OPTICAL OBSERVATIONS OF X-RAY SOURCES IN THE LMC

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ABSTRACT*

Photoelectric and spectroscopic observations of optical counterparts of X-ray sources in the LMC are described.

Image-dissector scanner spectra of the recently discovered low-mass system LMC X-2 (Pakull, IAUC 3313; Pakull and Swings, IAUC 3318) are presented and compared with those of faint galactic bulge sources. Their similar appearance, namely strong UV excess and the presence of He II 4686 A, Hα , and C III + N III emission at 4640 - 4650 A, indicate that their optical emission is mainly a result of the intense X-ray heating of the stellar atmosphere and/or matter sourrounding the system.

Photometry of the star "19" and of R 148, the optical candidates for the recurrent LMC transient A0538-66 and for LMC X-1, respectively, reveals variability of about 0.05 mag. The data for the B5 supergiant R 148 suggest a 20-day double sinusoidal variation.

The ellipsoidal light curve of the Sanduleak-Philip star = LMC X-4 is discussed by means of light curve synthesis. The large amplitude conflicts with the spectroscopically determined mass ratio. However, two well separated brightness states have been found in each of the two maxima. The resulting smaller amplitudes are in agreement with the standard picture of light curve analysis. Several mechanisms to explain the third light phenomenon are discussed.

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DISCUSSION FOLLOWING PAKULL

Wilson: There are at least two additional parameters on which your two empirical measures depend, namely R/Roche, the size of the star with respect to its lobe, and (L_x/L_{opt}) bolometric. Did you assume that the

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star fills its lobe and that the bolometric X-ray luminosity is zero (i.e. that there is negligible X-ray heating)? If either of these assumptions is significantly wrong, it would affect your results systematically.

Pakull: I assume that the star fills its Roche lobe. The fact that the minimum at phase ϕ_X = 0.5 is deper than at the X-ray eclipse tells us that the X-ray heating is negligible. Some of the assumptions might be wrong, I agree. However, the aim of the simple model presented was to give one possible selfconsistent explanation of the system.

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