

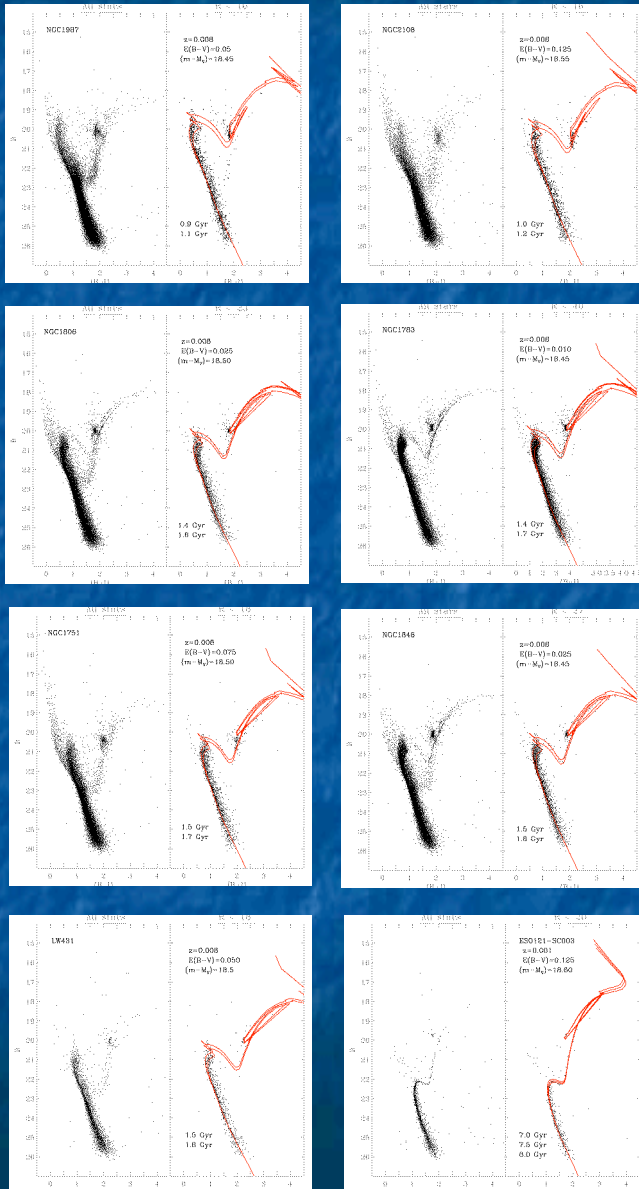
New Color-Magnitude Diagrams of Star Clusters in LMC



Symp. No 258

Vera Kozhurina-Platais (STScI), Paul Goudfrooij (STScI), Thomas Puzia (HIA/Canada), Rupali Chandar (U.Toledo)

Eight stellar clusters in Large Magellanic Cloud, selected within the metallicity range of $-1 < [Fe/H] < 0.1$ and the age range of 0.5 - 7 Gyr, were observed with HST/ACS Wide Field Channel. Newly derived Color-Magnitude Diagrams from high precision ePSF photometry reach up to 5 magnitudes below the MS turn-off. Accurate age and metallicity estimates were obtained for each cluster by fitting the observed CMDs with evolutionary isochrones from different stellar models.



The GO--10595 (PI P. Goudfrooij) was designed to perform high-precision photometry at the 1% level in order to derive accurate ages and metallicities for star clusters in the Large Magellanic Cloud (LMC).

Observations:

- Each cluster was observed with ACS/WFC (FOV 202");
- F435W (B), F555W (V) and F814W (I) filters (F606W for some clusters);
- a single exposure at 40, 30 and 8 sec through each filter F435W (B), F555W (V) and F814W (I) respectively, and two 340 sec exposures through the same filters;
- the same pointing and orientation for short and long exposures. The second long exposure was spatially offset from the others to sample the gap between the two ACS chips and to mask out hot pixels and cosmic rays.

Reduction:

- effective PSF fitting (Anderson, J., 2006) was used to measure accurate stellar positions and fluxes on flat-fielded ACS/WFC images (*_flt.fits);
- CTE correction was applied as described by Kozhurina-Platais V., et.al. (2007);
- photometric calibration is in VEGAsystem (Bedin, L., et.al, 2005)

Analysis :

- King model was used to find the core radius for each cluster;
- completeness tests with artificial stars (Anderson et.al, 2008) were performed for each cluster;
- stellar isochrones (Padova for this poster) were fitted to CMDs to establish the accurate age and metallicity. BaSTI, Padova and Dartmouth isochrones will be used in comparative manner as in forthcoming papers (Goudfrooij et.al, 2008);

Conclusion:

Newly derived CMDs for eight star clusters are shown of the left, arranged in order of their age from left to right, and from top to bottom. The left panels show CMDs for all stars, the right panels show CMDs for stars within the King core radius. The high quality CMDs represent a homogeneous and statistically indicative sample of age distribution and metallicity in LMC.

- derived ages reach ranges from 0.9 to 1.9 Gyr for seven clusters and 7 Gyr for ESO121-SC003 which is younger than result of Mackey A.D., et.al., 2006;
- derived metallicity for all seven intermediate age clusters is $[Fe/H] = -0.4$ ($z=0.008$) and consistent with one another. For older cluster ESO121-SC003 derived metallicity is $[Fe/H] = -1.3$ ($z=0.001$);
- some intermediate age clusters shown a wide MSTO which can not be explained from photometric errors. Three of them show a clear indication of MSTO bimodality with different range in age $\Delta t = 0.2-0.3$ Gyr;
- it appears to be correlation between the width of MSTO and the total mass cluster among the clusters in this sample.

References:

Anderson J., 2006, ACS-ISR-06-01 (Baltimore:STScI)
 Anderson, J., Sarajedini, A., Bedin, L., et.al., 2008, AJ, 135
 Bedin L., Cassisi S., Catelli, F., Piotto, G., Anderson, J., et.al, 2005, MNRAS, 357
 Goudfrooij, P., Puzia, T.H., Kozhurina-Platais, V., Chandar R. submitted to AJ
 Kozhurina-Platais, V., Goudfrooij, Puzia, T., 2007, ACS-ISR-07-04 (STScI)
 Mackey A.D., Payne, M.L., Gilmore, G.F., 2006, MNRAS

Acknowledgments:

VKP is grateful to Jay Anderson for sharing with us his ePSF and artificial stars fitting codes.