16282 - The IR CMD of the Metal-Rich Bulge Cluster NGC6553: Pushing its Age to Sub-Gyr Precision

Cycle: 28, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) NGC-6553	WFC3/IR	1	29-Jun-2020 19:02:15.0	yes

1 Total Orbits Used

ABSTRACT

Globular Clusters (GCs) in the Milky Way are the primary laboratories for establishing the ages of the oldest stellar populations and for measuring the color-magnitude relation of stars. The gold standard for these studies has involved high-precision visible light investigations with the Hubble Space Telescope (HST). However, the shape of the color-magnitude relation in the visible bandpasses offers little leverage to disentangle the effects of distance, reddening, and metallicity, and these uncertainties impact our derived age measurements for GCs. Recently, a new feature has been observed in several HST WFC3-IR color-magnitude diagrams (CMDs) of nearby GCs. At low stellar masses, the stellar main sequence in an infrared

(IR) CMD exhibits a sharp "kink" (due to opacity effects in M dwarfs), such that lower mass and cooler dwarfs become bluer in the F110W - F160W color baseline and not redder. As demonstrated by Correnti et al. (2016, 2018), this inversion of the color- magnitude relation offers a new opportunity to fit GC properties in the IR baseline, and to reduce their uncertainties. Here, we propose a 1-orbit HST WFC3-IR program to measure the color-magnitude relation of stars (down to 2.5 mag below the MS "kink") for the metal-rich bulge cluster NGC6553. We will establish the most accurate age for the cluster to date, with sub-Gyr precision. Combining these observations with the sample analyzed by Correnti et al. (2016, 2018), will establish an independent and sensitive test to the age-metallicity relation of clusters.

OBSERVING DESCRIPTION

The target cluster NGC6553 is observed with WFC3/IR using the F110W and F160W broad-band filters. In the target cluster, we expect the magnitude of the kink to occur at M_F110W ~ 5.9 mag and M_F160W ~ 5.1 mag which translates to an apparent magnitude of F110W ~ 20.6 mag at the distance of the cluster. To accurately map the shape of the main sequence and the color-magnitude relation below the main sequence kink we need high signal-to-noise photometry ~ 4 magnitudes below this limit. To resample the PSF, mitigate hot pixels, and minimize errors from flat fielding we apply a 4-point dither pattern. We use the STEP100 sample sequence with 9 samples for each filters. Observations are arranged in 1 visit that covers the available orbit.

We sligthly offset our pointing from the target center in order to have a complete overlap with the field of view of the existing WFC3/UVIS observations (GO-15232) and to avoid a sampling of only the innermost region of the cluster.

We are not imposing any constraints on the observations orient nor any special requirements.

Visit

Proposal 16282, Visit 01 Mon Jun 29 23:02:15 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-6553	RA: 18 09 19.5832 (272.3315967d) Dec: -25 55 9.65 (-25.91935d) Equinox: J2000	Proper Motion RA: 1.8528834973922183E-4 sec of time/yr Proper Motion Dec: 0.00535 arcsec/yr Epoch of Position: 2015.5	V=8.06	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[BULGE, GLOBULAR CLUSTER]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC-6553	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP100; NSAMP=9	POS TARG 0.000,0.000	Sequence 1-8 Non-Int in Visit 01	299.231323 Secs (299.231 Secs) *[==>]*	*[1]*
2		(1) NGC-6553	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP100; NSAMP=9	SAME POS AS 1	Sequence 1-8 Non-Int in Visit 01	299.231323 Secs (299.231 Secs) *[==>]*	*[1]*
3		(1) NGC-6553	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP100; NSAMP=9	POS TARG +0.542,+0.182	Sequence 1-8 Non-Int in Visit 01	299.231323 Secs (299.231 Secs) *[==>]*	*[1]*
4		(1) NGC-6553	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP100; NSAMP=9	SAME POS AS 3	Sequence 1-8 Non-Int in Visit 01	299.231323 Secs (299.231 Secs) *[==>]*	*[1]*
5		(1) NGC-6553	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP100; NSAMP=9	POS TARG +0.339,+0.485	Sequence 1-8 Non-Int in Visit 01	299.231323 Secs (299.231 Secs) *[==>]*	*[1]*
6		(1) NGC-6553	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP100; NSAMP=9	SAME POS AS 5	Sequence 1-8 Non-Int in Visit 01	299.231323 Secs (299.231 Secs) *[==>]*	*[1]*
7		(1) NGC-6553	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=STEP100; NSAMP=9	POS TARG -0.203,+0.303	Sequence 1-8 Non-Int in Visit 01	299.231323 Secs (299.231 Secs) *[==>]*	*[1]*
8		(1) NGC-6553	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP100; NSAMP=9	SAME POS AS 7	Sequence 1-8 Non-Int in Visit 01	299.231323 Secs (299.231 Secs) *[==>]*	*[1]*

Orbit Structure