



12862 - Towards Identifying Carbon Stars Beyond the Local Group

Cycle: 20, 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) NGC224-DISK2	WFC3/IR	1	31-Jul-2012 21:30:45.0	yes

1 Total Orbits Used

ABSTRACT

Recently, HST WFC3/IR broad-band imaging has proved effective at detecting AGB stars in galaxies beyond the Local Group, but it is impossible to distinguish between different AGB subtypes with only the available broad-band filters. We propose a 1-orbit pilot program to establish the ability of the WFC3/IR medium-band filters to separate carbon-rich and oxygen-rich AGB stars. Synthetic spectra of C and M stars indicate that the molecular

features in the NIR will cause C-rich stars to appear much bluer than O-rich stars in medium-band colors. The ratio of C to M stars can have a dramatic impact on a galaxy's NIR flux and colors and studies of the C-rich stars in particular inform models of the processes of the third dredge up and dust production (which is dominated by C-rich sources in the Magellanic Clouds). Separating C-rich and O-rich AGB stars in galaxies outside of the Local Group will provide robust constraints on stellar evolution models, especially in the low and high metallicity realms, and act as a pathfinder for future mid-IR JWST observations.

We choose a well-studied field in M31 to calibrate the utility of using WFC3's medium-band filters to separate C and M stars. The metal-rich environment of M31 provides the added benefit of an opportunity to study C-rich stars at high metallicity.

OBSERVING DESCRIPTION

We will observe a field in M31 with WFC3/IR in the four medium-band IR filters, using a single orbit.

We can achieve the necessary photometric depth in all four WFC3/IR medium-band filters within a single orbit. This allows for total exposure times of about 600 s in each filter, resulting in $S/N > \sim 9$ in F139M for $m_H = 22$ mag. The S/N is even better in the F098M, F127M, and F153M filters, owing to a higher throughput.

We choose a 2-point dithering strategy that will allow us to fit all four medium-band filters into a single orbit. Each exposure is about 300 s.

We will avoid saturation of bright sources by using the STEP ramp sequences with 11 reads.

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Visit	Proposal 12862, M31-DISK2 (01), implementation					Wed Aug 01 01:30:53 GMT 2012
	Diagnostic Status: No Diagnostics					
	Scientific Instruments: WFC3/IR					
	Special Requirements: SCHED 100%					
	Comments: -All four medium-band filters (F098M, F127M, F139M, F153M), one field.					
	-Two ~300s exposures per filter, using the STEP50 timing sequences. NSAMP = 11.					
	-Each pair of exposures are manually dithered, according the WFC3/IR Manual, by adjusting POSTARG to mimic a linear 2-point dither.					
Fixed Targets	-Exposures arranged to avoid latency due to buffer dump.					
	-Total of one orbit					
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	NGC224-DISK2	RA: 00 43 21.6600 (10.8402500d)		V=(?)	Reference Frame: GSC2
		Alt Name1: M31-DISK2	Dec: +41 21 55.08 (41.36530d)		16 < H mag < 21	
		Alt Name2: GSC2-N3300122890	Equinox: J2000			
	Comments: This is a field of the disk of M31 from Davidge et al. (2007). There is one bright star in the center that they used for AO imaging. The field is centered on that star (GSC2-N3300122890, V=11.386 +/- 0.122 mag, J=9.334 +/- 0.022 mag). We are targeting all AGB stars in the field (H < 21 mag).					

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Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	F098M-pos A	(1) NGC224-DISK2	WFC3/IR, MULTIACCUM, IR	F098M	SAMP-SEQ=STEP5 0; NSAMP=11			[==>]	[1]
	Comments: At dither position A									
	2	F127M-pos A	(1) NGC224-DISK2	WFC3/IR, MULTIACCUM, IR	F127M	SAMP-SEQ=STEP5 0; NSAMP=11			[==>]	[1]
	Comments: At dither position A									
	3	F139M-pos A	(1) NGC224-DISK2	WFC3/IR, MULTIACCUM, IR	F139M	NSAMP=11; SAMP-SEQ=STEP5 0			[==>]	[1]
	Comments: At dither position A									
	4	F153M-pos A	(1) NGC224-DISK2	WFC3/IR, MULTIACCUM, IR	F153M	NSAMP=11; SAMP-SEQ=STEP5 0			[==>]	[1]
	Comments: At dither position A									
	5	F153M-pos B	(1) NGC224-DISK2	WFC3/IR, MULTIACCUM, IR	F153M	NSAMP=11; SAMP-SEQ=STEP5 0	POS TARG 0.474,0. 424		[==>]	[1]
	Comments: At dither position B									
	6	F098M-pos B	(1) NGC224-DISK2	WFC3/IR, MULTIACCUM, IR	F098M	NSAMP=11; SAMP-SEQ=STEP5 0	POS TARG 0.474,0. 424		[==>]	[1]
	Comments: At dither position B									
	7	F139M-pos B	(1) NGC224-DISK2	WFC3/IR, MULTIACCUM, IR	F139M	NSAMP=11; SAMP-SEQ=STEP5 0	POS TARG 0.474,0. 424		[==>]	[1]
	Comments: At dither position B									
	8	F127M-pos B	(1) NGC224-DISK2	WFC3/IR, MULTIACCUM, IR	F127M	NSAMP=11; SAMP-SEQ=STEP5 0	POS TARG 0.474,0. 424		[==>]	[1]
	Comments: At dither position B									

