PHOTOMETRY OF SELECTED CEPHEIDS

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ABSTRACT. Cepheids with periods around 15 days sometimes show a reversal, or dip, in their light curves near phase 0.85. The theoretical interpretation of this feature is still in doubt. We present a list of suspected dip Cepheids, accessible to small telescopes, which need additional photometry to verify the dip.

Ever since 1912 when Henrietta Levitt published the first period-luminosity relation, Cepheids have been the cornerstone of the cosmological distance scale. Over the past 75 years, Cepheids have received so much attention from observers that one might ask if there is anything new to be gained from additional Cepheid photometry. The answer is a resounding yes! There are features in the light curves of Cepheids which need better observational definition.

A new feature in the light curve of the Cepheid X Cygni was reported by Davis, Moffett and Barnes (1981). On the rising branch of the light curve a dip in luminosity occurs near phase 0.85. This dip was first observed by the amateur astronomer H.J. Landis (1973) but went unnoticed by the professional community. The physical cause for this reversal on the rising branch is still uncertain but two possibilities have been suggested.

Theoretical Cepheid light curves sometimes show dips in the computed curves associated with the passage of a compression wave through the photosphere. Since real Cepheids did not show this dip, most theorists argued that the dip was an artifact of the approximate treatment of shocks in the models. The photometry of X Cygni showed a dip at the phase predicted by theory.

Under the assumption that the theoretical dips were real, Davis, Moffett and Barnes (1981) were able to fit theoretical light curves to the observed curve of X Cygni and thereby determine a mass for the Cepheid. The mass of X Cygni, determined in this manner, was found to be nearly the evolutionary mass. This may be a fortuitous result so it must be tested on other dip Cepheids. If this interpretation turns out to be correct, then we have a new means of attacking the Cepheid mass problem.

Klapp, Goupil and Buchler (1985) put forth a different interpret-

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ation which does not depend on the Cepheid's mass. They suggest that the dips may be related to an amplitude saturation mechanism resulting from an interaction between the linear driving and the nonlinear quadratic coupling terms.

The theoretical interpretation will probably remain uncertain until more examples of dip Cepheids are found by observers. Using the light curves published by Moffett and Barnes (1980, 1984) and Pel (1976) we have selected Cepheids which show some indication of a dip (see Table I).

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TABLE I
DIP CEPHEID CANDIDATES

CEPHEID	α (1900)	δ (1900)	PERIOD (DAYS)	<V>	COMMENTS
SZ Aql	18 59 35	+01 09.4	17.141	8.675	SUSPECT
TT Aql	19 03 09	+01 08.5	13.754	7.182	SUSPECT
RW Cam	03 46 10	+58 21.3	16.415	8.720	DEFINITE
RW Cas	01 30 43	+57 14.9	14.798	9.281	SUSPECT
TX Cen	14 27 36	-60 33.0	17.090	10.530	SUSPECT
SZ Cyg	20 29 38	+46 15.6	15.110	9.469	SUSPECT
TX Cyg	20 56 26	+42 12.4	14.710	9.572	SUSPECT
CD Cyg	20 00 37	+33 49.7	17.074	9.015	DEFINITE
β Dor	05 32 45	-62 38.3	9.842	3.754	SUSPECT
AA Gem	06 00 22	+26 20.3	11.302	9.741	SUSPECT
Z Lac	22 36 55	+56 18.4	10.886	8.451	SUSPECT
SV Mon	06 16 04	+06 30.9	15.233	8.302	DEFINITE
SZ Mon	06 46 24	-01 15.2	16.375	10.286	SUSPECT
AD Pup	07 43 53	-25 19.7	13.594	10.965	SUSPECT
WZ Sgr	18 11 06	-19 06.6	21.850	8.090	DEFINITE

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