Long Period Variable Stars in NGC 5927

Dan Roth and Andy Layden
Department of Physics and Astronomy

History

Long period variables are stars that vary in size, and therefore magnitude (brightness) with a period of 80 days or greater. Globular clusters have a well-established age and composition, which eliminates most of the factors that affect a star's magnitude, leaving only mass/evolutionary status. Some work has been done using photographic plates, which have limited sensitivity to changes in magnitude. In the 1980's, the CCD was introduced and interest moved from LPVs to fainter stars. Since then, very little work has been done concerning the discovery of LPVs. There are currently only 11 known LPVs in NGC 5927; we aim to discover more. This data will be added to the wealth of information for stellar modeling; as we observe how stars act, we can get a better idea of how the density and temperature changes deeper inside stars.

References

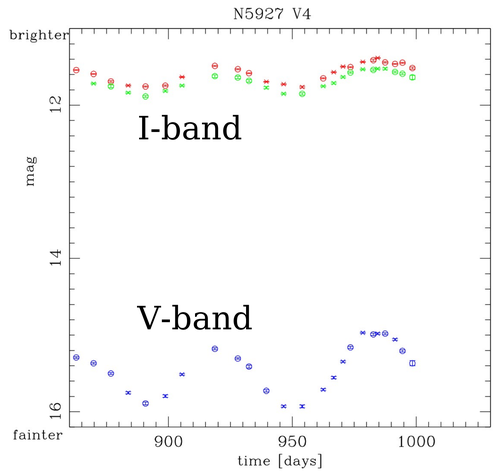
Clement et. al., 2001, A.J., vol 122, 2587.

Lloyd Evans, T. & Menzies, J., 1977 M.N.R.A.S., 178, 163L.

Menzies, J., 1974. M.N.R.A.S., 169, 79M.

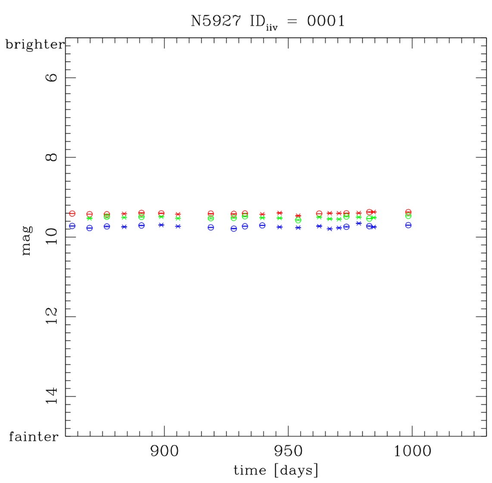
PROMPT

We are using the 0.4 meter telescope PROMPT5 at Cerro Tololo Inter-American Observatory on a mountain (elev. 2200 m) near La Serena, Chile. Using the digital camera (CCD) fitted to the telescope, we take 4 exposures in the V-band (green) at 60 seconds each. We also take 3 exposures in the I-band (near IR) at 40 seconds and 3 at 10 seconds.



▲ Light curve for the known variable star V4

▼ Light curve for a non-variable star for

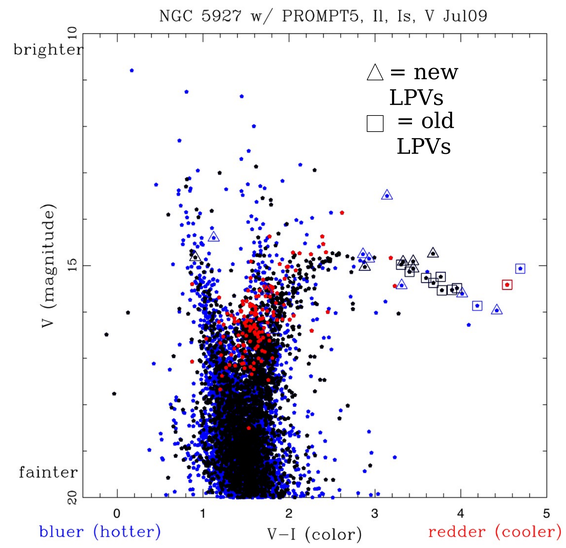


▼ NGC 5927

Globular clusters are clusters of thousands of stars that are held in close proximity by their mutual gravities. NGC 5927 is 7.6 kpc (24,800 ly) from the sun

IRAF and DAOPHOT

IRAF is a software suite that we use to correct the images for known defects in the CCD. After the images are calibrated, we combine each set of exposure times (60, 40 and 10) into an image with a higher signal-to-noise ratio. We use DAOPHOT, another suite, to analyze the magnitude and how it changes of every detectable star. We single out the significant instances (high variability).



A color-magnitude diagram (CMD) for the cluster. Red points are stars in the cluster center (more crowded), blue points are field stars (not members of the cluster) and black points are in between--cluster members with the best photometry

Conclusions

We have confirmed the 11 previously known variables and have found 9 new variables and 6 suspected ones. We will continue observing this cluster through October.

PROMPT telescopes