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NEAR-INFRARED PHOTOMETRIC PARAMETERS OF BULGE GLOBULAR CLUSTERS FROM THE VVV SURVEY

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We present results from near-infrared photometry of Galactic globular clusters towards the Galactic bulge from the Vista Variables in the Via Lactea survey. In light of updated chemical abundance information, correlations between photometric parameters and cluster metallicities are examined and compared to predictions from evolutionary models, while the large survey area permits statistical field star decontamination. These data are supplemented with additional high resolution optical and infared photometry, facilitating not only photometric analyses over a broad color baseline, but also new constraints on the reddening and reddening law in the direction of these clusters as well as their structural parameters.

The globular clusters (GCs) of the Galactic bulge provide important insight into Galactic formation as well as dynamical evolution. However, these GCs have generally been excluded from large-scale photometric surveys due to severe and differential reddening. The *Vista Variables in the Via Lactea* survey (Minniti et al. 2010) provides deep, wide-field $YZJHK_S$ photometry which mitigates many of these issues, and contains ∼37 GCs in the survey area. We use an initial sample of 17 GCs with well-determined metallicities to build distance- and reddening-independent photometric calibrations which will be crucial to the accurate characterization of the severely reddened GCs in the inner bulge.

For the first time, we apply statistical field star decontamination techniques and the latest differential reddening maps to the photometry. Known variables are removed, fiducial sequences representative of the cluster red giant branches (RGBs) are generated, and luminosity functions are constructed. We use these luminosity functions to measure the location of the RGB bump in all three filters (see Fig. 1), and we also measure the RGB slope (see Fig. 2) and the location of the cluster horizontal branches. To optimize our photometric calibrations versus cluster metallicity, we use the latest spectroscopic values of

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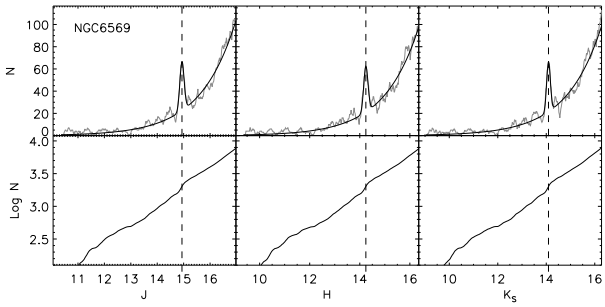

Fig. 1. Example of observed differential (top row, grey) and cumulative (bottom row) RGB luminosity functions along with the exponential plus Gaussian fit (top, black) used to characterize the magnitude of the RGB bump

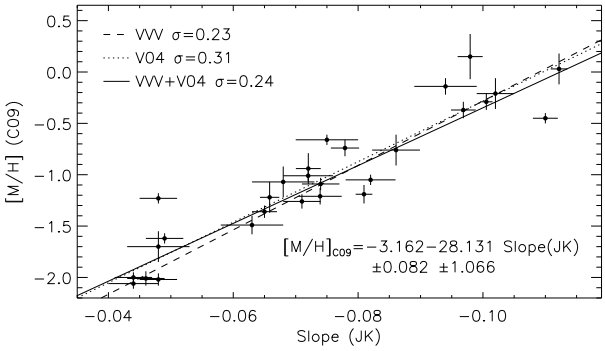

Fig. 2. The RGB slope as a metallicity diagnostic. Observations from our VVV photometry are shown in black and additional literature values in grey.

$[Fe/H]$ and $[M/H]$, supplementing our sample with literature measurements where available (e.g. Valenti et al. 2004)

We use a bootstrapping technique to estimate the uncertainties on our measured parameters, finding that the scatter in our relations is consistent with observational uncertainties, and these calibrations will be extended to the absolute plane using forthcoming multi-wavelength photometry and recent homogenous distance and reddening estimates for calibrating GCs.

REFERENCES

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