

VARIABLE STARS IN THE VVV GLOBULAR CLUSTERS

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The VVV survey is observing the central regions of our Galaxy in the near-infrared, where the extinction is highly diminished, in several epochs. Numerous inner Galactic globular clusters fall inside the area covered by the VVV survey. Most of these clusters, especially the faintest ones, have been poorly studied due to the presence of severe extinction and high stellar densities in the field. We have started a search for variable stars in these clusters. Our main aim is to obtain a better determination of the physical parameters of these globular clusters using the information provided by their variables.

The *VISTA Variables in the Vía Láctea (VVV)* is one of the six ESO near-infrared public surveys currently ongoing with VISTA, a new 4m-class telescope located in Cerro Paranal, Chile. VVV is surveying a region of 562 square degrees towards the central region of our Galaxy, and will provide a complete atlas of the area surveyed in five near-infrared filters (Z , Y , J , H , and K_S), along with light-curves with up to 100 epochs in K_S for the objects detected (Minniti et al. 2010).

Within the area surveyed by VVV there are 36 known globular clusters (GCs) which appear in the Harris (1996) catalog, along with some new candidates (Minniti et al. 2011; Moni Bidin et al. 2011). Most of these GCs are severely affected by the interstellar extinction present towards the central regions of the Milky Way. But extinction is significantly diminished at the near-infrared wavelengths in which the VVV is conducted ($A_{K_S} \sim 0.1A_V$), and we can use the VVV data to produce near-infrared color-magnitude diagrams (CMDs), that could allow a better analysis of these poorly-studied GCs. However, densities of field stars in the VVV surveyed regions are usually very high, and the extraction of such physical properties of the GC as distance and reddening from the CMDs can be complicated by this fact, mainly for the faintest, less-populated GCs.

Fortunately, the light-curves provided by the VVV allow us the search for variable stars present in the GCs. Especially useful will be the discovery of any RR Lyrae in these GCs, since the period-luminosity relation is very tight for these stars in the near-infrared (Longmore et al. 1986; Catelan et al. 2004). Although the amplitude of the RR Lyrae stars decreases in the near-infrared filters, the VVV superb photometry let us identify and characterize these variables (Catelan et al. 2013).

The first targets of our study have been two of the most-extincted, poorly-populated GCs in our sample: 2MASS-GC02 and Terzan 10. In both GCs we have been able to discover several RRLyrae stars, and using the relations by Catelan et al. (2004), adapted to the VVV filters, we have been able to provide measurements for their distances and reddening. These relations have been tested using two more-massive, lower-extincted GCs: M 22 and NGC 6441, which have several known RR Lyrae, and their physical parameters are known from other techniques. We have found the period-luminosity relations to be very reliable. Our study shows agreement with literature values for 2MASS-GC02 physical parameters, but put Terzan 10 significantly farther away than it was previously thought (Alonso-García et al., in preparation). We have also found the Oosterhoff classification of 2MASS-GC02 and Terzan 10 to be odd compared to other Galactic GCs (Alonso-García et al. 2013).

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