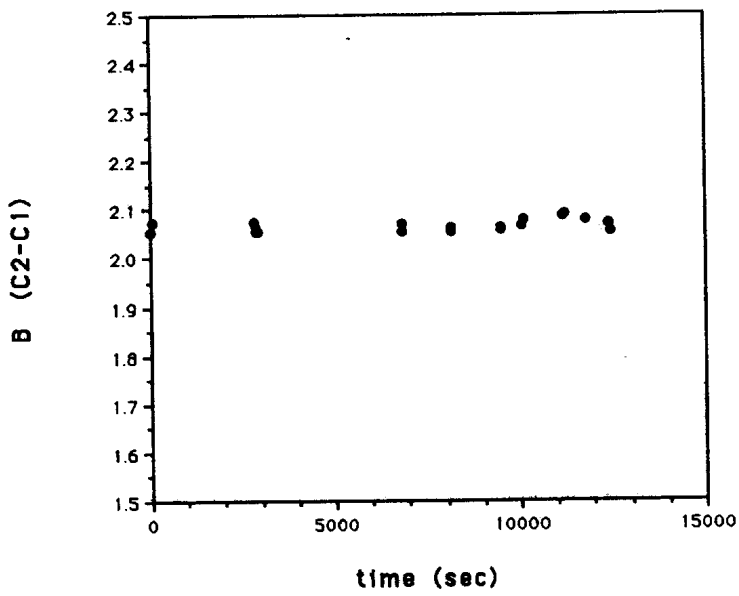
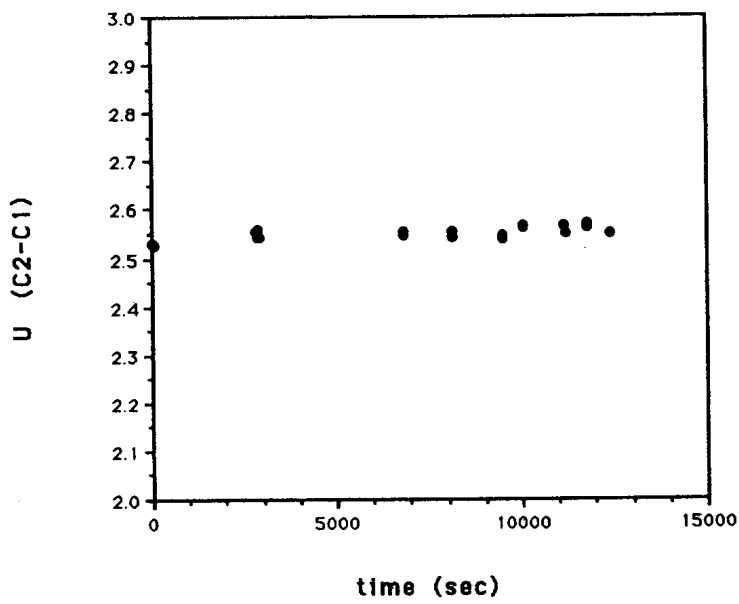


Figure 2(a,b)

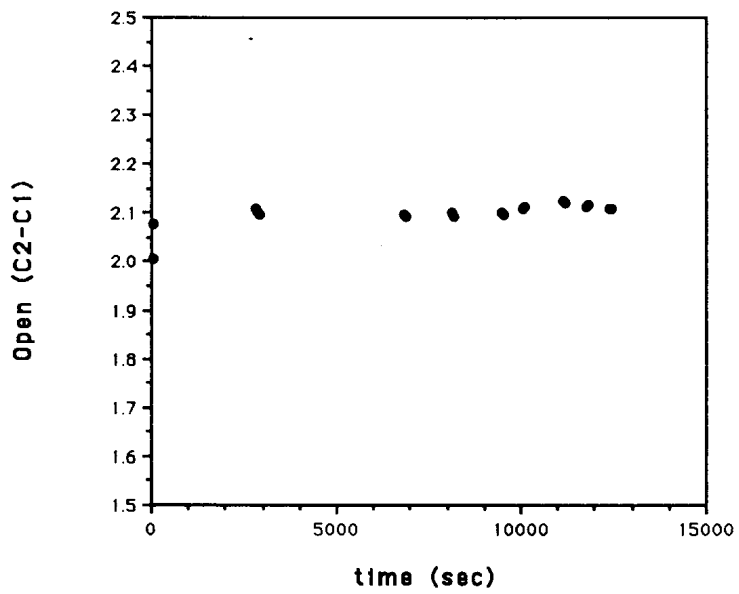
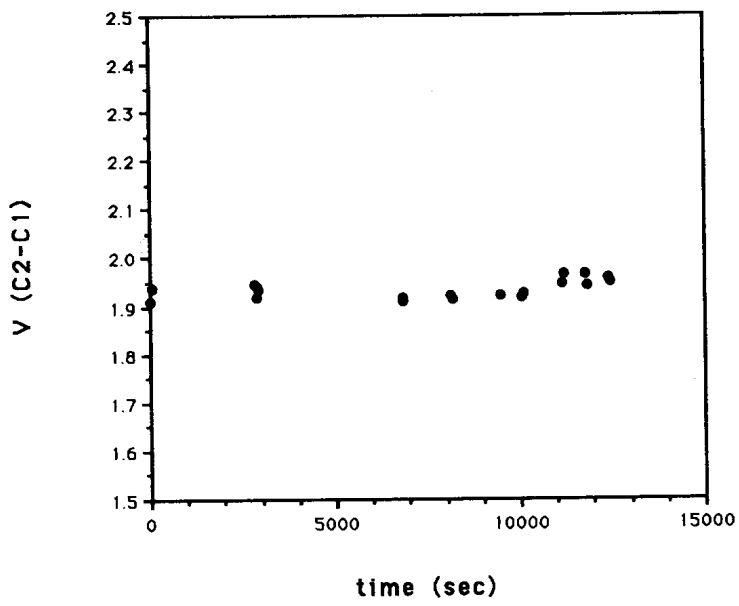


Figure 2 (c,d)

Thus, the eclipse we observed occurred on

JD 2447765.7788  $\pm$  0.0007.

Using the method described by Hall and Genet (1), we converted this time to the heliocentric Julian day,

HJD 2447765.7808  $\pm$  0.0007.

The ephemerides of Gimenez and Margrave (2) predict an eclipse for PV Cas on

HJD 2447765.7840  $\pm$  0.0153.

Our observed time of eclipse agrees, to within the uncertainty, of their predicted time. We also note that the difference in the two times is only 0.0032 days, or about 4.6 minutes! Considering that Gimenez and Margrave calculated their ephemerides from observations made prior to seven years ago, this is a remarkable degree of agreement with the presently observed behavior of PV Cas.

We conclude that the ephemerides calculated by Gimenez and Margrave accurately predict the times of minimum of PV Cas, within a reasonable uncertainty, for present as well as past eclipses.

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#### REFERENCES:

- (1) Hall, Douglas S. and Genet, Russell M., *Photoelectric Photometry of Variable Stars*, 2nd ed., Willman-Bell, Inc., 1988.
- (2) Gimenez, Alvaro and Margrave, Thomas E., "Apsidal Motion of PV Cassiopeiae", *The Astronomical Journal*, vol.87, no.8, August 1982, pp.1233-1236.