



12523 - Dissecting the integrated light of a massive elliptical galaxy with pixel-to-pixel fluctuations: is the IMF bottom-heavy?

Cycle: 19, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
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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	(3) M-49	ACS/WFC	2	26-Jan-2013 02:11:32.0	yes
02	(3) M-49	ACS/WFC	2	26-Jan-2013 02:11:40.0	yes
03	(3) M-49	ACS/WFC	1	26-Jan-2013 02:11:45.0	yes
04	(3) M-49	ACS/WFC	1	26-Jan-2013 02:11:51.0	yes
05	(3) M-49	ACS/WFC	3	26-Jan-2013 02:12:00.0	yes
06	(3) M-49	ACS/WFC	2	26-Jan-2013 02:12:07.0	yes
07	(3) M-49	ACS/WFC	2	26-Jan-2013 02:12:13.0	yes
08	(3) M-49	ACS/WFC	2	26-Jan-2013 02:12:18.0	yes

15 Total Orbits Used

ABSTRACT

Proposal 12523 (STScI Edit Number: 2, Created: Friday, January 25, 2013 9:12:25 PM EST) - Overview

The stellar initial mass function (IMF) is a critical ingredient in the interpretation of extragalactic observations and provides important clues to the physics of star formation. Unfortunately, the low-mass IMF ($M < 0.3 M_{\text{sun}}$) is very difficult to measure beyond the Galaxy because low mass dwarf stars contribute only a few percent to the integrated light of old stellar populations. Using high quality Keck spectra we recently found that massive elliptical galaxies in the Virgo and Coma clusters have enhanced dwarf-sensitive absorption features, indicating a very "bottom-heavy" IMF with many more low-mass stars than the IMF in our Galaxy. The main uncertainty in this result is that the subtle absorption features that we ascribe to dwarf stars may actually be due to unusual abundance patterns in giant stars. Here we propose to directly determine whether three key IMF sensitive spectral features in massive elliptical galaxies are caused by giants or by dwarfs. We will exploit the high angular resolution of ACS, in combination with its unique ramp filters, to measure pixel-to-pixel fluctuations in the light of these spectral features for one of the massive Virgo elliptical galaxies that we previously observed with Keck (NGC 4649). Pixel-to-pixel fluctuations are caused by Poisson variations in the number of giants, and by correlating the behavior of a spectral feature with the number of giants in each pixel we directly measure whether that feature comes from giants or dwarfs.

OBSERVING DESCRIPTION

We are observing a single target, the elliptical galaxy M60, in 6 ramp filters and in the broad F814W filter.

The aim is that the "on" and "off" exposures for a given feature (Na I, CaT, FeH) fall approximately on the same area of the detector. The four bluest settings will fall on the WFC-1 chip; the two reddest settings (FeH "on" and FeH "off") will fall on the WFC-2 chip. In order to have broad band data for all of the filters, we split the F814W observations in two visits: one for the WFC1 ramp aperture and one for the WFC2 ramp aperture.

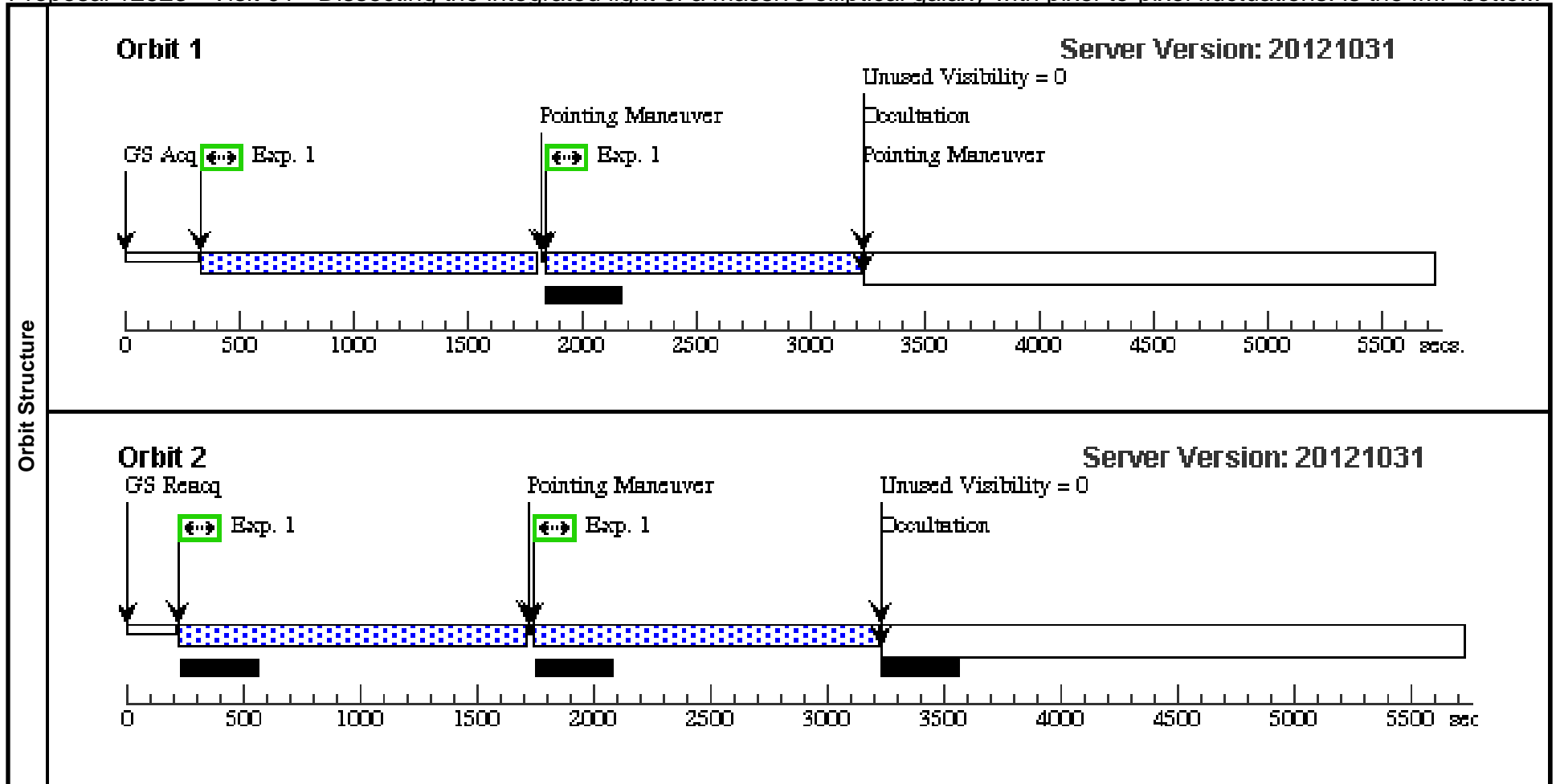
A standard dither pattern of 4 exposures is used to improve the sampling and identify hot pixels.

The data can be taken at any ORIENT but it is crucial that all 8 visits are taken at the same ORIENT.

Proposal 12523 - Visit 01 - Dissecting the integrated light of a massive elliptical galaxy with pixel-to-pixel fluctuations: is the IMF botto...

Sat Jan 26 02:12:25 GMT 2013

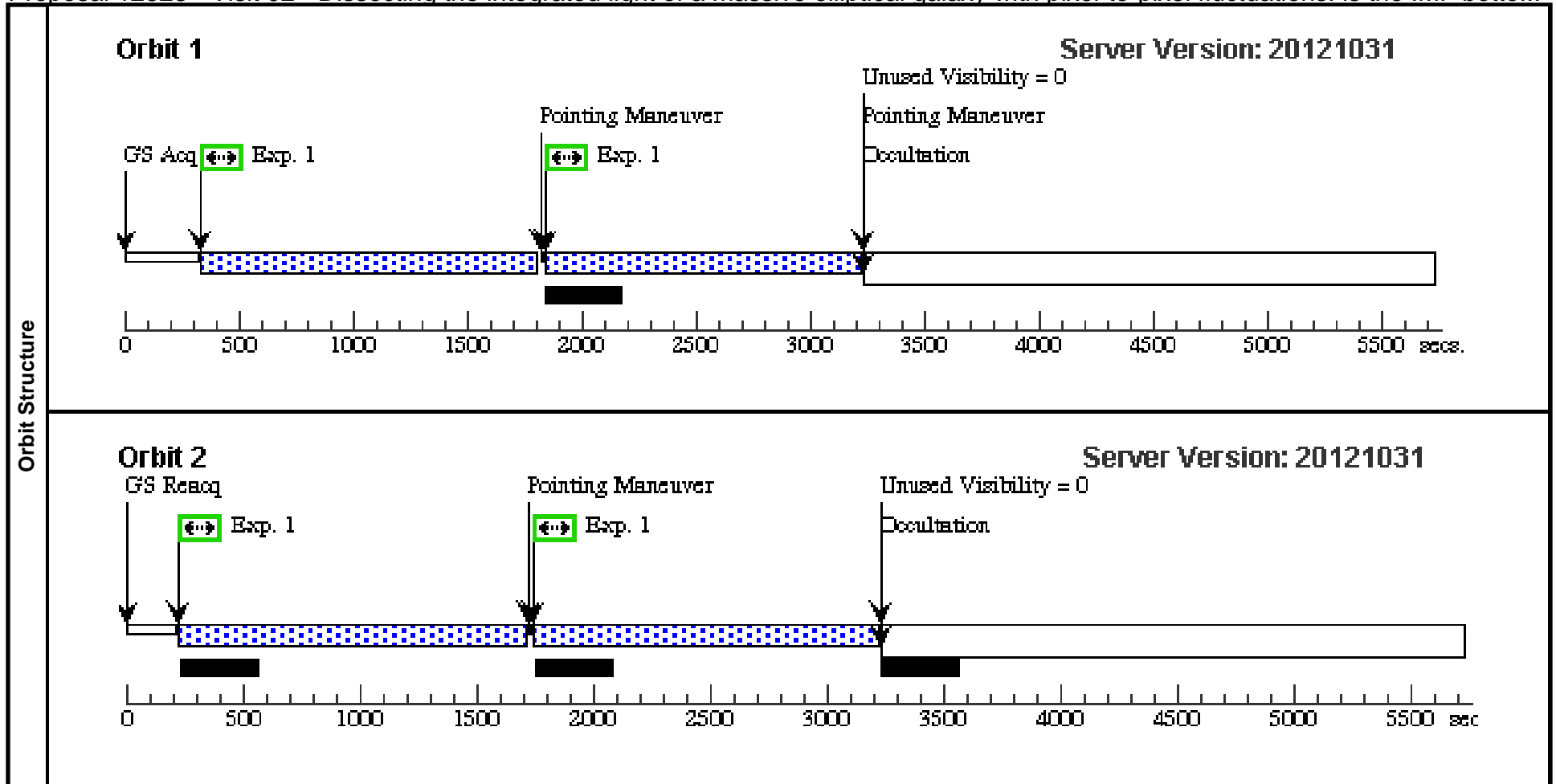
Visit	Proposal 12523, Visit 01, implementation Diagnostic Status: Warning Scientific Instruments: ACS/WFC Special Requirements: (none)										
	(Na I ON 8230 (01.001)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.										
Diagnosics											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures	
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187				Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false				(1)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(3)	M-49	RA: 12 29 46.7980 (187.4449917d) Dec: +08 00 1.48 (8.00041d) Equinox: J2000				V=12.17		Reference Frame: SIMBAD		
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>											
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
	1	Na I ON 823 (3) M-49		ACS/WFC, ACCUM, WFC1-IRAMP	FR853N 8230 A		GS ACQ SCENARI O BASE1B3	Pattern 1, Exps 1-1 i n Visit 01 (1)	1000 Secs		
									[==>1267.0 Secs (Pattern 1)]		[1]
									[==>1255.0 Secs (Pattern 2)]		
								[==>1363.0 Secs (Pattern 3)]			
								[==>1352.0 Secs (Pattern 4)]		[2]	



Proposal 12523 - Visit 02 - Dissecting the integrated light of a massive elliptical galaxy with pixel-to-pixel fluctuations: is the IMF botto...

Sat Jan 26 02:12:28 GMT 2013

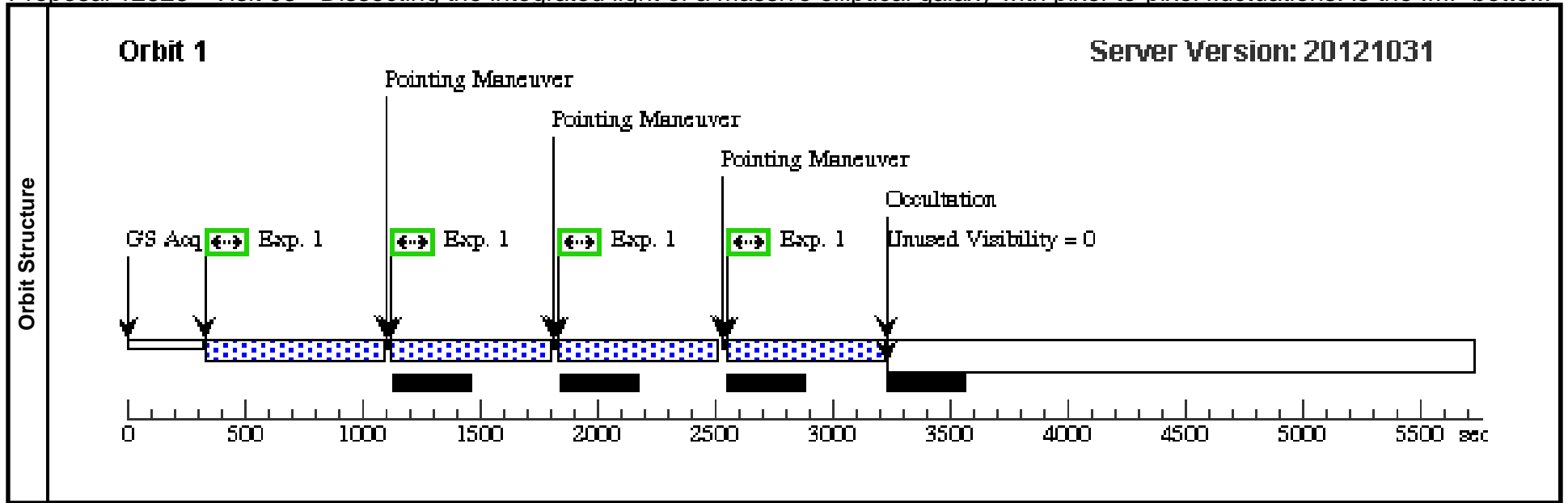
Visit	Proposal 12523, Visit 02, implementation Diagnostic Status: Warning Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01									
	(Na I OFF 8365 (02.001)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.									
Diagnosics										
Patterns	#	Primary Pattern			Secondary Pattern			Exposures		
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187			Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false			(1)		
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	M-49	RA: 12 29 46.7980 (187.4449917d) Dec: +08 00 1.48 (8.00041d) Equinox: J2000		V=12.17	Reference Frame: SIMBAD				
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Na I OFF 8365	(3) M-49	ACS/WFC, ACCUM, WFC1-IRAMP	FR853N 8365 A		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 02 (1)	1000 Secs	
									[==>1267.0 Secs (Pattern 1)]	[1]
									[==>1255.0 Secs (Pattern 2)]	
								[==>1363.0 Secs (Pattern 3)]		
								[==>1352.0 Secs (Pattern 4)]	[2]	



Proposal 12523 - Visit 03 - Dissecting the integrated light of a massive elliptical galaxy with pixel-to-pixel fluctuations: is the IMF botto...

Sat Jan 26 02:12:30 GMT 2013

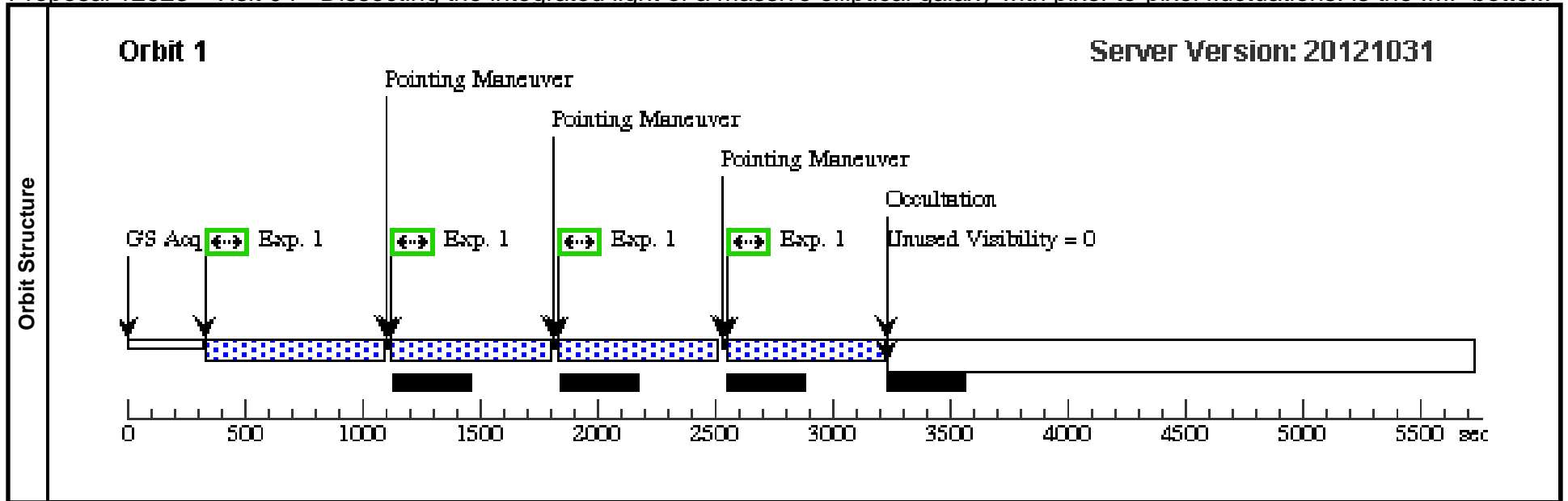
Visit	Proposal 12523, Visit 03, implementation Diagnostic Status: Warning Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01									
	(CaT ON 8560 (03.001)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.									
Diagnosics										
Patterns	#	Primary Pattern			Secondary Pattern			Exposures		
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187			Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false			(1)		
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	M-49	RA: 12 29 46.7980 (187.4449917d) Dec: +08 00 1.48 (8.00041d) Equinox: J2000		V=12.17	Reference Frame: SIMBAD				
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	CaT ON 8560	(3) M-49	ACS/WFC, ACCUM, WFC1-IRAMP	FR853N 8560 A		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 03 (1)	500 Secs [==>554.0 Secs (Pattern 1)] [==>554.0 Secs (Pattern 2)] [==>554.0 Secs (Pattern 3)] [==>544.0 Secs (Pattern 4)]	[1]



Proposal 12523 - Visit 04 - Dissecting the integrated light of a massive elliptical galaxy with pixel-to-pixel fluctuations: is the IMF botto...

Sat Jan 26 02:12:31 GMT 2013

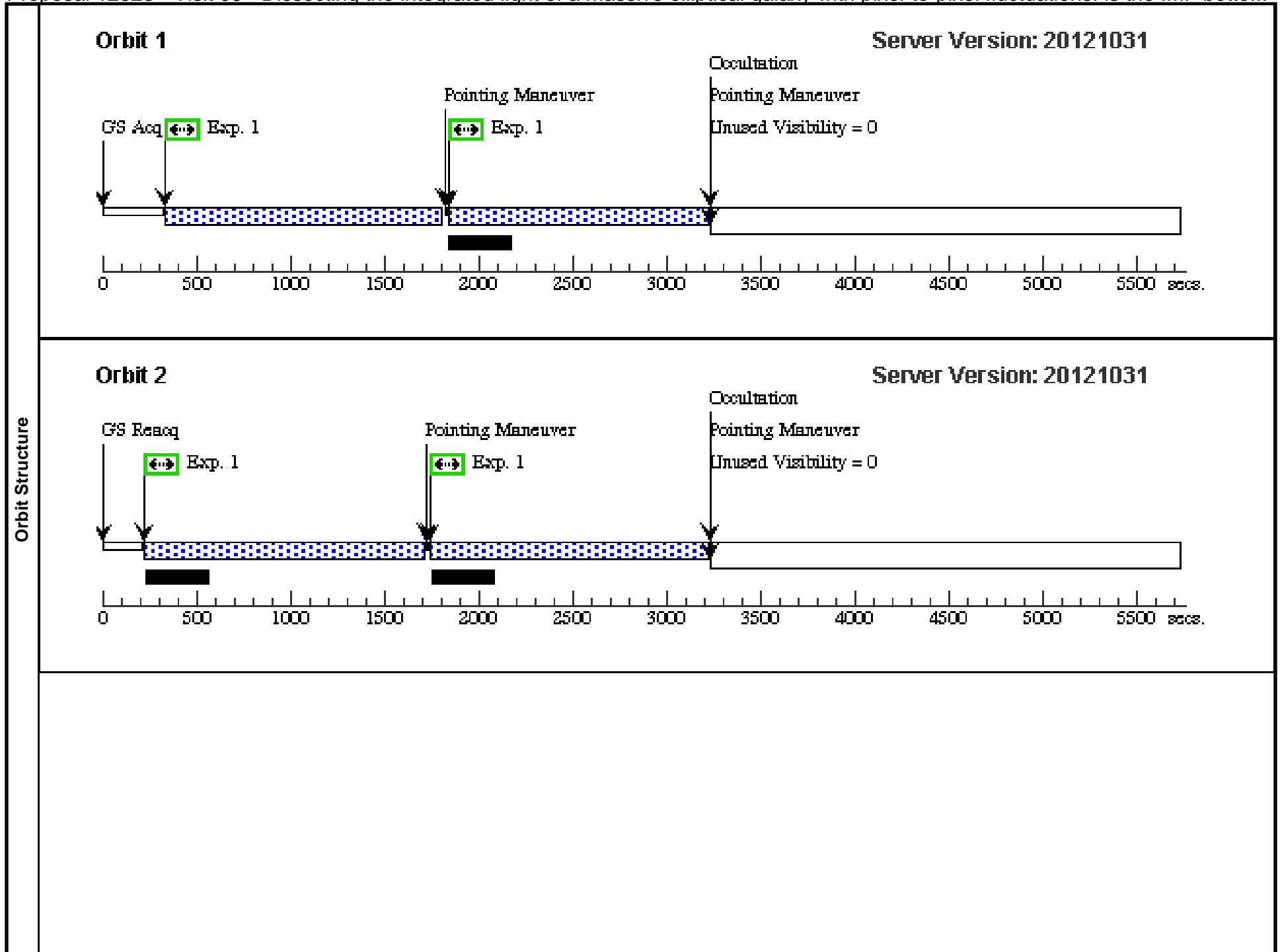
Visit	Proposal 12523, Visit 04, implementation Diagnostic Status: Warning Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01									
	(CaT OFF 8800 (04.001)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.									
Diagnosics										
Patterns	#	Primary Pattern				Secondary Pattern				Exposures
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187				Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false				(1)
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes	Miscellaneous		
	(3)	M-49	RA: 12 29 46.7980 (187.4449917d) Dec: +08 00 1.48 (8.00041d) Equinox: J2000				V=12.17	Reference Frame: SIMBAD		
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	CaT OFF 8800	(3) M-49	ACS/WFC, ACCUM, WFC1-IRAMP	FR853N 8800 A		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 04 (1)	500 Secs [==>554.0 Secs (Pattern 1)] [==>554.0 Secs (Pattern 2)] [==>554.0 Secs (Pattern 3)] [==>544.0 Secs (Pattern 4)]	[1]

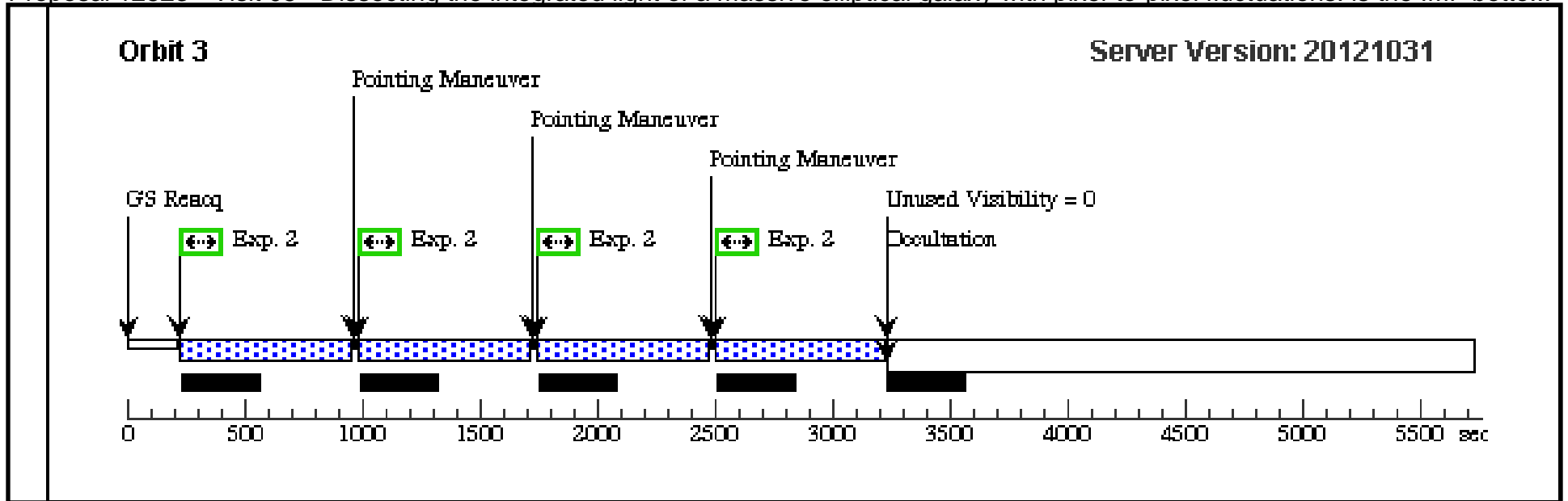


Proposal 12523 - Visit 05 - Dissecting the integrated light of a massive elliptical galaxy with pixel-to-pixel fluctuations: is the IMF botto...

Sat Jan 26 02:12:32 GMT 2013

Visit	Proposal 12523, Visit 05, implementation Diagnostic Status: Warning Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01										
	(FeH ON 9960 (05.001)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures. (FeH ON 9960 (05.002)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.										
Diagnosics											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures	
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187				Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false				(1), (2)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(3)	M-49	RA: 12 29 46.7980 (187.4449917d) Dec: +08 00 1.48 (8.00041d) Equinox: J2000				V=12.17		Reference Frame: SIMBAD		
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>											
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	FeH ON 9960	(3) M-49	ACS/WFC, ACCUM, WFC2-ORAMP		FR1016N 9960 A		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 05 (1)	1000 Secs	
										[==>1267.0 Secs (Pattern 1)]	[1]
										[==>1255.0 Secs (Pattern 2)]	
										[==>1363.0 Secs (Pattern 3)]	[2]
										[==>1352.0 Secs (Pattern 4)]	
2	FeH ON 9960	(3) M-49	ACS/WFC, ACCUM, WFC2-ORAMP		FR1016N 9960 A			Pattern 1, Exps 2-2 in Visit 05 (1)	500 Secs		
									[==>602.0 Secs (Pattern 1)]		
									[==>602.0 Secs (Pattern 2)]		
									[==>602.0 Secs (Pattern 3)]		
									[==>593.0 Secs (Pattern 4)]	[3]	

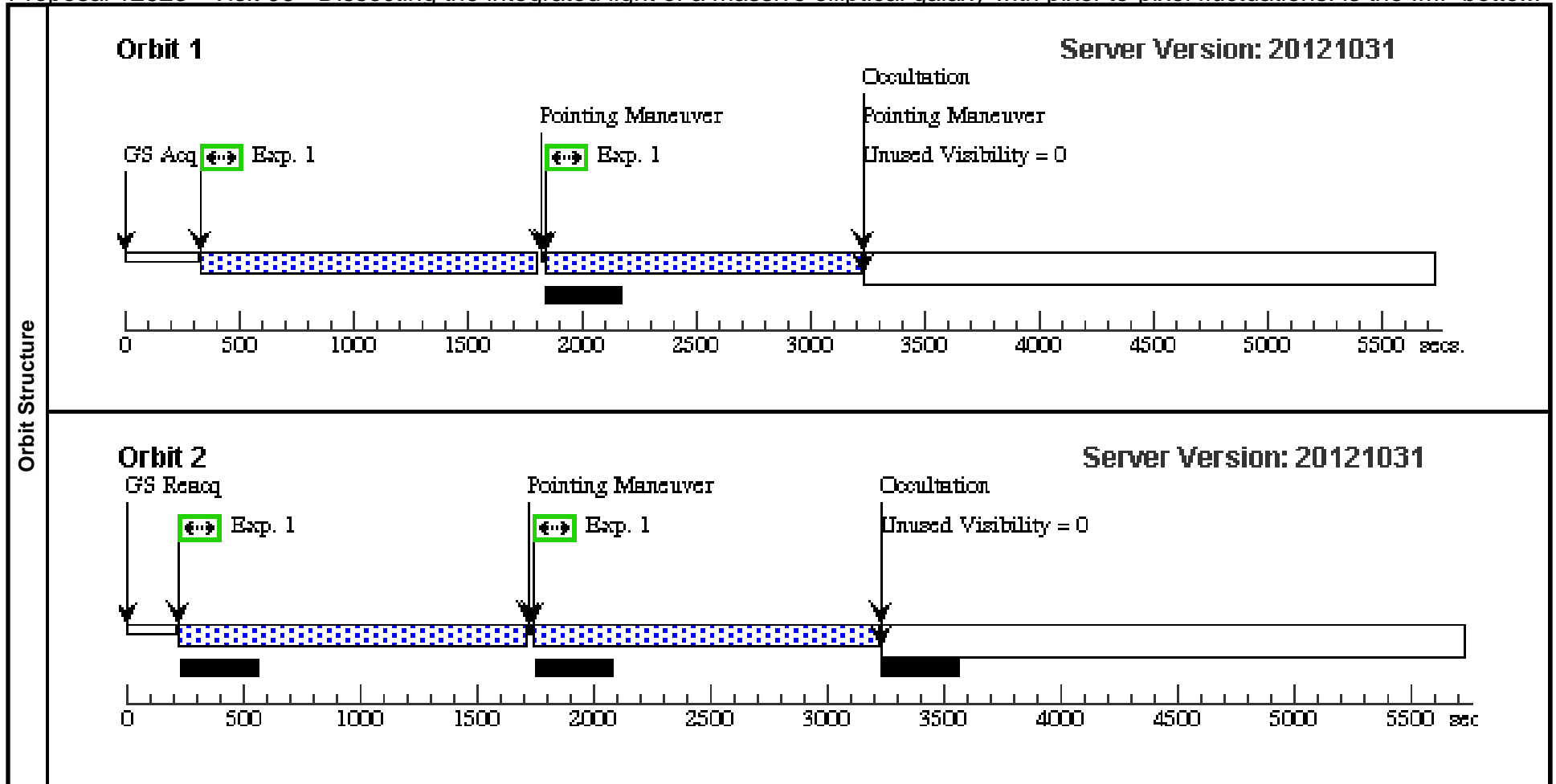




Proposal 12523 - Visit 06 - Dissecting the integrated light of a massive elliptical galaxy with pixel-to-pixel fluctuations: is the IMF botto...

Sat Jan 26 02:12:36 GMT 2013

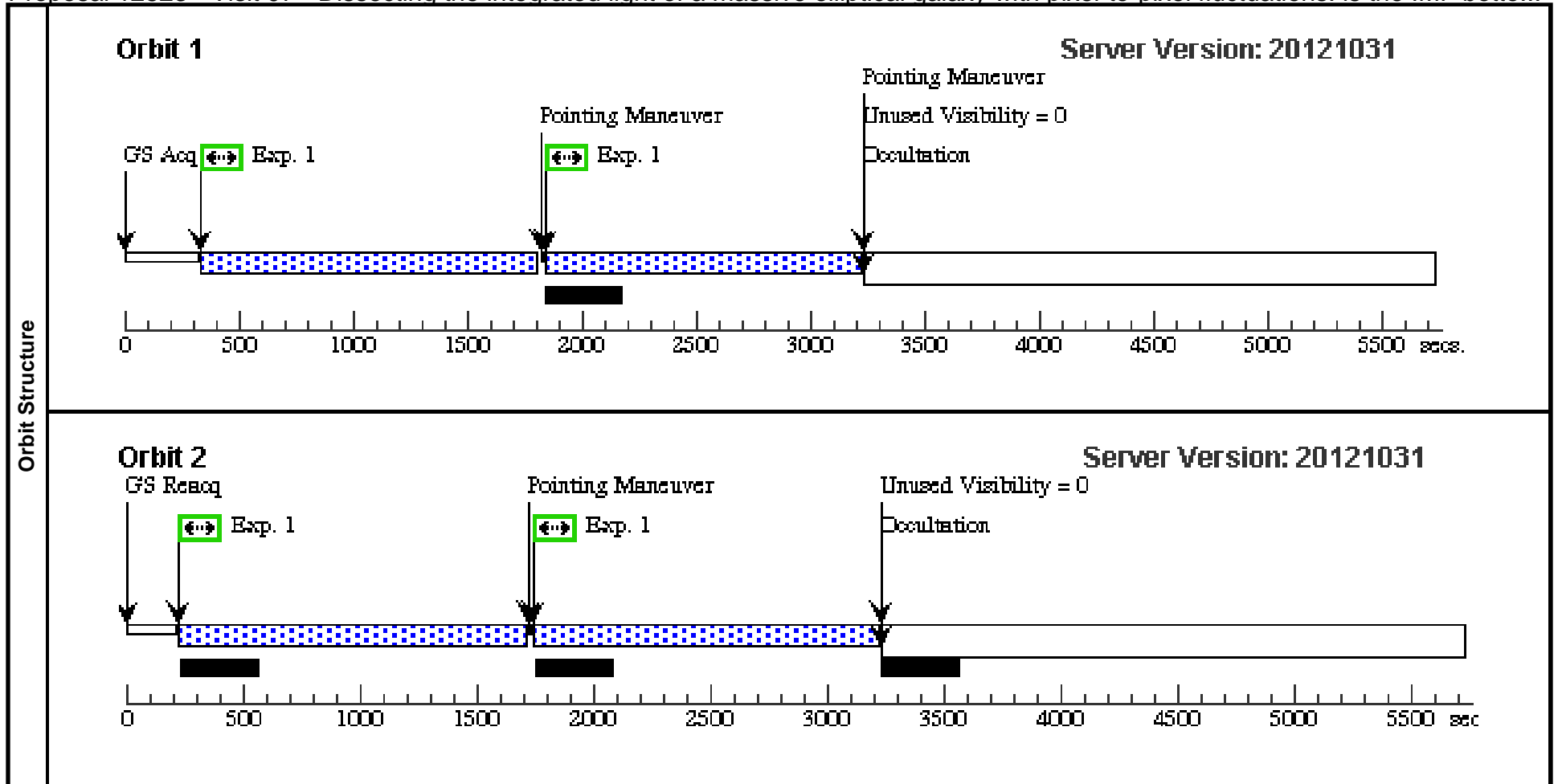
Visit	Proposal 12523, Visit 06, implementation Diagnostic Status: Warning Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01										
	(FeH OFF 9810 (06.001)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.										
Diagnosics											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures	
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187				Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false				(1)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(3)	M-49	RA: 12 29 46.7980 (187.4449917d) Dec: +08 00 1.48 (8.00041d) Equinox: J2000				V=12.17		Reference Frame: SIMBAD		
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>											
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
	1	FeH OFF 9810	(3) M-49	ACS/WFC, ACCUM, WFC2-ORAMP	FR1016N 9810 A		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 06 (1)	1000 Secs		
									[==>1267.0 Secs (Pattern 1)]		[1]
									[==>1255.0 Secs (Pattern 2)]		
									[==>1363.0 Secs (Pattern 3)]		
									[==>1352.0 Secs (Pattern 4)]		[2]



Proposal 12523 - Visit 07 - Dissecting the integrated light of a massive elliptical galaxy with pixel-to-pixel fluctuations: is the IMF botto...

Sat Jan 26 02:12:38 GMT 2013

Visit	Proposal 12523, Visit 07, implementation Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01										
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
		(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false							(1)
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(3)	M-49	RA: 12 29 46.7980 (187.4449917d) Dec: +08 00 1.48 (8.00041d) Equinox: J2000				V=12.17			Reference Frame: SIMBAD	
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
	1	F814W WF C1-IRAMP	(3) M-49	ACS/WFC, ACCUM, WFC1-IRAMP	F814W		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 07 (1)	1000 Secs		
									[=>1267.0 Secs (Pattern 1)]	[1]	
									[=>1255.0 Secs (Pattern 2)]		
									[=>1363.0 Secs (Pattern 3)]		
									[=>1352.0 Secs (Pattern 4)]	[2]	



Proposal 12523 - Visit 08 - Dissecting the integrated light of a massive elliptical galaxy with pixel-to-pixel fluctuations: is the IMF botto...

Sat Jan 26 02:12:40 GMT 2013

Visit	Proposal 12523, Visit 08, implementation Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01										
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
		(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false							(1)
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(3)	M-49	RA: 12 29 46.7980 (187.4449917d) Dec: +08 00 1.48 (8.00041d) Equinox: J2000				V=12.17			Reference Frame: SIMBAD	
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	F814W WF C2-ORAMP	(3) M-49	ACS/WFC, ACCUM, WFC2-ORAMP		F814W		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 08 (1)	1000 Secs [==>1267.0 Secs (Pattern 1)] [==>1255.0 Secs (Pattern 2)] [==>1363.0 Secs (Pattern 3)] [==>1352.0 Secs (Pattern 4)]	[1] [2]

