



14147 - Opening a New Window towards the Nuclear Star Cluster in the Milky Way

Cycle: 23, 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) SGRA-NC	WFC3/IR	3	21-Jul-2015 21:49:54.0	yes
02	(1) SGRA-NC	WFC3/IR	2	21-Jul-2015 21:49:58.0	yes

5 Total Orbits Used

ABSTRACT

The nuclear star cluster in the Galactic Centre is the only place where we can study star formation near a massive black hole in great detail. However, due to the strong foreground extinction, previous studies have been limited to the J-band and longer wavelengths. The short wavelength coverage, from J to K, hampers attempts to accurately determine the extinction curve, to map the extinction distribution, to distinguish between massive and low-mass stars and finally, to disentangle different stellar populations through the colour magnitude diagram. Deep F105W observations with HST WFC3/IR would result in great progress toward overcoming these problems. This program can help us to make significant progress in addressing the following important astrophysics questions: 1) what are the properties of the extinction law toward the Galactic Centre environment? 2) what was the assembly history of the nuclear star cluster in the Galactic Centre?

OBSERVING DESCRIPTION

We use five HST orbits to observe the nuclear star cluster in the Milky Way at F105W band with one WFC3/IR pointing. In order to achieve our scientific goals, i.e. extinction law, extinction map and disentangling different stellar populations from the color-magnitude diagram, we need high photometry precision, especially in this extreme crowding region.

We fine-tune the dithering pattern to overcome the undersample problem of the WFC3/IR detector, the main obstacle affecting the photometry accuracy. We use sub-pixel offset among dithering exposures to better sample the point spread function. Meanwhile, we also employ integer-pixel dithering exposures to recover the information lost due to the bad pixels.

Due to the huge number of visits with non-stop 5 orbits, as suggested by the Contact Scientist, we divide our 5 orbits into two visits, one with two orbits and the other one with three orbits. In these two visits, we choose 1/3 and 1/4 pixel sub-pixel offset, respectively. Meanwhile, four and three dithering exposures with integer-pixel offset are used too.

In order to use each orbit efficiently, we slightly change the parameters of MULTIACCUM for different dithering exposures. As a result, we have only ~10 second left in each orbit, although the exposure time among different exposures change from 350 to 450 seconds. The total effective exposure time of the five orbits is 12.6 ks.

For each dithering exposure, we employ the STEP sequence, instead of the SPARS sequence, considering the wide range of stellar magnitudes of stars in the Galactic Center.

In order to compare with previous WFC3/IR observations in the F127M, F139M, F153M, we use the same coordinate and rotation angle as those used in Program 11671.

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Visit	Proposal 14147, Visit 01 Wed Jul 22 01:49:59 GMT 2015 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: ORIENT 90D TO 100 D; ORIENT 270D TO 280 D					
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes
(1)		SGRA-NC	RA: 17 45 40.0400 (266.4168333d) Dec: -29 00 28.10 (-29.00781d) Equinox: J2000		V=14+/-0.1 J=12.2, H=9.26, K=6.5	Reference Frame: ICRS
<i>Comments: The magnitude are for the brightest star in the field-of-view.</i>						

Proposal 14147 - Visit 01 - Opening a New Window towards the Nuclear Star Cluster in the Milky Way

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0				349.232932 Secs (349.233 Secs)	[1]
	2	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 0,0.3935 7500			349.232932 Secs (349.233 Secs)	[1]
	3	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 0.47425 000,0			349.232932 Secs (349.233 Secs)	[1]
	4	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 0.47425 000 ,0.45412500			349.232932 Secs (349.233 Secs)	[1]
	5	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 0,3.4513 500			349.232932 Secs (349.233 Secs)	[1]
	6	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 0,3.8449 250			349.232932 Secs (349.233 Secs)	[1]
	7	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 0.47425 000 ,3.4513500			349.232932 Secs (349.233 Secs)	[1]
	8	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 0.47425 000,3.7843750			449.233834 Secs (449.234 Secs)	[2]
	9	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 3.82787 50,0.0000000			449.233834 Secs (449.234 Secs)	[2]
	10	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 3.82787 50,0.39357500			449.233834 Secs (449.234 Secs)	[2]
	11	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 4.30212 50,0			449.233834 Secs (449.234 Secs)	[2]
	12	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 4.30212 50,0.42385000			449.233834 Secs (449.234 Secs)	[2]
	13	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=13; SAMP-SEQ=STEP5 0	POS TARG 3.82787 50,3.4513500			399.233383 Secs (399.233 Secs)	[2]
	14	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 3.82787 50 ,3.8449250			449.233834 Secs (449.234 Secs)	[3]
	15	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 4.30212 50 ,3.4210750			449.233834 Secs (449.234 Secs)	[3]
	16	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 4.30212 50,3.8449250			449.233834 Secs (449.234 Secs)	[3]

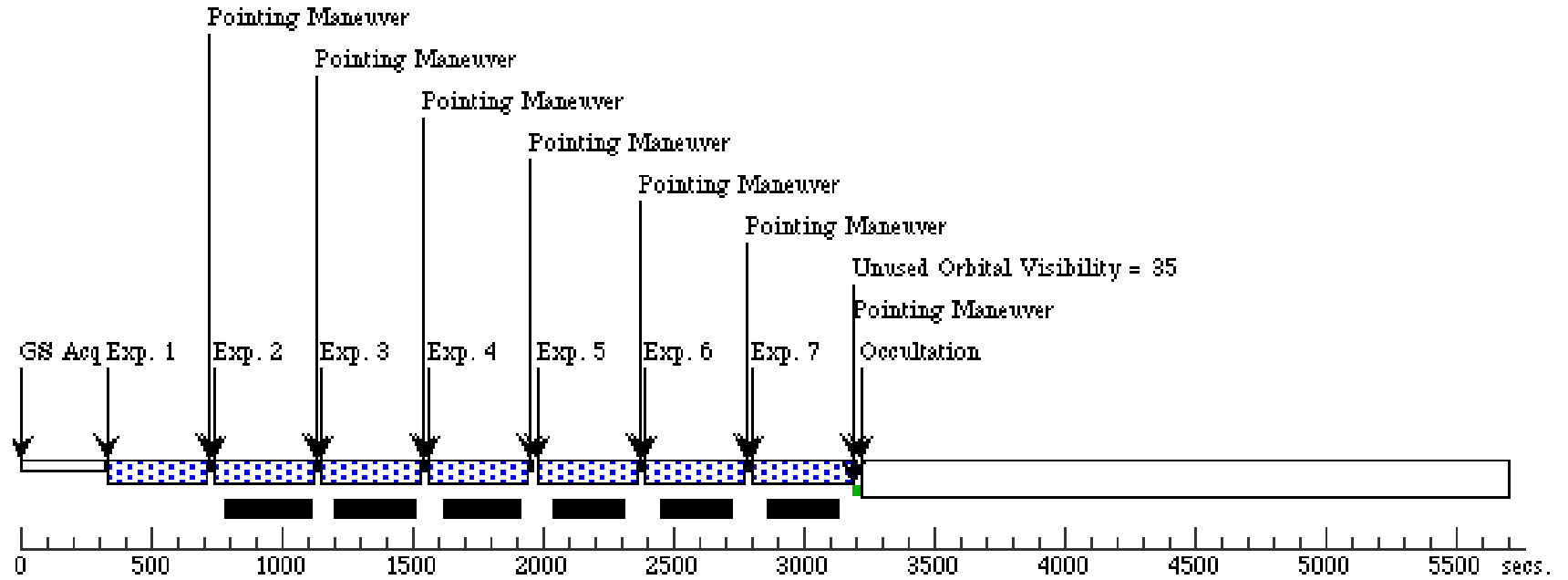
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17	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 1.35500 00,2.4220000	449.233834 Secs (449.234 Secs)	
						[==>]	[3]
18	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 2.71000 00,1.2110000	449.233834 Secs (449.234 Secs)	
						[==>]	[3]
19	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=13; SAMP-SEQ=STEP5 0	POS TARG 2.71000 00,2.4220000	399.233383 Secs (399.233 Secs)	
						[==>]	[3]

Orbit 1

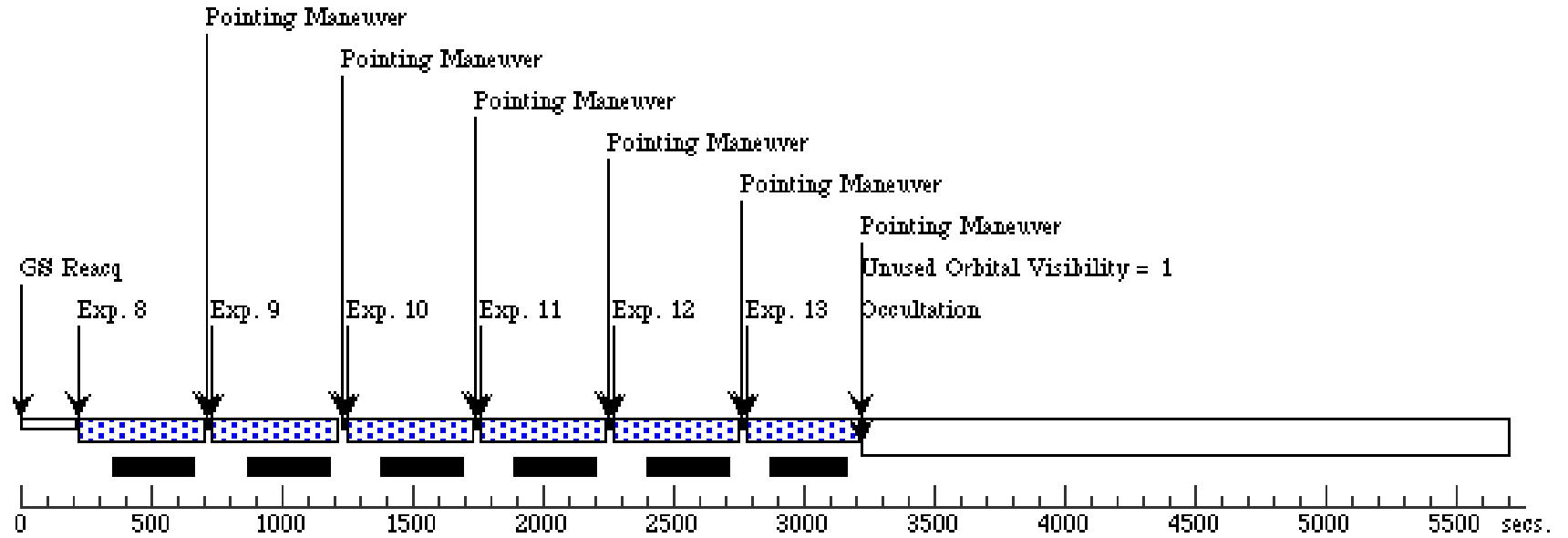
Server Version: 20150609

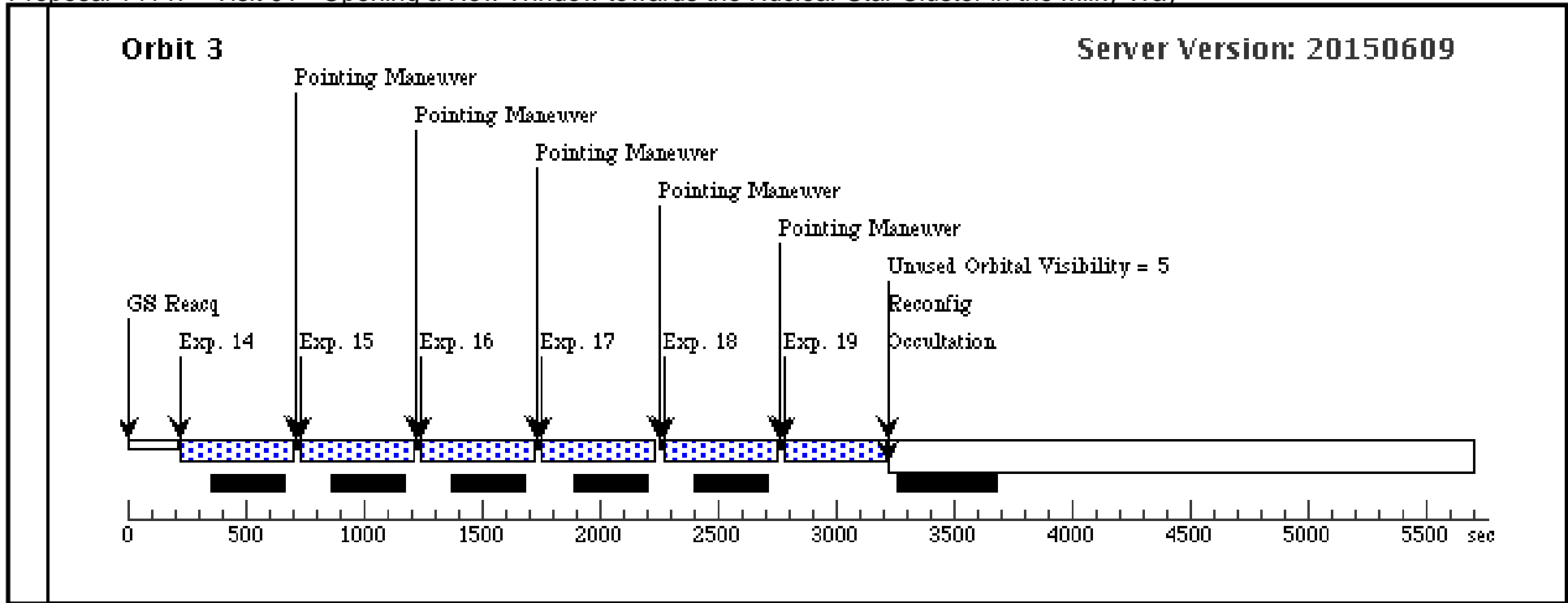
Orbit Structure



Orbit 2

Server Version: 20150609





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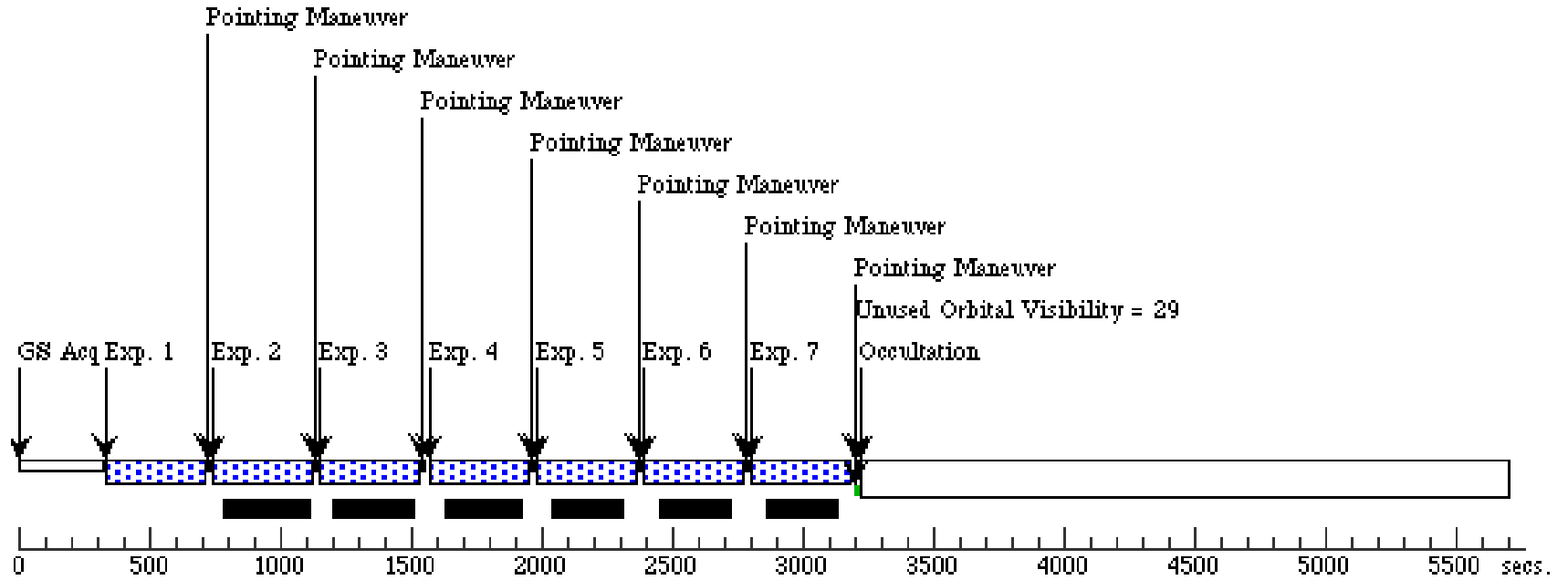
Visit	Proposal 14147, Visit 02 Wed Jul 22 01:50:00 GMT 2015 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: ORIENT 90D TO 100 D; ORIENT 270D TO 280 D					
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes
(1)		SGRA-NC	RA: 17 45 40.0400 (266.4168333d) Dec: -29 00 28.10 (-29.00781d) Equinox: J2000		V=14+/-0.1 J=12.2, H=9.26, K=6.5	Reference Frame: ICRS
<i>Comments: The magnitude are for the brightest star in the field-of-view.</i>						

Proposal 14147 - Visit 02 - Opening a New Window towards the Nuclear Star Cluster in the Milky Way

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0				349.232932 Secs (349.233 Secs) [==>]	[1]
	2	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 0,0.4444 3701			349.232932 Secs (349.233 Secs) [==>]	[1]
	3	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 0.45121 499,0.0000000			349.232932 Secs (349.233 Secs) [==>]	[1]
	4	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 0.00000 00 ,3.4307630			349.232932 Secs (349.233 Secs) [==>]	[1]
	5	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 0.45121 499 ,3.4307630			349.232932 Secs (349.233 Secs) [==>]	[1]
	6	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 0.45121 499,3.4719370			349.232932 Secs (349.233 Secs) [==>]	[1]
	7	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP5 0	POS TARG 3.88478 50 ,3.3908000			349.232932 Secs (349.233 Secs) [==>]	[1]
	8	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 3.88478 50,3.4307630			449.233834 Secs (449.234 Secs) [==>]	[2]
	9	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 3.88478 50 ,3.4719370			449.233834 Secs (449.234 Secs) [==>]	[2]
	10	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 1.35500 00 ,1.2110000			449.233834 Secs (449.234 Secs) [==>]	[2]
	11	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 1.35500 00,2.4220000			449.233834 Secs (449.234 Secs) [==>]	[2]
	12	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=13; SAMP-SEQ=STEP5 0	POS TARG 2.71000 00 ,1.2110000			399.233383 Secs (399.233 Secs) [==>]	[2]
13	(1) SGRA-NC	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=STEP5 0	POS TARG 2.71000 00,2.4220000			449.233834 Secs (449.234 Secs) [==>]	[2]	

Orbit 1

Server Version: 20150609



Orbit Structure

