



14174 - Probing Extended Star Formation in the Young Massive Cluster NGC 1850

Cycle: 23, Proposal Category: GO

(Availability Mode: AVAILABLE)

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) NGC-1850 ANY	ACS/WFC WFC3/UVIS	2	24-Sep-2015 21:09:44.0	yes

2 Total Orbits Used

ABSTRACT

Recently, deep HST images revealed that several massive intermediate-age star clusters (SCs) in the Magellanic Clouds exhibit extended main-sequence turn-offs (eMSTOs), and in some cases also dual red clumps. This poses serious questions regarding the mechanisms responsible for the formation of SCs and their well-known light-element abundance variations. While many recent studies indicate that the eMSTOs are caused by a range in stellar age of about 100-500 Myr among cluster stars, the obvious and important question is: Why has this not been observed yet in SCs in that age range? Our recent studies suggest that prolonged star formation in SCs requires a cluster escape velocity in excess of about 15 km/s, and young SCs with such high escape velocities are extremely rare in the Local Group. We recently identified a SC in the Large Magellanic Cloud (LMC) that has the right mass and size to be able to retain mass loss in slow winds of the first stellar generation while being young enough to still

host some of its second stellar generation (if present) on the pre-main sequence (PMS) and showing emission-line signatures: the ~90 Myr old cluster NGC 1850 in the LMC. Since this SC has no adequate HST imaging to detect an eMSTO or PMS stars associated with the cluster, we propose to obtain deep WFC3/UVIS broad-band imaging with filters F275W and F814W to analyze the MSTO region and use F656N imaging to search for Balmer-line emission signatures from PMS stars of the second stellar generation. The detection of an eMSTO and/or PMS stars in this SC (or a lack thereof) will have a lasting impact on our understanding of the eMSTO phenomenon and of star cluster formation in general.

OBSERVING DESCRIPTION

The target star cluster is observed with WFC3 using the F275W and F814W broad-band filters and the F656N narrow-band H α filter. For the broad-band filters, we make sure we include one exposure that does not saturate the brightest stars expected from its age mentioned in the literature. On the other hand, we need color uncertainties less than 0.05 mag down to well beyond the estimated magnitude of the main sequence turnoff to achieve an accurate age determination and to enable a robust identification of multiple or broad turnoff structures if the target cluster in question is indeed found to host multiple stellar populations. Hence we also include at least two longer exposures per filter to achieve deep photometry. At least two dither positions are used for each filter to allow a robust elimination of hot pixels and cosmic ray hits during the analysis. ACS is used in parallel to the primary WFC3 exposures, using the filters F555W, F658N, and F814W. This will allow a robust determination of the field population contribution to the star cluster pointing.

Proposal 14174 - NGC 1850 (01) - Probing Extended Star Formation in the Young Massive Cluster NGC 1850

Visit	<p>Proposal 14174, NGC 1850 (01), implementation Fri Sep 25 01:09:47 GMT 2015</p> <p>Diagnostic Status: No Diagnostics</p> <p>Scientific Instruments: WFC3/UVIS, ACS/WFC</p> <p>Special Requirements: SCHED 30%; ORIENT 320D TO 359.9 D; ORIENT 50D TO 111 D; ORIENT 155D TO 202 D; ORIENT 233D TO 250 D</p> <p><i>Comments: The visit orientation requirements are set to (a) avoid bright stars in or near the ACS parallels, (b) avoid catching another star cluster by the ACS parallels (and hence not sampling enough "background field" area), and (c) to still make sure NGC 1850B stays within the field of view of the prime WFC3 images.</i></p>					
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes
(1)		NGC-1850	RA: 05 08 45.7900 (77.1907917d) Dec: -68 45 39.79 (-68.76105d) Equinox: J2000		V=8.96	Reference Frame: ICRS
<p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i></p>						

Proposal 14174 - NGC 1850 (01) - Probing Extended Star Formation in the Young Massive Cluster NGC 1850

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
Exposures	1	Short F814 W	(1) NGC-1850	WFC3/UVIS, ACCUM, UVIS2	F814W	FLASH=12; BLADE=A	POS TARG 0.18,0.1 8	Prime + Parallel Gro up 3-4 in NGC 1850 (01)	7 Secs (7 Secs) [==>]	[1]
	2	Short F275 W	(1) NGC-1850	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=12.	SAME POS AS 1	Prime + Parallel Gro up 3-4 in NGC 1850 (01)	150 Secs (150 Secs) [==>]	[1]
	3	F275W	(1) NGC-1850	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=12		Prime + Parallel Gro up 3-4 in NGC 1850 (01)	780 Secs (780 Secs) [==>]	[1]
	4	ACS F555W	ANY	ACS/WFC, ACCUM, WFC	F555W			Prime + Parallel Gro up 3-4 in NGC 1850 (01)	600 Secs (670 Secs) [==>670.0 Secs]	[1]
	5	F275W dith 1	(1) NGC-1850	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=12	POS TARG 0.18,-2. 414	Prime + Parallel Gro up 5-6 in NGC 1850 (01)	790 Secs (790 Secs) [==>]	[1]
	6	ACS F555W	ANY	ACS/WFC, ACCUM, WFC	F555W			Prime + Parallel Gro up 5-6 in NGC 1850 (01)	720 Secs (780 Secs) [==>780.0 Secs]	[1]
	7	F656N dith1	(1) NGC-1850	WFC3/UVIS, ACCUM, UVIS2	F656N	FLASH=12	SAME POS AS 5	Prime + Parallel Gro up 7-8 in NGC 1850 (01)	900 Secs (900 Secs) [==>]	[1]
	8	ACS F658N	ANY	ACS/WFC, ACCUM, WFC	F658N			Prime + Parallel Gro up 7-8 in NGC 1850 (01)	730 Secs (730 Secs) [==>]	[1]
	9	F814W	(1) NGC-1850	WFC3/UVIS, ACCUM, UVIS2	F814W	FLASH=4	SAME POS AS 5	Prime + Parallel Gro up 9-10 in NGC 1850 (01)	350 Secs (350 Secs) [==>]	[2]
	10	ACS F814W	ANY	ACS/WFC, ACCUM, WFC	F814W			Prime + Parallel Gro up 9-10 in NGC 1850 (01)	330 Secs (330 Secs) [==>]	[2]
	11	F656N	(1) NGC-1850	WFC3/UVIS, ACCUM, UVIS2	F656N	FLASH=12	POS TARG 0,0	Prime + Parallel Gro up 11-12 in NGC 1850 (01)	1050 Secs (1050 Secs) [==>]	[2]
	12	ACS F658N	ANY	ACS/WFC, ACCUM, WFC	F658N			Prime + Parallel Gro up 11-12 in NGC 1850 (01)	900 Secs (1014 Secs) [==>1014.0 Secs]	[2]
	13	F656N dith2	(1) NGC-1850	WFC3/UVIS, ACCUM, UVIS2	F656N	FLASH=12	POS TARG 0.18,0.1 8	Prime + Parallel Gro up 13-14 in NGC 1850 (01)	925 Secs (925 Secs) [==>]	[2]
	14	ACS F658N	ANY	ACS/WFC, ACCUM, WFC	F658N			Prime + Parallel Gro up 13-14 in NGC 1850 (01)	850 Secs (902 Secs) [==>902.0 Secs]	[2]
	15	F814W dith 1	(1) NGC-1850	WFC3/UVIS, ACCUM, UVIS2	F814W	FLASH=4	SAME POS AS 3	Prime + Parallel Gro up 15-16 in NGC 1850 (01)	440 Secs (440 Secs) [==>]	[2]
	16	ACS F814W	ANY	ACS/WFC, ACCUM, WFC	F814W			Prime + Parallel Gro up 15-16 in NGC 1850 (01)	340 Secs (340 Secs) [==>]	[2]

Orbit 1



