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6. ESTIMATES OF THE ZERO-POINT OF THE $P-L$ RELATION, REDUCED TO A UNIFIED SYSTEM

G. PSKOVSKY

Dr Pskovsky summarized recent determinations of the zero-point by different authors. He reduced these to a uniform system, similar to that adopted by Parenago (*Var. Stars*, **10**, 193, 1954). In this system M_{pg} for the short-period cepheids is $+0^m.5$, the velocity of the Sun relative to cepheids is 20 ± 2 km/sec, and the distance to the galactic centre 7·2 kpc. The results were presented in the form of a table, but for simplicity are reproduced here as an annotated list. If there are two numbers after an entry, the first refers to the original determination, the second to that revised by Pskovsky. The zero-point correction is to the Shapley $P-L$ relation, and so is identical with ΔM in Weaver's paper, which follows. Errors are root mean square, and account has been taken, where necessary, of a dispersion of $\pm 0^m.3$ in the $P-L$ relation (Kukarkin).

Pskovsky finds from these determinations a weighted mean zero-point correction of $-1^m.37 \pm 0.30$.

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7. THE CEPHEID DISTANCE SCALE AND GALACTIC KINEMATIC PARAMETERS

HAROLD WEAVER

Cepheid variables have long been a primary source of knowledge of galactic distances. It is therefore important to examine critically the accuracy of the cepheid distance scale to determine whether it is adequate for present needs.

Proper motions resulting from the solar motion provide a fundamental determination of the distance scale, according to the well-known formula:

$$\text{est } r = S_\odot \sin \Delta / k\mu_v.$$

Photometric distances follow from this r in the usual way:

$$5 \log r - 5 = y = m_{pg} - \chi \text{ C.E.} - M_{pg}.$$

We adopt 4·0 as the value of $\chi = A_{pg}/\text{C.E.}$ in the P, V system.

We assume that both the $P-L$ and $P-C$ relations (period—intrinsic colour at maximum) are linear in log P. The present state of knowledge does not allow us to take account of such factors as shape of light-curve. Thus we write:

$$M_{pg} = -(0.28 + \Delta M) - 1.74 \log P,$$

where the numerical coefficients are Shapley's [1] and ΔM the correction to his zero-point. Also:

$$\text{C.E.} = (P-V)_{obs} - \chi(a + b \log P).$$

Then

$$y = m_{pg} - \chi(P-V)_{obs} - (\chi a - 0.28) - (\chi b - 1.74) \log P + \Delta M. \quad (1)$$

If we take y as fixed by the proper motions, via the est r above, and if we can decide on a $P-C$ relation, that is, on a and b, we can determine ΔM, the zero-point correction. The dependence of this on the adopted $P-C$ relation is crucial. For example, if two observers adopt two $P-C$ relations differing only by a constant, thus:

$$(P-C)_2 = (P-C)_1 - q, \quad \text{then} \quad \Delta M_2 = \Delta M_1 + \chi q.$$

Many $P-C$ relations have been proposed, as illustrated in Fig. 11. To derive the ΔM appropriate to each, we employ the following additional observational data:

1. Accurate μ_v components tabulated by Blaauw and Morgan [2] for eighteen population I cepheids with light-curves of all forms;
2. the solar motion adopted by Blaauw and Morgan [2] (21 km/sec towards $\alpha = 270°$, $\delta = +30°$);
3. median apparent magnitudes on the P system observed photo-electrically by Eggen, Gascoigne and Burr [3] for seventeen of the stars;
4. photo-electric colours $(P-V)_{obs}$ at maximum light observed by Eggen, Gascoigne and Burr [3] and independently by Kron and Svolopoulos [4].

With these data we derived the $P-L$ zero-point corrections listed in Table 1.