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A CATALOG OF PARAMETERS FOR GLOBULAR CLUSTERS IN THE MILKY WAY

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ABSTRACT

A database of parameters for globular star clusters in the Milky Way is described which is available in electronic form through the WorldWideWeb. The information in the catalog includes up-to-date measurements for cluster distance, reddening, luminosity, colors and spectral types, velocity, structural and dynamical parameters, horizontal branch morphology, metallicity, and other quantities. This catalog will be updated regularly and maintained in electronic form for widest possible accessibility. © *1996 American Astronomical Society.*

1. INTRODUCTION

The globular clusters in the Milky Way have proven throughout this century to be irreplaceable objects in an amazingly wide range of astrophysical studies: they provide critical observational boundary conditions on cosmology and galaxy formation, the evolution of low-mass stars, stellar dynamics, the properties of variable and binary stars, and Galactic structure and dynamics, among many other areas. Year after year, it has proven important to have readily available up-to-date lists of parameters for these unique objects. Efforts to produce excellent catalogs have been repeated over the decades by many authors (e.g., Shapley 1930; Sawyer Hogg 1959; Arp 1965; Kukarkin 1974; Harris & Racine 1979; Webbink 1985; Djorgovski & Meylan 1993). However, the key problem with any published catalog, in such an active field as this, is that it becomes rapidly superseded by the ongoing publication of new data. For example, even the superb and exhaustively researched catalog of Webbink (1985), which is the most frequently used compilation over the past decade, is now seriously out of date for more than half of the ~150 clusters in the list. Even the lists of Djorgovski & Meylan (1993, and the other appendices in the same volume) have already been outmoded for numerous clusters, particularly for critical quantities such as distances, reddenings, velocities, and metallicities.

At the same time, the proliferation of electronic information tools such as the Internet and the WorldWideWeb has now made it possible to bypass the old problem that a printed catalog is "frozen" once it is in print. Anyone preparing such a compilation can make it available electronically, update it regularly, and thus ensure that it always keeps up with the original literature with very little timelag. In this article I describe such a catalog for the Milky Way globular clusters.

2. THE CATALOG

The early stages of this catalog were prepared in 1993 and a first trial version was distributed electronically on request to any interested users. A more comprehensive version is now publicly available either by anonymous ftp or through the WorldWideWeb. The Website address is:

http://www.physics.mcmaster.ca/Globular.html

The complete catalog consists of two separate files: the first is the list of parameters itself, in a formatted table which is easily machine-readable once it is downloaded. The second is a complete bibliography which gives the literature sources for every quantity. These two files are self-explanatory and fully documented internally.

The parameters listed in the catalog for the nearly 150 objects defined as globular clusters in the Galaxy include the following:

(1) Cluster name, identification, and coordinates (galactic and J2000 equatorial);

(2) Horizontal branch magnitude V_{HB}, distance modulus, foreground reddening E_{B-V}, heliocentric distance, and Galactic distance coordinates;

(3) Integrated apparent V magnitude, luminosity M_V^t, and integrated $UBVRI$ colors;

(4) Horizontal branch morphology, including a modified Dickens (1972) HB type, and the HB ratio $(B-R)/(B+V+R)$ of Lee (1990);

(5) Specific frequency S_{RR} of RR Lyrae stars (Suntzeff *et al.* 1991);

(6) Metallicity [Fe/H] and integrated spectral type;

(7) Heliocentric radial velocity v_r, and v_r corrected to the Local Standard of Rest;

(8) Core radius, half-mass radius, and King (1966) central concentration $c = \log r_t/r_c$;

(9) Central surface brightness μ_V and central luminosity density ρ_0 ($L_\odot$ per pc^3);

(10) Relaxation times at the core and the half-mass radius.

The relative quality of the data differs greatly from one object to the next, and (as always) depends completely on the type of cluster and the level of work that has been put into it. For example, a decade ago (cf. Webbink 1985), almost nothing accurate was known about the heavily reddened clusters embedded in the Galactic bulge region. Today, thanks to concerted efforts by many authors, and the deployment of

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new tools such as infrared arrays, reasonably accurate estimates of basic quantities are known for almost all these clusters. Especially, the impact of CCD photometry and of modern velocity measurement techniques over the past decade cannot be overemphasized: almost all the data from earlier eras have been superseded. As an indicator of the level of activity in this field, Fig. 1 shows how many distance measurements (from color-magnitude diagrams) have been drawn from a given year. Almost nothing is left from the pre-CCD era.

It should be stressed that this catalog is not a totally comprehensive bibliography of all literature on globular clusters (which would be a vastly larger task). Instead, it should be regarded as a "critical list" of the best available measurements for each of the quantities listed above. These are subject to change continually as new data enter the literature, and the author's intention is to keep the catalog updated on a roughly annual basis. In future editions I may be able to add other useful quantities, such as ultraviolet or infrared color indices, proper motions, internal velocity dispersions, or tidal radii. Suggestions from users for other kinds of updates, or information from the literature that I have missed, is very welcome and will be incorporated.

Finally, I note that a shorter version of this catalog (with literature survey complete to the end of 1995) is published by Harris & Harris (1997).

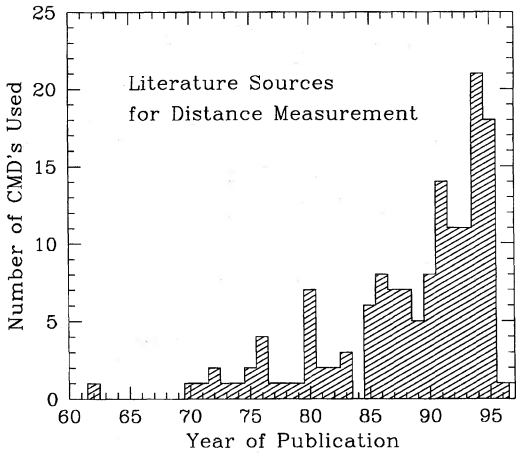

FIG. 1. Histogram of publication dates for color-magnitude studies used to derive the cluster distances and CMD parameters in the catalog. There is one entry per cluster. The great majority belong to the CCD era (1984 and after), and the level of activity continues to grow.

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