COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 5394

Konkoly Observatory
Budapest
18 March 2003

HU ISSN 0374 – 0676

DATABASE ON BINARIES AMONG GALACTIC CLASSICAL CEPHEIDS

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A new website has been created containing information on classical Cepheids in the Milky Way galaxy which are known to have physical companion(s). Its URL is:

`http://www.konkoly.hu/CEP/intro.html` .

This site complements the two other important databases on Cepheids (not only on binaries) that are available on the Internet:
– the Database of Galactic Classical Cepheids maintained by the David Dunlap Observatory (Fernie et al. 1995):
`http://ddo.astro.utoronto.ca/cepheids.html` ;
– and the McMaster Cepheid Photometry and Radial Velocity Data Archive:
`http://dogwood.physics.mcmaster.ca/Cepheid/HomePage.html` .

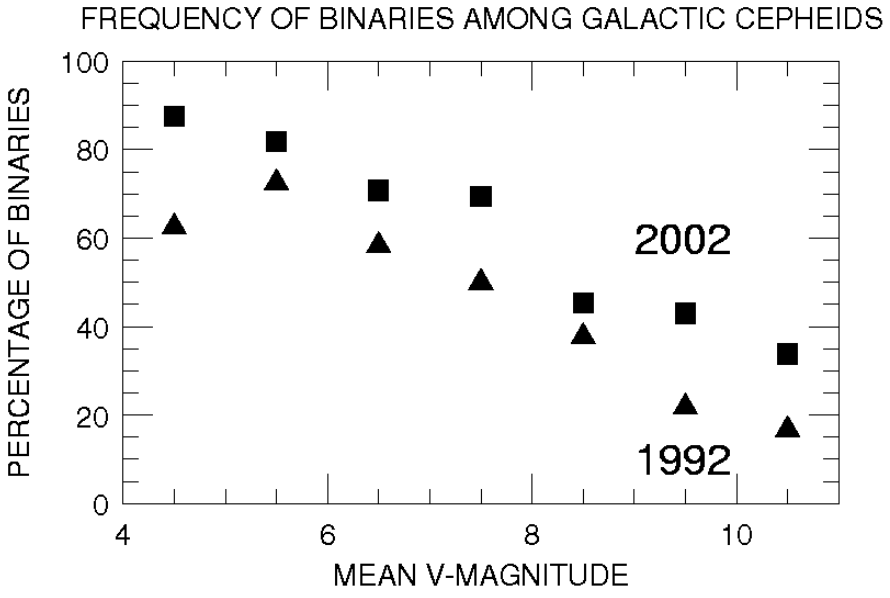

Figure 1. Frequency of occurrence of known binaries among the classical Cepheids in our Galaxy and its increase during the last decade (triangles: 1992; squares: 2002).

The site is intended to give easily accessible background information for those who are involved in performing or analysing photometric or spectroscopic observations of classical

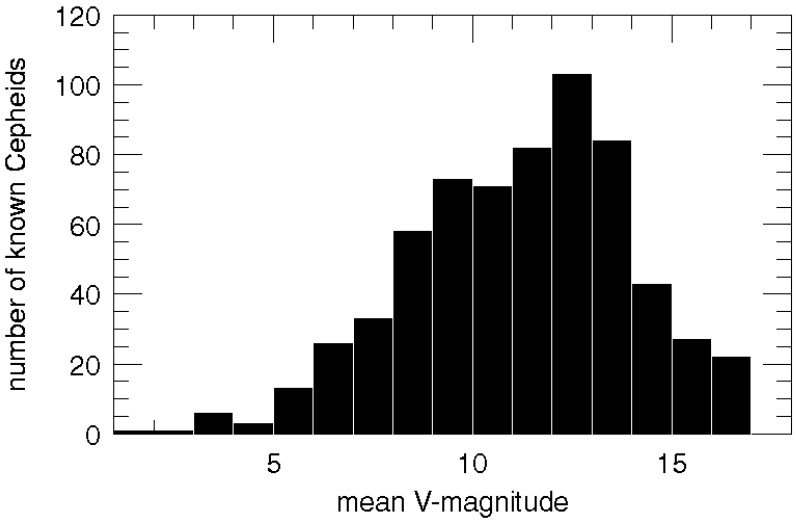

Figure 2. Histogram showing the distribution of Galactic Cepheids as a function of the average apparent brightness.

(i.e. Pop. I) Cepheids. When compiling this list, the published literature was critically reviewed, and whenever new pieces of information are available, the site is revised, updated and extended.

When involving binary Cepheids in any study that makes use of the regular behaviour of these variables, e.g. works related to the period-luminosity relationship, one has to pay special attention to the effect of companions. As far as photometric data are concerned, the effect of the companion is essential in deriving the apparent brightness and the intrinsic colour indices of the Cepheid. If the effect of a blue main-sequence companion is not taken into account (i.e. the observed brightness is attributed solely to the Cepheid), the apparent magnitude and colour indices can be falsified by several hundredth of a magnitude. The false (bluer) colour introduces an error in the derivation of the interstellar extinction, mimicking a smaller amount of absorption. Together with the brighter apparent magnitude (also due to the companion) the Cepheid seems to be more luminous than it is in reality. In brief, negligence of the companion(s) leads to an erroneous zero-point of the period-luminosity relationship (see e.g. Szabados, 1997).

It would be an easy but unreasonable solution to exclude Cepheids belonging to binary systems from the calibration of the period-luminosity relation because majority of classical Cepheids have one or more companions (Szabados, 2003). Figure 1 demonstrates the strong increase in the percentage of recently revealed binaries among Galactic Cepheids, as well as the still existing selection effect: the brighter Cepheids are amply studied from the point of view of duplicity but towards fainter Cepheids, these variables have not been properly investigated in order to point out their companion(s). The distribution of Galactic Cepheids as a function of the average apparent brightness is shown in Figure 2. It is seen that half of the known Cepheids in our Milky Way galaxy are fainter than 11th magnitude. It is worth mentioning that there are only 20 known binaries in the subsample (about 400 stars) containing the fainter half of the known Cepheid population.

The new database consists of three parts, each of them can be accessed from the In-

troduction, and the tables are interconnected by properly placed links. The main table contains the GCVS identification of the Cepheid linked to the SIMBAD Database (CDS, Strasbourg, France), the pulsation period, the mean brightness in the V band of the Johnson UBV system, the spectral type of the companion, the duplicity status of the Cepheid, remark on the importance or peculiarity of the given Cepheid, and a comprehensive but not exhaustive list of references linked to the bibliographical part of the site. A separate table contains the orbital elements for binary Cepheids, while the third part is the bibliography. Most of the references listed there are directly linked to the CDS bibliographic service or ADS.

Acknowledgements. The new database was compiled in the frame of the OTKA projects T029013 and T034584. Comments and additional information on new or already known binary Cepheids are welcome (to the address `szabados@konkoly.hu`), in order to update the content of the tables.

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