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HIGH SPEED PHOTOMETRY OF SS CYGNI AFTER AN OUTBURST

The cataclysmic variable SS Cygni has been investigated in great detail by a number of authors over the past ninety years. During July and August 1984, a co-ordinated ultraviolet and optical monitoring of the source had been planned, using instruments operating onboard IUE and Voyager spacecrafts and with ground-based optical telescopes (Polidan et al., 1984). Outbursts of the source were predicted to occur approximately around July 1 and August 25, 1984, with an uncertainty of +-5 days in each case. The star did not, however, flare up exactly as predicted. It reached a maximum on 26 June as per prediction. It flared again in late July 1984, considerably earlier than the 25 August prediction (Mattei, 1984). In order to follow-up the object as per the earlier prediction, and as a target of opportunity in our program of high speed photometry of optical counterparts of X-ray sources, we carried out a relatively short observation of SS Cygni on 27 August 1984.

The observations reported here were conducted with a high speed single photon counting photometer attached to the one meter telescope of the Kavalur Observatory. The star was monitored with an integration time of either 0.5 sec or 1 sec from 19h14m UT to 20h24m UT. A 12 arcsec diaphragm was used. The star SAO 051 224 was used as the comparison star.

Figures 1 and 2 show the light curves in blue filter and unfiltered light respectively of SS Cygni, after subtracting the sky background. Extreme level of flickering activity is evident throughout our observations. The decline from the outburst appears to have been not very calm. Large flares seen in unfiltered light curves have amplitudes as large as 0.7 magnitude and durations of 3 to 4 minutes. The V magnitude estimated at 19h50m UT is 12.0m. Figure 3 shows the average light curve of the outburst based on our observation in association with published results in IAU Circulars as indicated. It is seen from the figure that although the star had almost reached its low luminosity state at the time of our observations, the flare activity had continued unabated.

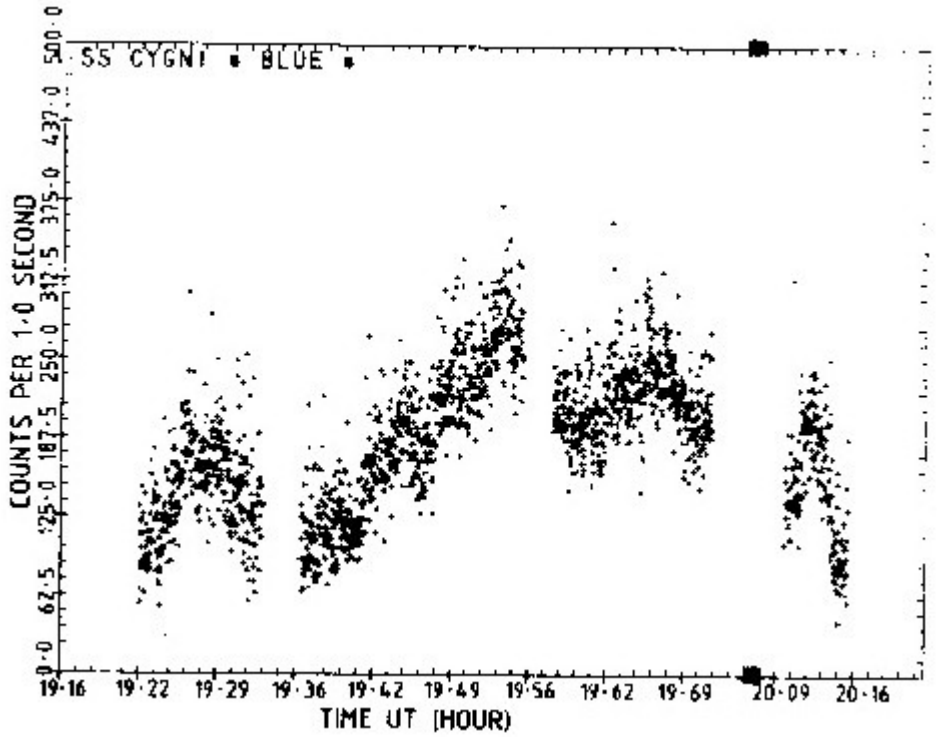

Figure 1. Blue filtered light curve of SS Cygni

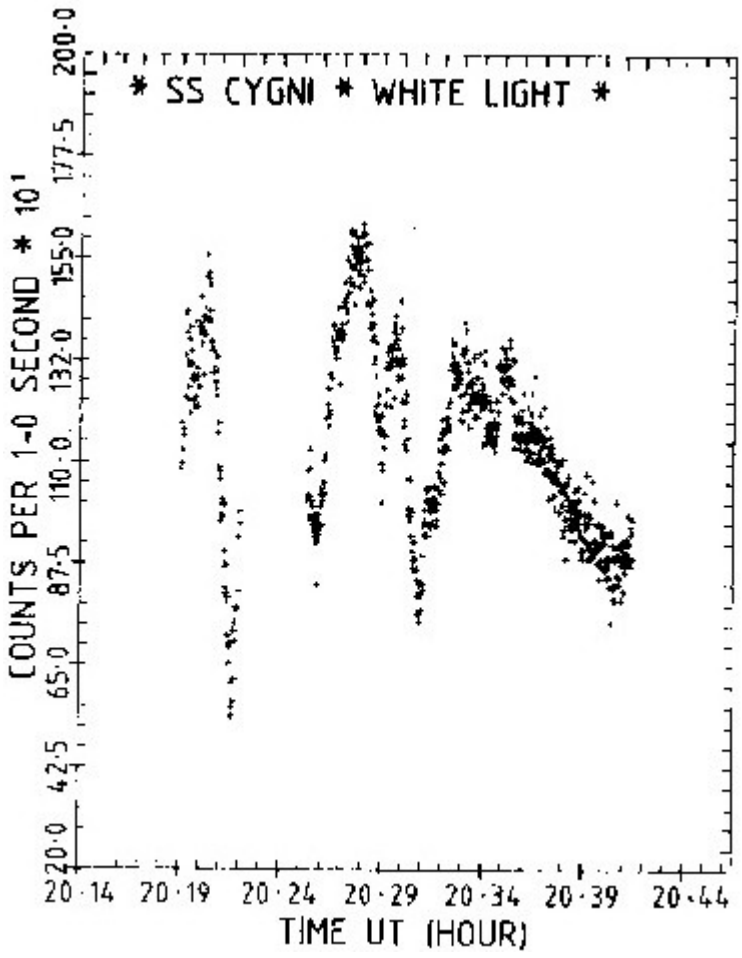

Figure 2. Unfiltered light curve of SS Cygni

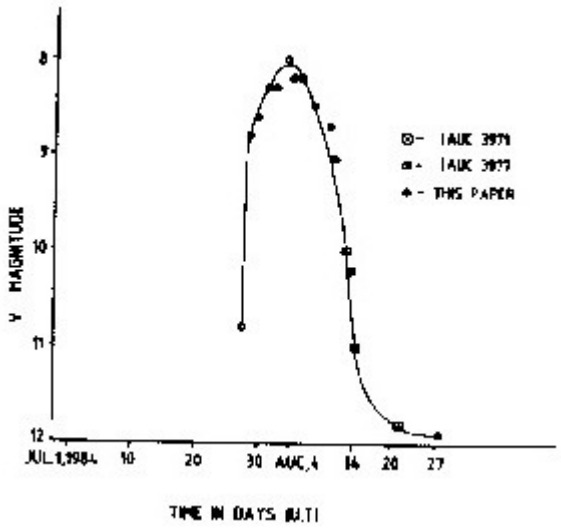

Figure 3. V magnitude profile of July-Aug 1984 outburst

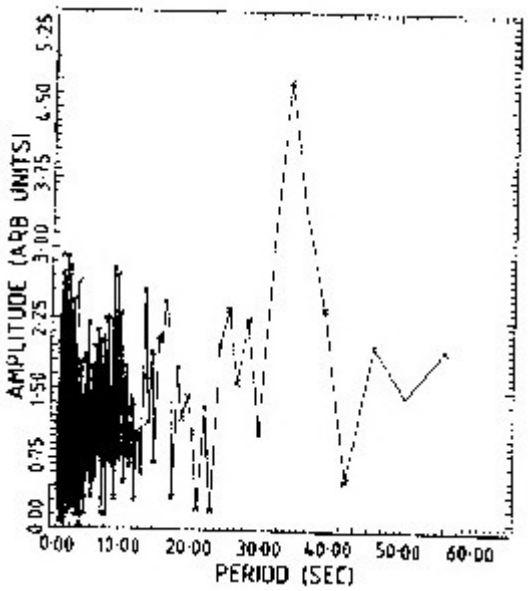

Figure 4. FFT output of the blue run started at 19h13m

Coherent optical pulsations in SS Cyg with periods between 8.2 and 10.6 sec during outbursts have been reported by a number of authors (Patterson et al., 1978; Horne and Gomes, 1980 ; Hildebrand et al., 1981). Quasi-periodic oscillations with a mean period in the range of 32 - 36 sec and mean amplitudes of about 0.1% have also been reported (Patterson, 1981). In order to search for these periodicities in our data, we have carried out an FFT and a period folding analysis. The results of this analysis (shown partly in Figure 4) with the long blue filter starting at 19h21m UT and the unfiltered run starting at 20h15m UT are consistent with the presence of oscillations with a period of 34 +- 1 sec.

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