



16864 - WFC3/IR Time-Dependent Sensitivity in Staring Mode (Clusters)

Cycle: 29, Proposal Category: CAL/WFC3

(Availability Mode: RESTRICTED)

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) M-4-V1	WFC3/IR	1	22-Nov-2021 11:01:42.0	yes
02	(2) M-4	WFC3/IR	1	22-Nov-2021 11:01:42.0	yes
03	(3) NGC-5139B	WFC3/IR	1	22-Nov-2021 11:01:43.0	yes
04	(3) NGC-5139B	WFC3/IR	1	22-Nov-2021 11:01:43.0	yes
05	(4) 47TUC DARK	WFC3/IR	1	22-Nov-2021 11:01:44.0	yes

5 Total Orbits Used

ABSTRACT

The IR grism flux monitor shows a sensitivity loss of 0.12 \pm 0.01%/yr in G102 and 0.06 \pm 0.01%/yr in G141. Observations of flux standards in the IR filters, however, show no evidence of any loss over time, but the repeatability is limited by systematic errors of \pm 1%. Scanned observations of M35 from 2015-2020 show marginal losses of 0.024 \pm 0.008%/yr in F140W, but these data show a large scatter which may be related to detector

Proposal 16864 (STScI Edit Number: 0, Created: Monday, November 22, 2021 at 11:01:45 AM Eastern Standard Time) - Overview
preconditioning. Cluster observations allow for the measurement of many more stars, and photometry of the core Omega-Cen used for distortion monitoring suggests losses of $0.23 \pm 0.03\%/yr$ in F160W, but crowding may play an effect on the results. Recent observations of a less dense stellar field in M4 in F110W suggest losses of $0.13 \pm 0.02\%/yr$ (first images only) and $0.20 \pm 0.03\%/yr$ (all images), but these consist of only 4 visits. We propose continued monitoring of M4 at a ~ 6 month cadence. Two additional clusters are requested: the NGC104 field 6' from the core with F160W data from 2009-2013 and an Omega-Cen field 17' from the core with F110W & F160W images from 2016-2018, both of which mimic the observation strategy from the respective preceding epochs, to eliminate systematics from differing observing modes.

OBSERVING DESCRIPTION

In general, these observations copy the targets, sample sequences, NSamps, and orbit structure of previously obtained WFC3/IR observations, as this yields the fewest systematics when attempting to measure sensitivity losses over time.

We propose two visits of WFC3/IR observations of M4. Both visits will be executed with the same exposure parameters, but will be scheduled approximately 6 months apart (Summer/Fall 2022 and Winter/Spring 2023), to best sample the time dependence of the sensitivity within the window in which the target is visible. Each visit will be composed of 4 exposures, the first two in F110W and the latter two in F160W. The F110W images will use 14 samples with the SPARS50 sample sequence to match those taken in 16512. To mitigate persistence, POSTARGS of 2.5 arcseconds in X and Y will be used between exposures, to match the observations of 16512. The visits are constrained to be 180 degrees apart, to be able to discern flat field effects. The orientations of visits will match the respective visits from 16512 to separate flat field effects from sensitivity loss. The target coordinates for Visit 01 have been adjusted from 16512 to more closely match the field of view in Visit 02 as well as prior observations.

The two visits of WFC3/IR observations of Omega Centauri are configured to match the IR observations of 14662 (Visits 31 and 39 for F110W and F160W, respectively). In this case however, WFC3/IR is used as the primary instrument (as opposed to 14662 where ACS/WFC was the primary and WFC3/IR was the parallel). The roll angle was also constrained to be within 2.5 degrees of the visits from 14662, to eliminate flat field effects. The target positions and postargs were adjusted accordingly to account for the switch from parallel to prime. Visit 04 is constrained to occur at least 3 days after Visit 03 to prevent these two visits from being scheduled consecutively (which would introduce persistence).

The visit of WFC3/IR observations of 47 Tuc was configured to match 13563 Visit 01. The roll was not constrained, as previous observations were taken with a large range of roll angles. The last exposure in the visit was changed (relative to 13563 Visit 01) from a dark to another F160W exposure, as we will not be performing analysis on the darks, and thus the orbit time can be better spent taking one more external exposure, without changing the observational configuration for the previous exposures. The last exposure is also dithered by approximately 40 pixels to mitigate

Proposal 16864 (STScI Edit Number: 0, Created: Monday, November 22, 2021 at 11:01:45 AM Eastern Standard Time) - Overview persistence.

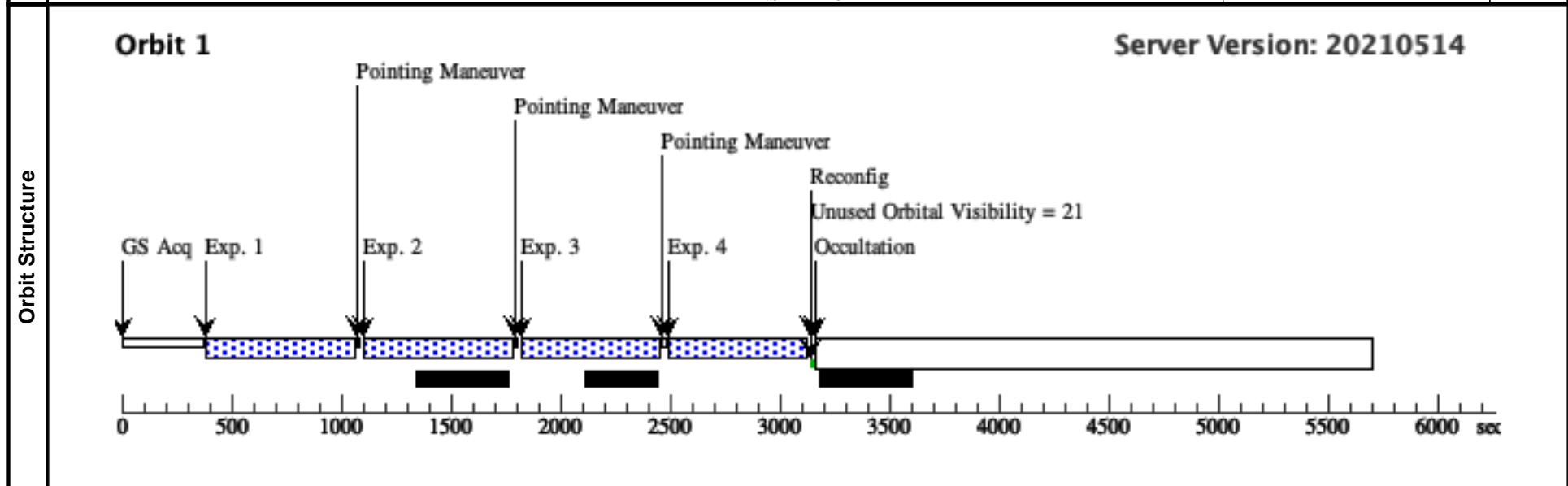
Proposal 16864 - Visit 01 - WFC3/IR Time-Dependent Sensitivity in Staring Mode (Clusters)

Mon Nov 22 16:01:45 GMT 2021

Visit	Proposal 16864, Visit 01				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/IR				
	Special Requirements: ORIENT 101.0D TO 101.0 D; BETWEEN 20-AUG-2022:00:00:00 AND 15-SEP-2022:00:00:00				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	M-4-V1	RA: 16 23 41.5344 (245.9230600d) Dec: -26 29 54.22 (-26.49839d) Equinox: J2000		V=5.9	Reference Frame: ICRS
	<i>Comments:</i> Category=STELLAR CLUSTER Description=[GLOBULAR CLUSTER]					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(1) M-4-V1	(1) M-4-V1	WFC3/IR, MULTIACCUM, IR-UVIS-FIX	F110W	SAMP-SEQ=SPARS 50; NSAMP=14	POS TARG -5,5		652.938154 Secs (652.938 Secs) [==>]	[1]
	2	(1) M-4-V1	(1) M-4-V1	WFC3/IR, MULTIACCUM, IR-UVIS-FIX	F110W	SAMP-SEQ=SPARS 50; NSAMP=14	POS TARG -2.5,2.5		652.938154 Secs (652.938 Secs) [==>]	[1]
	3	(1) M-4-V1	(1) M-4-V1	WFC3/IR, MULTIACCUM, IR-UVIS-FIX	F160W	SAMP-SEQ=SPARS 50; NSAMP=13	POS TARG 0,0		602.937703 Secs (602.938 Secs) [==>]	[1]
	4	(1) M-4-V1	(1) M-4-V1	WFC3/IR, MULTIACCUM, IR-UVIS-FIX	F160W	SAMP-SEQ=SPARS 50; NSAMP=13	POS TARG -7.5,7.5		602.937703 Secs (602.938 Secs) [==>]	[1]



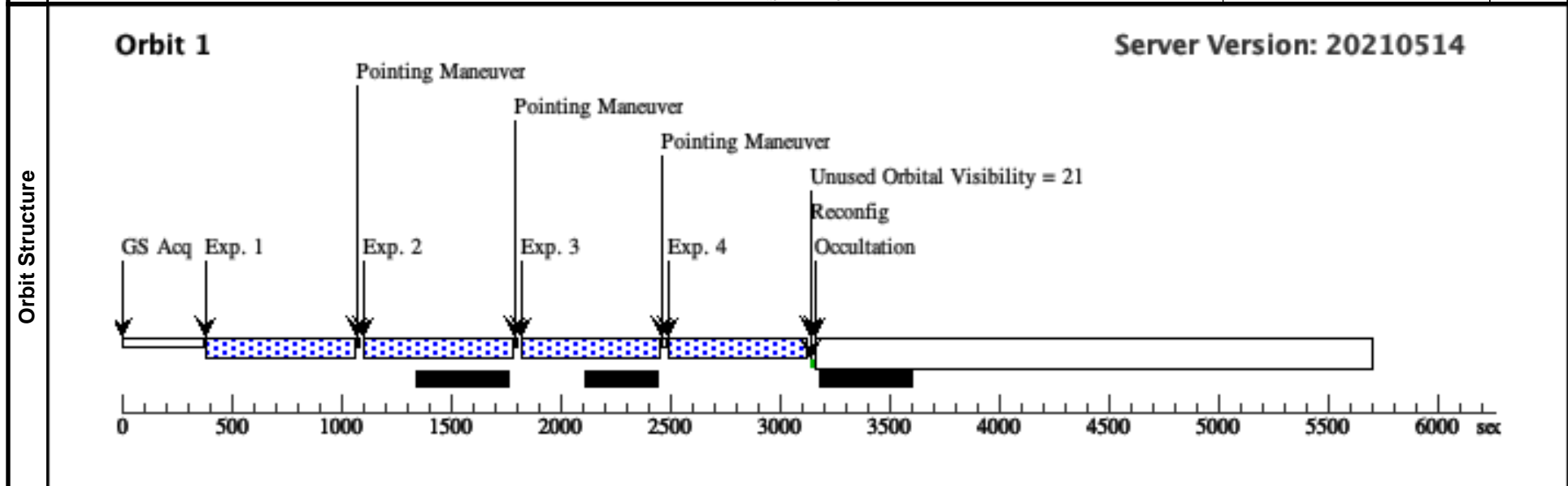
Proposal 16864 - Visit 02 - WFC3/IR Time-Dependent Sensitivity in Staring Mode (Clusters)

Mon Nov 22 16:01:45 GMT 2021

Visit	Proposal 16864, Visit 02				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/IR				
	Special Requirements: ORIENT 180D TO 180D FROM 01: BETWEEN 01-JAN-2023:00:00:00 AND 01-APR-2023:00:00:00				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	M-4	RA: 16 23 41.7160 (245.9238167d) Dec: -26 30 19.01 (-26.50528d) Equinox: J2000		V=5.9	Reference Frame: ICRS
<i>Comments:</i> Category=STELLAR CLUSTER Description=[GLOBULAR CLUSTER]						

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(2) M-4		WFC3/IR, MULTIACCUM, IR-UVIS-FIX	F110W	SAMP-SEQ=SPARS 50; NSAMP=14	POS TARG -5,5		652.938154 Secs (652.938 Secs) [==>]	[1]
	2	(2) M-4		WFC3/IR, MULTIACCUM, IR-UVIS-FIX	F110W	SAMP-SEQ=SPARS 50; NSAMP=14	POS TARG -2.5,2.5		652.938154 Secs (652.938 Secs) [==>]	[1]
	3	(2) M-4		WFC3/IR, MULTIACCUM, IR-UVIS-FIX	F160W	SAMP-SEQ=SPARS 50; NSAMP=13	POS TARG 0,0		602.937703 Secs (602.938 Secs) [==>]	[1]
	4	(2) M-4		WFC3/IR, MULTIACCUM, IR-UVIS-FIX	F160W	SAMP-SEQ=SPARS 50; NSAMP=13	POS TARG -7.5,7.5		602.937703 Secs (602.938 Secs) [==>]	[1]



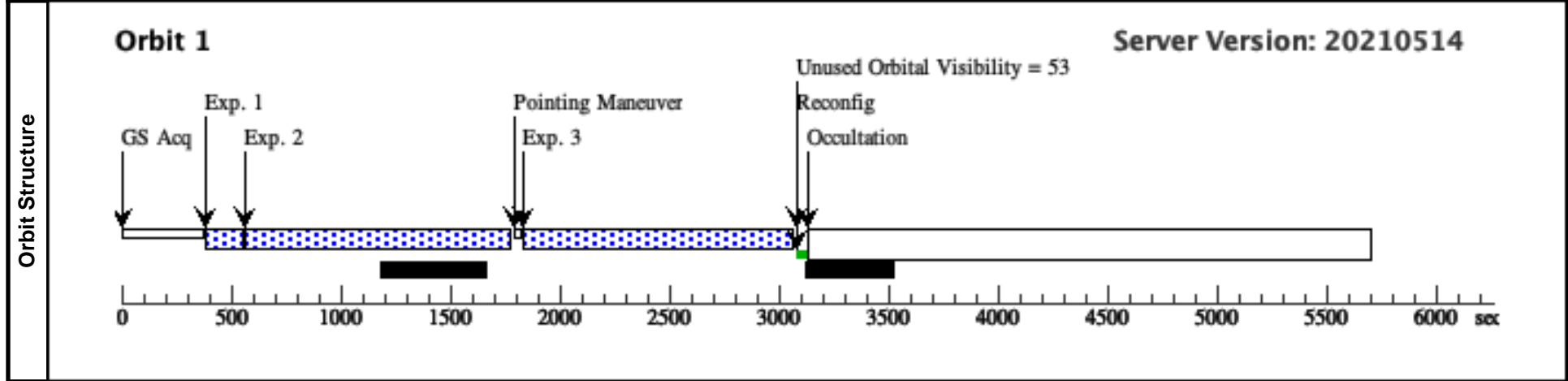
Proposal 16864 - OC F110W (03) - WFC3/IR Time-Dependent Sensitivity in Staring Mode (Clusters)

Mon Nov 22 16:01:45 GMT 2021

Visit	Proposal 16864, OC F110W (03)				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/IR				
	Special Requirements: SCHED 60%; ORIENT 309.2D TO 314.2 D; BETWEEN 01-JAN-2022:00:00:00 AND 30-APR-2022:00:00:00				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(3)	NGC-5139B	RA: 13 25 34.4378 (201.3934908d) Dec: -47 28 26.32 (-47.47398d) Equinox: J2000		V=5.33	Reference Frame: SIMBAD
	<i>Comments:</i>					
	Category=STELLAR CLUSTER Description=[GLOBULAR CLUSTER]					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(3) NGC-5139B	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=15; SAMP-SEQ=SPAR S10				142.945773 Secs (142.946 Secs) [==>]	[1]
	2	(3) NGC-5139B	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=13; SAMP-SEQ=SPAR S100				1202.936167 Secs (1202.936 Secs) [==>]	[1]
	3	(3) NGC-5139B	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=13; SAMP-SEQ=SPAR S100	POS TARG 26.5,27. 5			1202.936167 Secs (1202.936 Secs) [==>]	[1]



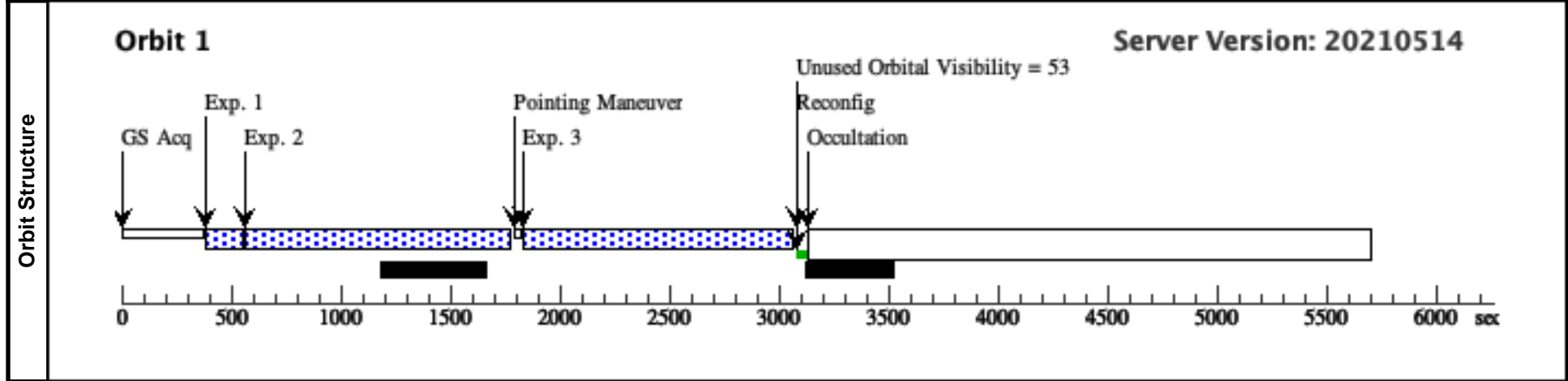
Proposal 16864 - OC F160W (04) - WFC3/IR Time-Dependent Sensitivity in Staring Mode (Clusters)

Mon Nov 22 16:01:45 GMT 2021

Visit	Proposal 16864, OC F160W (04)				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/IR				
	Special Requirements: SCHED 60%; ORIENT 309.2D TO 314.2 D; AFTER 03 BY 3 D TO 100 D				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(3)	NGC-5139B	RA: 13 25 34.4378 (201.3934908d) Dec: -47 28 26.32 (-47.47398d) Equinox: J2000		V=5.33	Reference Frame: SIMBAD
	<i>Comments:</i> Category=STELLAR CLUSTER Description=[GLOBULAR CLUSTER]					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(3) NGC-5139B	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=SPAR S10				142.945773 Secs (142.946 Secs) [==>]	[1]
	2	(3) NGC-5139B	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S100				1202.936167 Secs (1202.936 Secs) [==>]	[1]
	3	(3) NGC-5139B	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=SPAR S100	POS TARG 26.5,27. 5			1202.936167 Secs (1202.936 Secs) [==>]	[1]



Proposal 16864 - 47Tuc (05) - WFC3/IR Time-Dependent Sensitivity in Staring Mode (Clusters)

Mon Nov 22 16:01:45 GMT 2021

Visit	Proposal 16864, 47Tuc (05) Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: BETWEEN 01-JAN-2022:00:00:00 AND 01-APR-2022:00:00:00										
	Fixed Targets	# Name Target Coordinates Targ. Coord. Corrections Fluxes Miscellaneous (4) 47TUC RA: 00 22 27.8446 (5.6160192d) V=22.0 Reference Frame: ICRS Alt Name1: NGC104 Dec: -72 04 4.75 (-72.06799d) Equinox: J2000 <i>Comments:</i> Category=CALIBRATION Description=[DETECTOR LINEARITY TEST]									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 25; NSAMP=13			302.938471 Secs (302.938 Secs) [==>]	[1]	
	2	Short	(4) 47TUC	WFC3/IR, MULTIACCUM, IR-FIX	F160W	SAMP-SEQ=SPARS 10; NSAMP=10			92.940958 Secs (92.941 Secs) [==>]	[1]	
	3	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 50; NSAMP=15			702.938605 Secs (702.939 Secs) [==>]	[1]	
	4	Long	(4) 47TUC	WFC3/IR, MULTIACCUM, IR-FIX	F160W	SAMP-SEQ=SPARS 25; NSAMP=15			352.939501 Secs (352.94 Secs) [==>]	[1]	
	<i>Comments: Designed to just saturate V=20 stars.</i>										
	5	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 50; NSAMP=15			702.938605 Secs (702.939 Secs) [==>]	[1]	
	6	Short	(4) 47TUC	WFC3/IR, MULTIACCUM, IR-FIX	F160W	SAMP-SEQ=SPARS 10; NSAMP=10			92.940958 Secs (92.941 Secs) [==>]	[1]	
7	Extra Extern al	(4) 47TUC	WFC3/IR, MULTIACCUM, IR-FIX	F160W	SAMP-SEQ=SPARS 25; NSAMP=13	POS TARG 4,4		302.938471 Secs (302.938 Secs) [==>]	[1]		

