

SYNTHETIC LIGHT CURVE ANALYSIS OF THE CLOSE BINARY SYSTEMS
BX ANDROMEDAE AND RR LEPORIS

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ABSTRACT

Unpublished photoelectric observations of the systems BX And and RR Lep were subjected to light curve analysis using the Wilson-Devinney Code.

The short-period eclipsing binary system BX And was observed on five nights in 1976 at the Morgan-Monroe station of the Goethe Link Observatory of Indiana University. The observations covering the eclipse portions of the light curves yielded four times of minimum light. A period study covering 89 years of observations confirms that a major period change took place about 1950. The system is suspected of being quite active on a short time scale. Standard magnitudes were derived for BX And and for the comparison star. The corrected color indices indicate that BX And and the comparison star BD+39° 476 are in the spectral range of F3-F5. The light curves, defined by 1092 observations in B, 1097 in V and 971 in the U filter are symmetric. The difference in the eclipse depths are quite large averaging 0.^m46. A distinct de-reddening of the light curves occurs during the secondary eclipse. The first synthetic light curve solutions of the system were obtained. The solution of BX And indicates that the system consists of an F-type primary and a K-type secondary component in a state of shallow contact. This result is supported by the location of BX And on the Eggen period-color diagram for contact binaries. The large mass ratio, temperature disparity and period increase are found to be consistent with an early contact phase of thermal relaxation oscillations.

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The eclipsing binary star RR Lep was observed on seven nights during December, 1979 with the facilities at Cerro Tololo Inter-American Observatory. The observations covering eclipse portions of the light curve yielded two epochs of minimum light. These observations are apparently the first published photoelectric data to be reported on the system. A study of the period of the system indicates that it may have remained fairly constant for almost 50 years. The light curves, defined by 700 observations with the B filter and 699 with the V filter, indicate a very large temperature disparity between the components and they show a superluminous region between the phases of 0.1 and 0.26. Also, a sinusoidal light variation is found to be present in the light curve over half a cycle. The preliminary solution of the light curves indicates that RR Lep is a classical semi-detached Algol system with an A-type primary and a K-type secondary which fills its Roche lobe.

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