



14075 - Long-Lost Companions: A Search for the Binary Secondaries of Three Nearby Supernovae

Cycle: 23, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

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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) SN-2002AP	WFC3/UVIS	2	29-Sep-2015 21:33:09.0	yes

<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>
02	(2) SN-2001IG	WFC3/UVIS	4	29-Sep-2015 21:33:12.0	yes
03	(3) SN-2010BR	WFC3/UVIS	3	29-Sep-2015 21:33:14.0	yes

9 Total Orbits Used

ABSTRACT

Stripped-envelope supernovae (e.g., SNe Iib, Ib, and Ic) refer to a subset of core-collapse explosions with progenitors that have lost some fraction of their outer hydrogen and helium envelopes in pre-SN mass loss. Mounting evidence over the past decade suggests that the mass loss in a large fraction of these systems occurs due to binary interaction. An unbiased sample of companion-star characteristics (including deep upper limits) can constrain the binary models, but to date only two results have been published: SNe 1993J and 2011dh. In this proposal, we present 2 new archival discoveries and a plan to perform a WFC3/NUV search for the binary companion stars of 3 additional, nearby stripped-envelope SN progenitors: SNe 2002ap, 2001ig, and 2010br. The NUV color (F275W-F336W) offers an optimum detection strategy for the potential hot, blue stars. The combined dataset will result in a statistically meaningful sample of companion stars, with direct implications on the theoretical physics of binary interaction. Such a project cannot wait for more nearby SNe. Only 15 stripped-envelope SNe have occurred within our calculated sensitivity window (<15 Mpc) within the past 25 years, and of those, only 6 were at <10 Mpc. Given HST's time horizon (currently 2018), the degrading UV response on WFC3, and the requisite waiting period to allow the SN to fade before conducting a companion search, now is the time to take full advantage of HST's unique UV capabilities.

OBSERVING DESCRIPTION

WFC3:

- Use entire array to acquire fiducial stars for alignment purposes
- EXPTIME (actual):
 - SN 2002ap
 - F275W (2778 s)
 - F336W (2778 s)
 - SN 2001ig
 - F275W (8661 s)
 - F336W (2920 s)

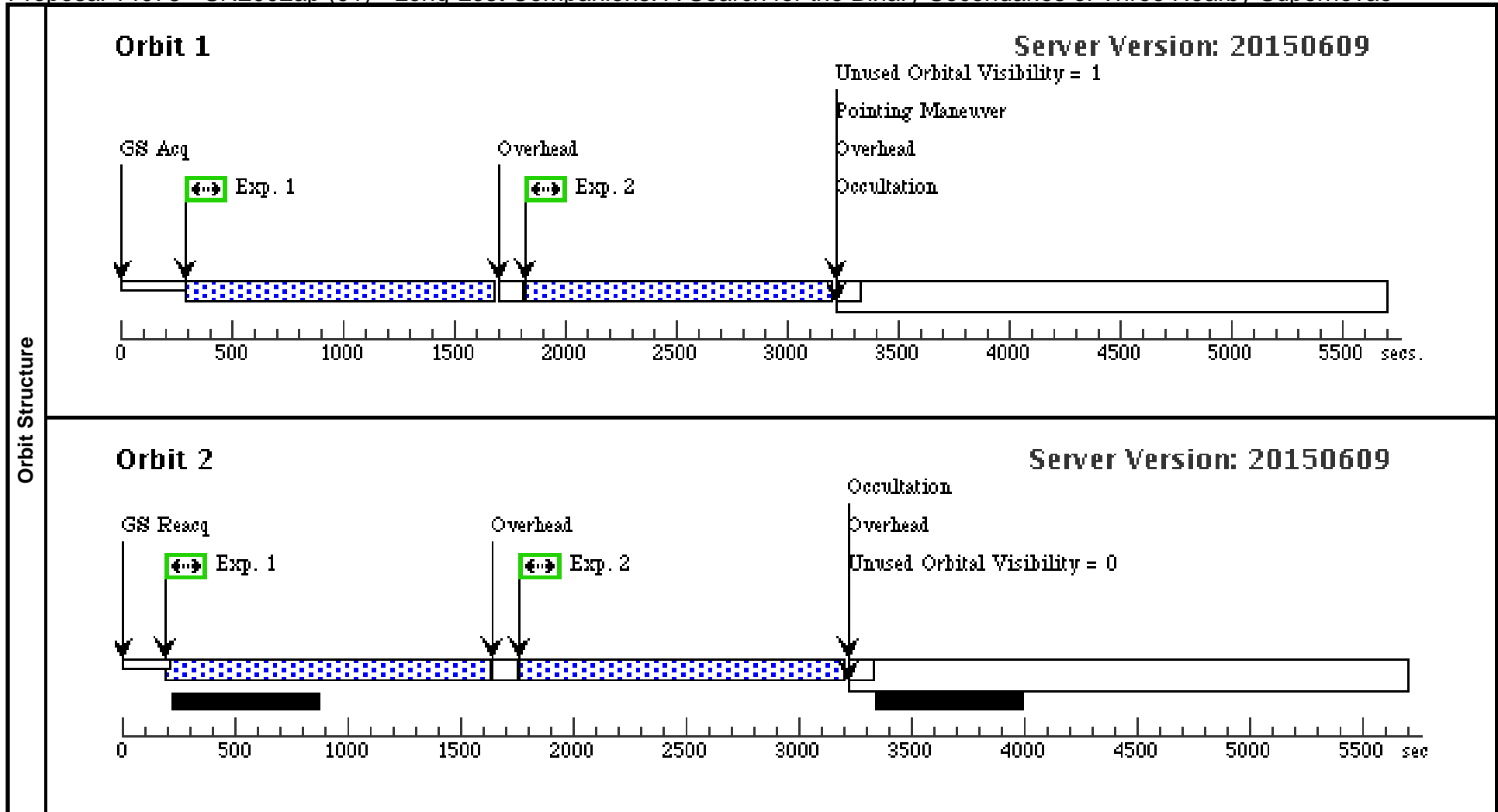
Proposal 14075 (STScI Edit Number: 1, Created: Tuesday, September 29, 2015 8:33:15 PM EST) - Overview

- SN 2010br
 - F275W (5752 s)
 - F336W (2920 s)
- FLASH = 12 e-
 - To be safe
- 2 pt WFC3-UVIS-DITHER-LINE
 - Provides optimal 2-step sampling of the PSF; produces spacings of >1 column for removal of hot columns
 - remove CR and hot pixels

Proposal 14075 - SN2002ap (01) - Long-Lost Companions: A Search for the Binary Secondaries of Three Nearby Supernovae

Wed Sep 30 01:33:15 GMT 2015

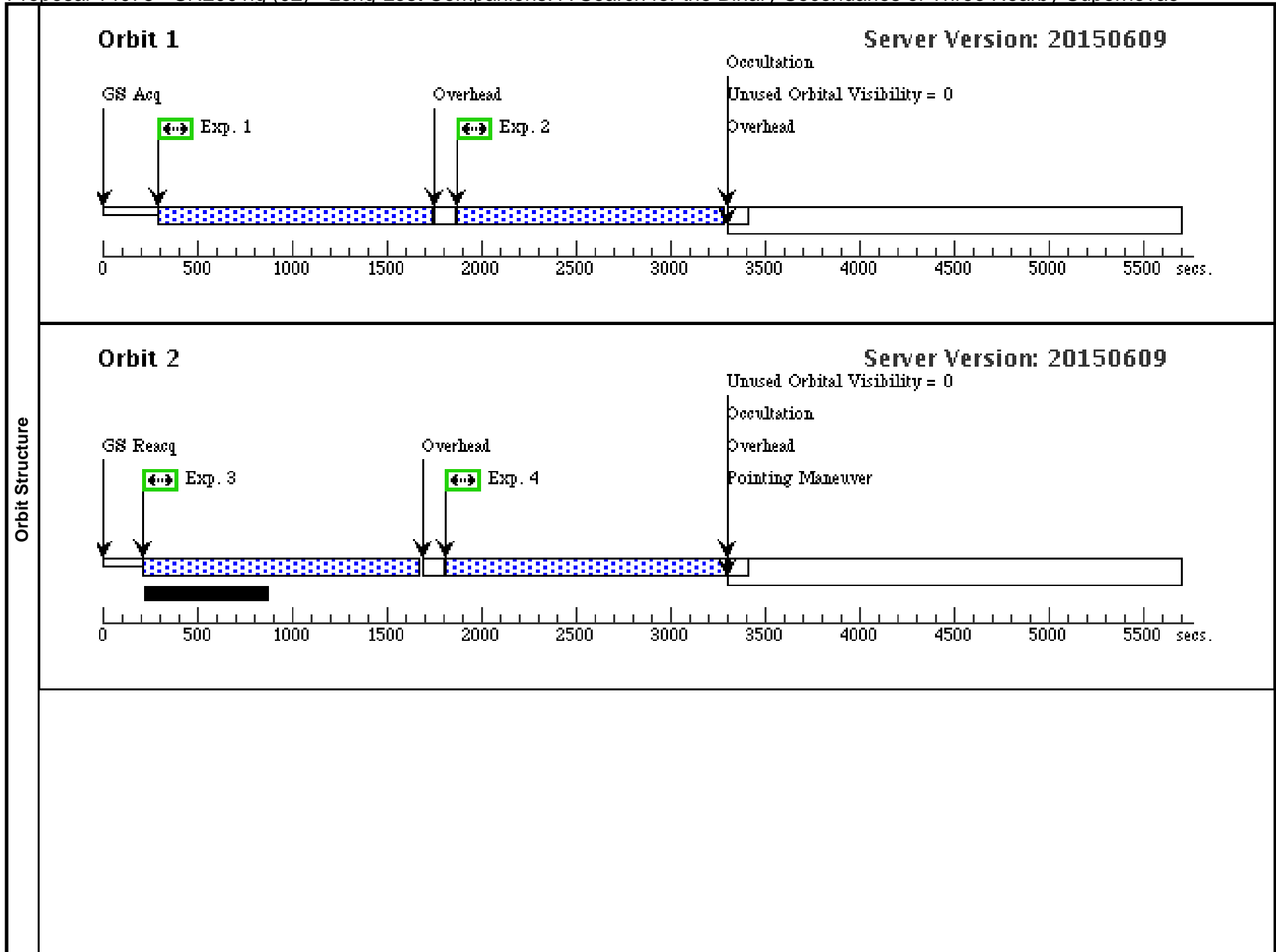
Visit	Proposal 14075, SN2002ap (01), scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none)										
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(1)		Pattern Type=WFC3-UVIS-DITHER- LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=				Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false			(1-2)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes	Miscellaneous			
	(1)	SN-2002AP	RA: 01 36 23.8700 (24.0994583d) Dec: +15 45 13.00 (15.75361d) Equinox: J2000				V=25.0	Reference Frame: NED			
<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	F275W (719031)	(1) SN-2002AP	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=8	GS ACQ SCENARI O BASE1B3	Pattern 1, Exps 1-2 i n SN2002ap (01) (1)	1000 Secs (2778 Secs)		
									[==>1361.0 Secs (Pattern 1)]		[1]
									[==>1417.0 Secs (Pattern 2)]		[2]
2	F336W (719032)	(1) SN-2002AP	WFC3/UVIS, ACCUM, UVIS2	F336W	FLASH=8		Pattern 1, Exps 1-2 i n SN2002ap (01) (1)	1000 Secs (2778 Secs)			
								[==>1361.0 Secs (Pattern 1)]		[1]	
								[==>1417.0 Secs (Pattern 2)]		[2]	



Proposal 14075 - SN2001ig (02) - Long-Lost Companions: A Search for the Binary Secondaries of Three Nearby Supernovae

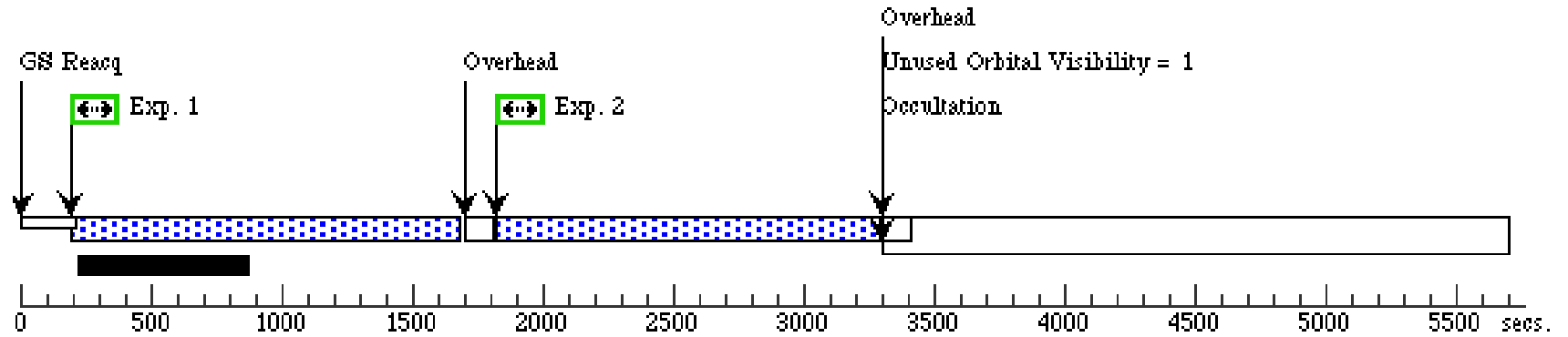
Wed Sep 30 01:33:15 GMT 2015

Visit	Proposal 14075, SN2001ig (02), scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=WFC3-UVIS-DITHER- LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1-4)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	SN-2001IG	RA: 22 57 30.7400 (344.3780833d) Dec: -41 02 26.10 (-41.04058d) Equinox: J2000		V=25.4	Reference Frame: NED				
<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F275W (719037)	(2) SN-2001IG	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=9		Pattern 1, Exps 1-4 in SN2001ig (02) (1)	1000 Secs (2887 Secs)	
									[==>1416.0 Secs (Pattern 1)]	[1]
									[==>1471.0 Secs (Pattern 2)]	[3]
	2	F275W (719037)	(2) SN-2001IG	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=9		Pattern 1, Exps 1-4 in SN2001ig (02) (1)	1000 Secs (2887 Secs)	
									[==>1416.0 Secs (Pattern 1)]	[1]
									[==>1471.0 Secs (Pattern 2)]	[3]
3	F275W (719037)	(2) SN-2001IG	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=9		Pattern 1, Exps 1-4 in SN2001ig (02) (1)	1000 Secs (2920 Secs)		
								[==>1460.0 Secs (Pattern 1)]	[2]	
								[==>1460.0 Secs (Pattern 2)]	[4]	
4	F336W (719035)	(2) SN-2001IG	WFC3/UVIS, ACCUM, UVIS2	F336W	FLASH=9		Pattern 1, Exps 1-4 in SN2001ig (02) (1)	1000 Secs (2920 Secs)		
								[==>1460.0 Secs (Pattern 1)]	[2]	
								[==>1460.0 Secs (Pattern 2)]	[4]	



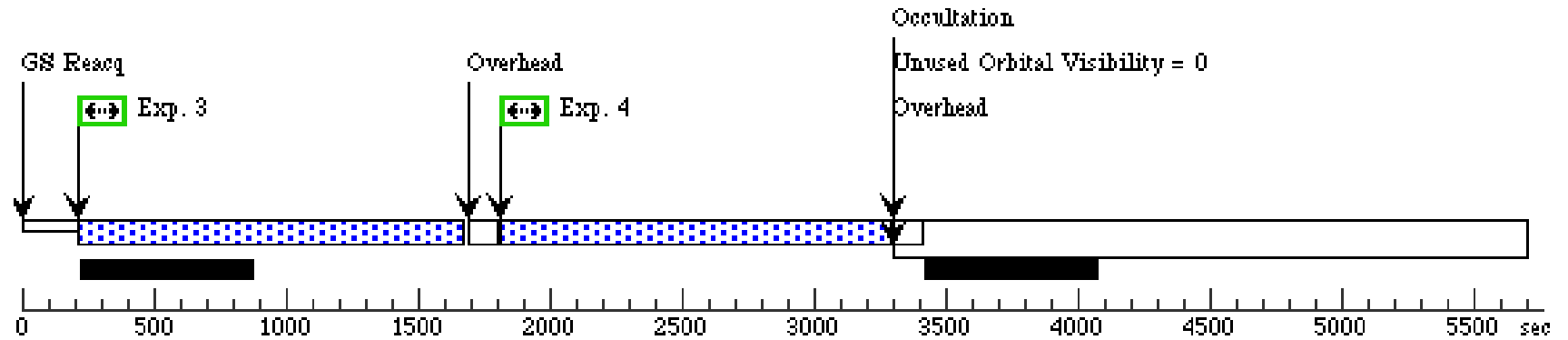
Orbit 3

Server Version: 20150609



Orbit 4

Server Version: 20150609



Proposal 14075 - SN2010br (03) - Long-Lost Companions: A Search for the Binary Secondaries of Three Nearby Supernovae

Wed Sep 30 01:33:16 GMT 2015

Visit	Proposal 14075, SN2010br (03), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none)										
	Patterns	#	Primary Pattern				Secondary Pattern				Exposures
(1)		Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=		Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false						(1-3)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(3)	SN-2010BR	RA: 12 03 10.9600 (180.7956667d) Dec: +44 31 42.80 (44.52856d) Equinox: J2000				V=26.1		Reference Frame: NED		
<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	F275W (719040)	(3) SN-2010BR	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=9		Pattern 1, Exps 1-3 in SN2010br (03) (1)	1000 Secs (2876 Secs)		
										[=>1416.0 Secs (Pattern 1)]	[1]
										[=>1460.0 Secs (Pattern 2)]	[2]
	2	F275W (719040)	(3) SN-2010BR	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=9		Pattern 1, Exps 1-3 in SN2010br (03) (1)	1000 Secs (2876 Secs)		
										[=>1416.0 Secs (Pattern 1)]	[1]
									[=>1460.0 Secs (Pattern 2)]	[3]	
3	F336W (719041)	(3) SN-2010BR	WFC3/UVIS, ACCUM, UVIS2	F336W	FLASH=9		Pattern 1, Exps 1-3 in SN2010br (03) (1)	1000 Secs (2920 Secs)			
									[=>1460.0 Secs (Pattern 1)]	[2]	
									[=>1460.0 Secs (Pattern 2)]	[3]	

