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PHOTOMETRIC VARIABILITY OF KAPPA CASSIOPEIAE

Kappa Cassiopeiae (HR 130, HD 2905, B1 Ia,  $V = 4.15$ ) has a long history of suspected velocity and light variability. Most recently, Elst (1979) has reported light variability with a period of  $0.09028^d$  (about  $2^h$ ) and an amplitude (as judged from his Figure 1) at least  $0.06^m$  in blue light. Such variability, if interpreted as pulsation, implies a very small Q-value and a very high overtone.

In view of this theoretical implication,  $\kappa$  Cas was observed on seven nights in November 1980, using the #4 0.4 m telescope at Kitt Peak National Observatory, near Tucson, Arizona. The telescope was equipped with a single-channel photometer, with a dry-ice-cooled 1P21 photomultiplier and pulse-counting electronics. A high-quality  $3^m$  neutral density filter was used to reduce the number of counts, in order to eliminate coincidence corrections. Observations were made through a Strömgren b filter, relative to HR 146 and HR 244. These observations, corrected for differential extinction and reduced to the sun, are shown in Figure 1.

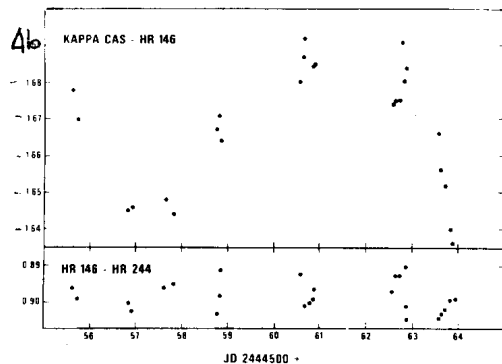


Figure 1: Light variability of  $\kappa$  Cas, relative to HR 146, in blue light. The lower panel demonstrates the constancy of the comparison stars HR 146 and HR 244.

On the first six nights, the hour-to-hour light variability in  $\kappa$  Cas is no greater than that in the comparison stars. Note that on the sixth night, the scatter is greater ( $\pm 0.^m005$ ) in both  $\kappa$  Cas and the comparison stars, than it is on the other five nights ( $\pm 0.^m003$ ). On the seventh night,  $\kappa$  Cas faded smoothly by  $0.^m030$  in  $0.^d26$ . The comparison stars remained constant. Thus there is no evidence for light variability in  $\kappa$  Cas with a period of  $0.^d1$ , and with an amplitude  $>0.^m01$ . An amplitude of  $0.^m06$  is certainly ruled out, at least in November 1980.

On the other hand, there is conspicuous light variability with a period of about  $7.^d$  and an amplitude of  $0.^m05$ . This period is close to that which would be expected due to the pulsation of a B1 Ia star (Burki 1978, but see also Maeder 1980 for a more detailed discussion of supergiant variability).

Several other B supergiants were also observed along with  $\kappa$  Cas: 5 Per, 9 Per, HR 1040, 55 Cyg, 9 Cep, 13 Cep and 26 Cep. In each case, there was no hour-to-hour variability  $>0.^m01$ , but in each case, there was day-to-day variability of a few hundredths of a magnitude. Such variability is often observed in B supergiants (Burki 1978).

On the other hand, hour-to-hour variability is not common in B supergiants; in  $\kappa$  Cas, it is either sporadic or non-existent.

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