COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 3700

Konkoly Observatory
Budapest
3 March 1992
HU ISSN 0374 - 0676

1988 AND 1989 UBV PHOTOMETRY OF FK COMAE

FK Comae Berenices (HD 117555), the prototype star of the FK Comae class of variable stars, was first studied by Chugainov (1966). The photometric properties have recently been studied and reviewed by a number of authors including: Morris and Milone (1983), Holzman and Nations (1984), Bianchi *et al*(1985), Cellino *et al*(1986), and Huovelin *et al*(1987).

We did the photometry on 8 nights between 10 and 21 May 1988, and on 10 nights in 1989 between 8 and 19 May and between 29 June and 3 July. We used the 0.6m telescope at Mount Laguna Observatory operated by San Diego State University. The photometer employed an EMI 6256 phototube operated at -10°F and -1300V. We usually used a 19" aperture but used larger apertures as seeing required. Data were transformed to the standard Johnson UBV system. HD 117567 was the comparison star, and HD 117876 was the check. We find no evidence for variability in the comparison star.

FK Com has two published ephemerides: ϕ=2442192.345 + 2.400E (Chugainov 1976) and ϕ=2442192.502 + 2.39960 (Morris and Milone 1983). The 2.400 day period was determined with a single two year study. Morris and Milone used all data available over a roughly fifteen year period. The Morris and Milone period (2.39960^d) is likely a more accurate photometric period; however, the Chugainov period (2.400^d) is more likely to represent the rotational period. If starspots cause the variability and they migrate, the photometric and rotational periods would not be equal. The photometric period would more closely approximate the rotational period, if it were determined over a shorter time interval. We are primarily interested in studying possible spot migrations; so, we used the Chugainov period (2.400^d).

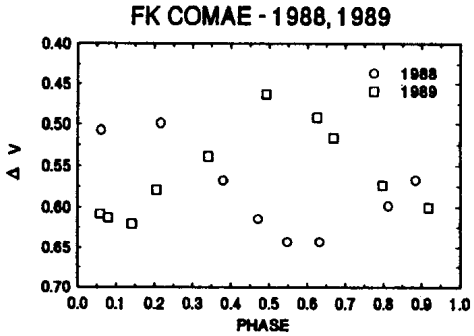

FIGURE 1

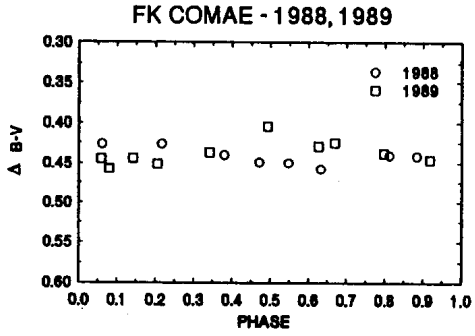

FIGURE 2

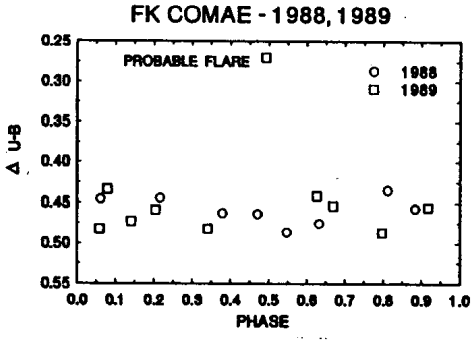

FIGURE 3

Flares are often observed on FK Com (Morris and Milone 1983). Our practice of averaging nightly observations from a short time period into a single nightly point makes it difficult to distinguish flares. Therefore caution must be used in interpreting data that might be contaminated by flares. None of our 1988 data seem to be significantly contaminated by flares; however, we seem to have a flare in our 1989 data. The point at phase 0.5 in our 1989 data appears bright but not anomalously so at V and B-V (Figures 1 & 2). However at U-B (Figure 3) this point is about 0.15 magnitudes brighter than one might expect. These data were taken on the night of 1 July 1989 UT at about 05:30 UT which we recorded as excellent sky conditions in our observing log. We therefore conclude that we observed a flare on FK Com. Note that the color behavior of this flare is similar to that observed in flares by Morris and Milone (1983). The flare is brightest at U and much less so at V. We have no information about the total energy or duration of the flare. We do however remove this point when considering the nonflare behavior of FK Com below.

We plot our V differential magnitudes in Figure 1. The phase of minimum light shifts from about 0.6 in 1988 to about 0.15 in 1989. The amplitude of variation is about 0.15 mag for both years but a small amount less for 1989 than for 1988. The level of light at maximum is about the same for both 1988 and 1989, if one remembers to ignore the point at phase 0.5. At minimum, the light level is slightly higher in 1989 than 1988. From this information we conclude, in the context of the starspot model, that the major spot or spot group either migrated significantly in longitude or disappeared and reformed at a new longitude between 1988 and 1989. In addition, the area covered by the major spot or spot group decreased slightly in 1989.

We present our B-V and U-B color curves in Figures 2 and 3. They generally show minima and maxima at the same phases as the V light curves. The star is reddest at minimum light as would be expected if cool spots cause the brightness variations.

Ron Angione scheduled generous amounts telescope of time at Mt. Laguna for this work. We also acknowledge support from both Western Carolina University and The Research Corporation.

P.A. HECKERT
G.V. MALONEY
Dept. of Chem. & Physics
Western Carolina University
Cullowhee, NC 28723 USA

References:

Bianchi, I., Grewing, M., Kappelmann, N.; 1985; *Astron. & Astrophys.;* 149, 41.
Cellino, A., Scaltriti, F., and Busso, M.; 1986; *Astrophys. & Space Sci.;* 121, 265.
Chugainov, P.V.; 1966; *Inf. Bull. Var. Stars,* no. 172.
Chugainov, P.V.; 1976; *Izv. Krimskoi Astrof. Obs.,* 54, 89.
Holzman, J.A., Nations, H.L.; 1984, *Astron. J.,* 89, 391.
Huovelin, J., Piirola, V., Vilhu, O., Efimov, Y.S., Shakhovskoy, N.M.; 1987 *Astron. & Astrophys.;* 176, 83.
Morris, S.L., Milone, E.F.; 1983, *Pub. Astron. Soc, Pac.;* 95, 376.

1991 V PHOTOMETRY OF CG CYG AND A POSSIBLE NEW VARIABLE

ERRATUM

We recently discovered an error in IBVS no. 3688. The latitude and radius of the spot solution for the August 1991 data should read: latitude=66° and radius=23°. The latitude and radius of 57° and 18° are in error. We regret any inconvenience this error may have caused.

P.A. HECKERT
Dept. of Chemistry and Physics
Western Carolina University
Cullowhee, NC 28723
USA

M. ZEILIK
Institute for Astrophysics
University of New Mexico
Albuquerque, NM 87131
USA