



17713 - Observing the Merger-induced Formation of a Nuclear Star Cluster in UGC 7346

Cycle: 32, Proposal Category: GO
(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) UGC-7346	ACS/WFC	2	16-Sep-2024 11:00:34.0	yes

2 Total Orbits Used

ABSTRACT

The formation of Nuclear Star Clusters are a key ingredient to understand fundamental aspects in galaxy evolution, such as super massive black hole growth, physics of dense stellar systems and galaxy morphology evolution. However, direct observational evidence of NSC formation is still lacking.

Proposal 17713 (STScI Edit Number: 1, Created: Monday, September 16, 2024, 10:00:35AM Eastern Standard Time) - Overview

Roman et al. (2023; R23) proposed that the dwarf galaxy UGC 7346 is an exceptional first case in which the formation of a Nuclear Star Cluster (NSC) is caught in the act of forming. This dwarf galaxy, located in the outskirts of the Virgo Cluster, appears to be a merging system of two dwarf galaxies. R23 postulate that the dynamical friction produced by a 1:5 merger would be the mechanism triggering the collapse of the globular clusters (GCs) towards the centre. Ground-based imaging hints that the GC surface density is much higher in the centre of the galaxy than other dwarf galaxies in the Virgo cluster with a bright tail in the GC luminosity function which could be explain as already merged GC.

Our proposed observations will have the resolution and depth needed to resolve the full GC population and study the complete GC luminosity function, critical and sufficient requirements to prove this scenario. With the resolution of HST, we will be able to resolve the GCs and estimate the morphological components of the point sources improving the detection and filetring of GCs while reducing the fraction of interlopers. The proposed observations would constitute the first observational evidence of ongoing NSC formation, which could serve as a unique prove for the feasibility of dwarf mergers as a mechanism to produce an NSC.

OBSERVING DESCRIPTION

We aim to detect the whole GC luminosity function (GCLF) of UGC 7346 down to an absolute magnitude of -4 to ensure the detention of the fainter tail of GCs. At the assumed distance of ~16.5 Mpc this requirement translates into a source detection of ~27 magnitudes with an SNR>5 in two different bands (F814W and F606W).

The APT indicates 53~minutes per orbit for the proposed observations. We will use a dithering pattern to fill the gap between the CCDs of the WFC/ACS and to correct for optical distortion. Withouth overhads we have 1920 seconds remain to observe. To optimise the overheads we use one filter per orbit. We expected a signal-to-noise ratio of 30 and 8 for point sources of 25.5 and 27 magnitudes in the i-band (AB system), respectively, which meet the requirements to study the full GCLF.

We will observe UGC 7346 for two obrits, one for each filter, the F606W and F814W. In each orbit, 4 frames of 480 seconds will be taken using a dithering pattern.

Proposal 17713 - Visit 01 - Observing the Merger-induced Formation of a Nuclear Star Cluster in UGC 7346

Mon Sep 16 15:00:35 GMT 2024

Visit	Proposal 17713, Visit 01, implementation Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.2637 Line Spacing=0.1856	Coordinate Frame=POS-TARG Pattern Orientation=20.7 Angle Between Sides=69.02 Center Pattern=false		(1), (2)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	UGC-7346	RA: 12 18 41.7920 (184.6741333d) Dec: +17 43 8.73 (17.71909d) Equinox: J2000	Epoch of Position: 2000	V=12.92+/-0.031 14.16 +- 0.02 (SDSS-g, AB), 13.36 +- 0.08 (SDSS-i, AB)	Reference Frame: ICRS				
	<i>Comments: This object was generated by the target selector and retrieved from the SIMBAD database.</i> Category=GALAXY Description=[DWARF ELLIPTICAL, LSB] Extended=YES									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F606W-Exp	(1) UGC-7346	ACS/WFC, ACCUM, WFC1-FIX	F606W				Pattern 1, Exps 1-1 in Visit 01 (1) 487 Secs (1949 Secs) [==>487.0 Secs (Pattern 1)] [==>487.0 Secs (Pattern 2)] [==>487.0 Secs (Pattern 3)] [==>488.0 Secs (Pattern 4)]	[1]
2	F814W-Exp	(1) UGC-7346	ACS/WFC, ACCUM, WFC1-FIX	F814W				Pattern 1, Exps 2-2 in Visit 01 (1) 500 Secs (1956 Secs) [==>489.0 Secs (Pattern 1)] [==>489.0 Secs (Pattern 2)] [==>489.0 Secs (Pattern 3)] [==>489.0 Secs (Pattern 4)]	[2]	

