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Variable stars in the globular cluster M15

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Abstract. We present new *BV* CCD photometry for variables in the globular cluster M15. The photometry used was obtained with the image subtraction package ISIS. The data were acquired on an observing run in 2001 and range over 11 observing nights. For 32 previously known variables, we obtained period for the first time. Improved periods were obtained for 28 previously known variables, and 13 new variables were found. For some of the variables intensity- and magnitude-averaged *B* and *V* magnitudes, magnitude-averaged colors, and pulsation amplitudes were obtained using DAOPHOT to calibrate the ISIS light curves.

Key words. : globular cluster: individual (M15) — stars: evolution — RR Lyrae variables – Stars: Population II – Galaxy: globular clusters –

1. Introduction

The metal-poor globular cluster M15 ([Fe/H] = -2.15: Zinn 1985) was one of the three original Oo type II clusters identified in Oosterhoff's (1939) seminal paper. It is a post-core-collapse cluster with an extraordinarily dense center (Sosin & King 1997). Observations of its RR Lyrae variables have long been seen as important to clarifying the origin and nature of the Oosterhoff phenomenon. M15 is known to contain over 180 intrinsic variables, predominately RR Lyraes.

RR Lyrae variables provide crucial information for estimating globular cluster ages and distances, as summarized by Smith (1995). They are easily identified by their distinctive light curves and are bright enough to be observed to considerable distances. Their absolute magnitudes appear to be quite restricted. The range of RR Lyrae luminosities is discussed in Carney (2001) and Harris (2001). Stellar variability studies of globular clusters are also of fundamental importance to understanding both stellar and cluster evolution.

The variables in M15 were previously studied by Silbermann & Smith (1995 and references therein), Butler et al. (1998), O'Tuairisg et al. (2003), and Zheleznyak & Kravtsov (2003). Butler et al. identified variables V128 through V155. O'Tuairisg added variables through V181. Zheleznyak & Kravtsov found 28 stars that they identified as new variables.

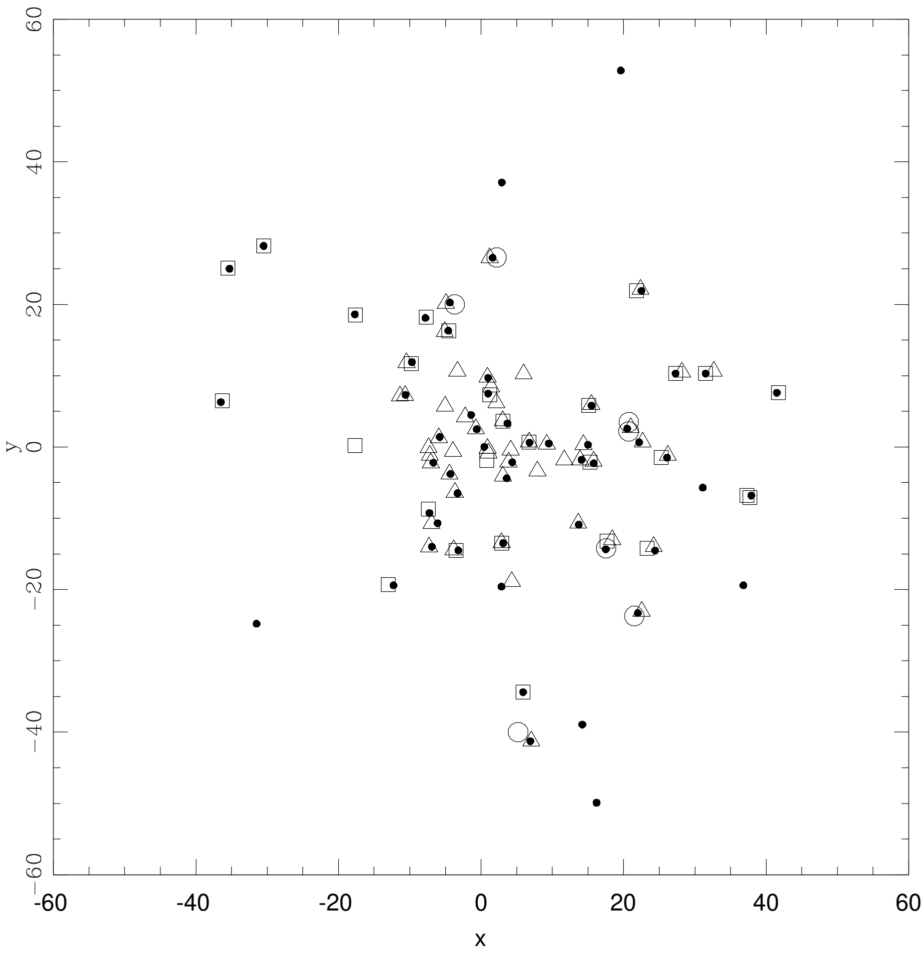

Fig. 1. The location of the variable stars in this study. The solid dots represent our data, the open triangles variables V128 through V181, the open squares the variables listed as new variables in Zheleznyak & Kravtsov, and the open circles some variables prior to V128. It is clear that there is some overlap between the various data sets. The x and y axes are plotted in arcseconds as in Zheleznyak & Kravtosov.

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