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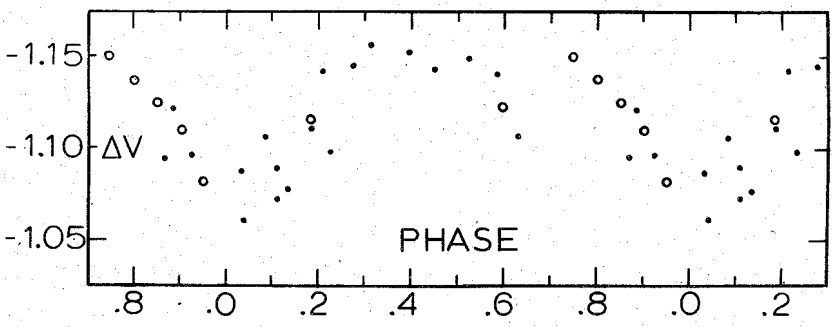
σ 75 Gem: A BRIGHT VARIABLE SIMILAR TO HK Lac

Recent photoelectric photometry of the bright ($V=4^m.2$) one-lined spectroscopic binary σ Gem has shown it to be a variable star. Landis obtained 41 differential measures on 20 nights between 2,443,181.5 and 2,443,261.5. At Dyer Observatory Henry obtained 18 differential measures on 7 nights between 2,443,261.5 and 2,443,276.5. Both used filters selected to match V of the UBV system and both used HR 2896 = ADS 6185AB as the comparison star. Nightly means of these observations, corrected for differential atmospheric extinction with mean extinction coefficients and transformed differentially to the UBV system with a mean value of $\Delta(B-V) = 0^m.11$, are plotted in the Figure. Points are from Landis Observatory and open circles are from Dyer; Δ is in the sense variable minus comparison.



Phase has been computed with the ephemeris

$$JD\ (hel.) = 2{,}418{,}967.33 + 19^d.603 \cdot E,$$

where the period is the spectroscopically determined orbital

period as redetermined by Harper (1935) and the epoch is the time of conjunction with the K component in front, derived by adding P/4 to the instant when the K star passes through the ascending node according to Luyten (1936).

From the Figure we can see that the amplitude of the variation, from maximum to minimum, is around $0^m.07$. Up until now σ Gem has been a suspected variable, SVS 100890. There are three photometric measures of σ Gem listed in the UBV catalogue of Blanco, Demers, Douglass and FitzGerald (1968). These show a range of $0^m.06$, consistent with the range we see.

Although we have too few observations at present actually to determine the photometric period reliably, the light does appear to vary in phase with the orbital period. Assuming the orbital period is uncertain by about $\pm 0^d.001$, the time elapsed between the initial epoch and our observations produces an uncertainty of only $\pm 0^P.06$ in our phases. Therefore it seems that light minimum occurs around conjunction. The minimum is too broad to let us explain the light variation as a result of eclipses. It would be more reasonable to attribute the light variation to the same mechanism operating in HK Lac. If this mechanism is operating then it is fortuitous that light minimum occurs so near conjunction. The following table, with data for HK Lac taken from Hall (1976), illustrates the similarities.

	HK Lac	σ Gem
spectrum	FIV + K0III	? + K1III
CaII H&K emm.	yes	yes
orb. period	$24^d.428$	$19^d.603$
phtm. period	$25^d.2$	$\sim 20^d$
wave ampl. in V	$0^m.10$	$0^m.07$

Although the orbital period of σ Gem is too long for it to be an RS CVn binary as defined by Hall (1976), it would be a member of his "long-period group".

We are planning to resume observing σ Gem as soon as it is available again in the sky. One goal will be to refine our determination of the photometric period. Since several RS CVn binaries and at least one in the long-period group (λ And) are radio sources, the radio astronomers also will want to observe σ Gem.

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