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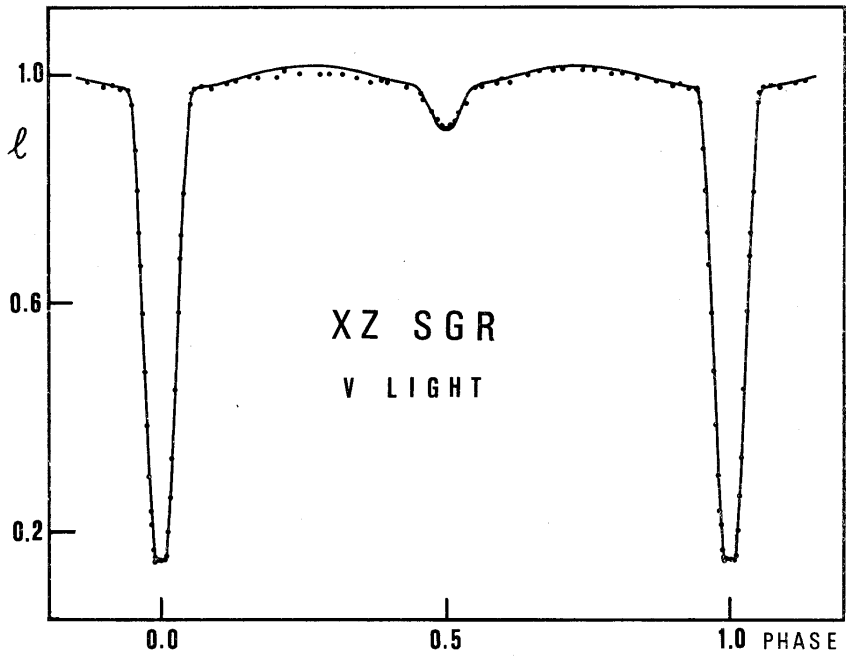
REVISED PHOTOMETRIC ELEMENTS OF XZ Sgr

The eclipsing variable XZ Sagittarii is an Algol-type system with a period of 3.28 days, composed of a main sequence A3 star and a G5 subgiant. Photoelectric observations of this binary have been performed by Knipe (1974) in V and B, and later by Kappelmann and Walter (1979) in V, B and U. Knipe found some problems in the solution of the light curves, mainly because of the unexpected absence of a normal reflection effect and the non-evidence of the orbital eccentricity found spectroscopically by Sahade (1945,1949). Suspecting that the problems that Knipe found were caused by gas streams in the system, Kappelmann and Walter did not use any conventional method, but applied the procedure described by Walter (1976) to take into account the absorption of the gas stream.

The orbital elements obtained by both Knipe and Kappelmann and Walter are however based on the rectifiable models of Kitamura (1965) and Russell and Merrill (1952), respectively, which we know have often led to misleading results (Mardirossian et al., 1980).

Therefore we decided to obtain new geometric and photometric elements for XZ Sgr, using the direct method developed by Wilson and Devinney (1971), whose original computer code has been modified in order to run on a DEC PDP-11/34A minicomputer (Maceroni et al., 1980). In this model, based on the Roche geometry, the light curve is computed as a function of the following parameters: i (inclination), $\Omega_{h,c}$ (surface potentials), $T_{h,c}$ (polar temperatures), $q=m_c/m_h$ (mass ratio), $L_{h,c}$ (unnormalized monochromatic luminosities), $g_{h,c}$ (gravity darkening parameters), $x_{h,c}$ (limb darkening parameters), $A_{h,c}$ (reflection parameters). The subscripts h and c refer to hotter and cooler component, respectively. Using the 75 normal points in V light given by Kappelmann and Walter (1979) and performing the solution using the second of


1.0
ℓ
0.6
0.2
XZ SGR
V LIGHT
0.0
0.5
1.0 PHASE

the seven modes offered by the program (cfr. Leung and Wilson, 1977) the following elements have been derived:

i	$= 88.5 \pm 0.2$	$L_h/(L_h+L_c)$	$= 0.1787$
Ω_h	$= 7.706 \pm 0.055$	$L_c/(L_h+L_c)$	$= 0.8213 \pm 0.0050$
Ω_c	$= 2.112 \pm 0.021$	T_h	$= 9200^{\circ}K$
q	$= 0.14 \pm 0.02$	T_c	$= 5150 \pm 20^{\circ}K$
r_h(pole)	$= 0.1321$	x_h	$= 0.53$
r_h(point)	$= 0.1324$	x_c	$= 0.73$
r_h(side)	$= 0.1323$	A_h	$= 1.0$
r_h(back)	$= 0.1324$	A_c	$= 0.5$
r_c(pole)	$= 0.1994$	g_h	$= 1.0$
r_c(point)	$= 0.2459$	g_c	$= 0.32$
r_c(side)	$= 0.2061$		
r_c(back)	$= 0.2295$		

The agreement with the solutions of the previous investigations is very good, but the absence of the rectification procedure ensures that effects such as reflection and polar brightening have been taken into the proper account. However, the not very good fitting in the maxima that can be seen from the Figure, validates the hypotheses of gas streams in the system and of a hot region on the A star advanced by Kappelmann and Walter (1979). New photoelectric and spectroscopic observations could allow a more detailed study of these effects, not rare in Algol systems.

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