



# 17876 - GOTCHA! Gravitational wave counterparts Observed with CHAndra

Cycle: 32, Proposal Category: GO

(Availability Mode: SUPPORTED)

## INVESTIGATORS

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Dr. Yuhan Yang (CoI) (ESA Member)	Universita di Roma Tor Vergata
Dr. Jamie Kennea (CoI)	The Pennsylvania State University
Dr. C. Kouveliotou (CoI)	George Washington University

## 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) GW	WFC3/UVIS	1	25-Nov-2024 17:00:52.0	yes
02	(1) GW	WFC3/IR	1	25-Nov-2024 17:00:53.0	yes
03	(1) GW	WFC3/IR	1	25-Nov-2024 17:00:53.0	yes
04	(1) GW	WFC3/UVIS	1	25-Nov-2024 17:00:53.0	yes
05	(1) GW	WFC3/UVIS	2	25-Nov-2024 17:00:54.0	yes
06	(1) GW	WFC3/IR	2	25-Nov-2024 17:00:55.0	yes
10	(1) GW	WFC3/UVIS	1	25-Nov-2024 17:00:56.0	yes

9 Total Orbits Used

### **ABSTRACT**

During the next science run (O4), planned to start in Summer 2023, the GW detectors will operate with an increased sensitivity, leading to routine detections of GW sources and their electromagnetic counterparts. We propose to exploit the unique capabilities of Chandra in conjunction with HST and the VLA to map out the diversity of these sources, probe their surrounding environment, and constrain the structure of their outflows. The next few detections of electromagnetic counterparts will shape our knowledge of GW sources for years to come, and the proposed observations will lead to seminal results in the nascent field of multi-messenger astronomy.

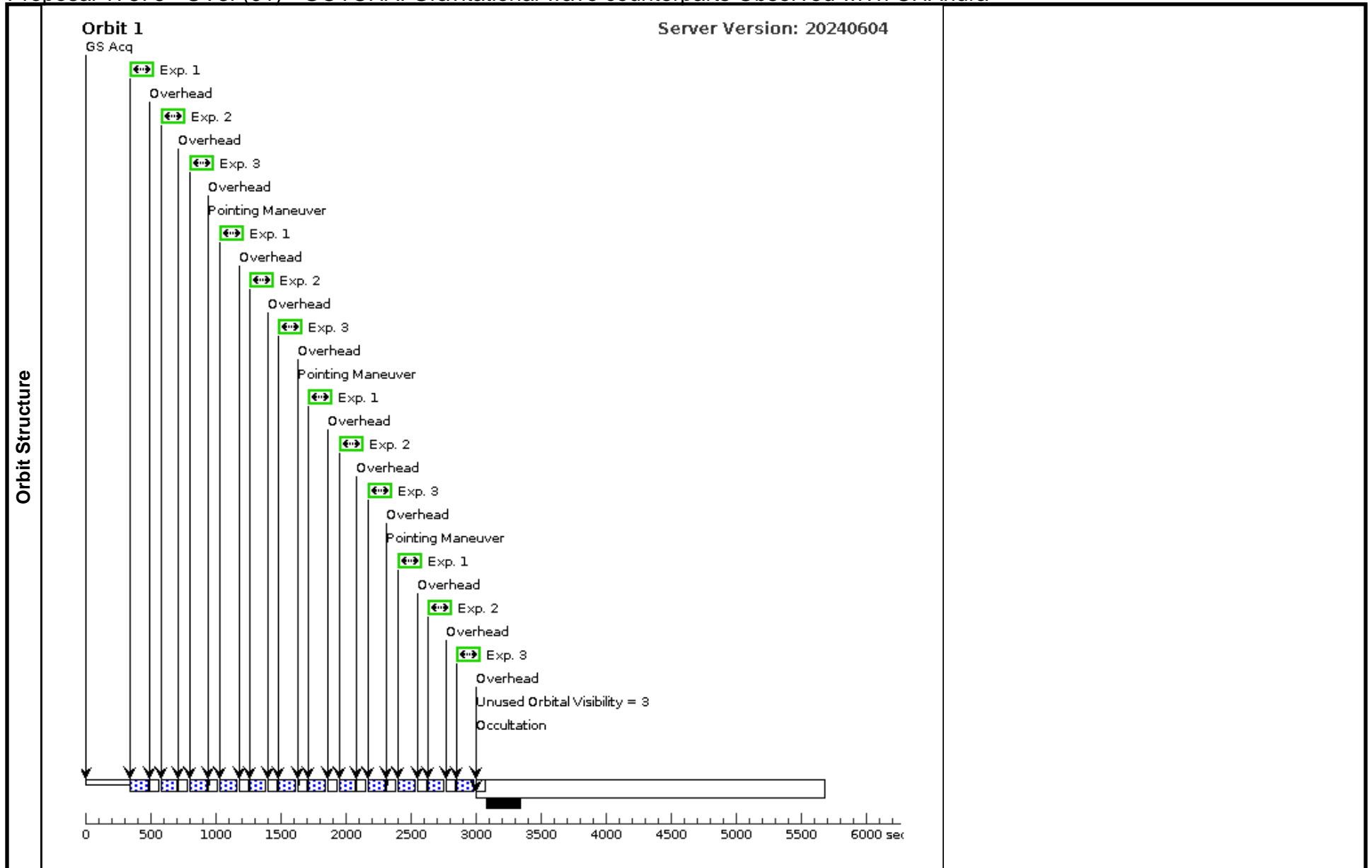
### **OBSERVING DESCRIPTION**

We request non-disruptive HST ToOs with the WFC3 camera split between optical filters (e.g. F435W, F606W, F814W) and infrared filters (e.g. F125W, F160W).

Proposal 17876 - UV3f (01) - GOTCHA! Gravitational wave counterparts Observed with CHAndra

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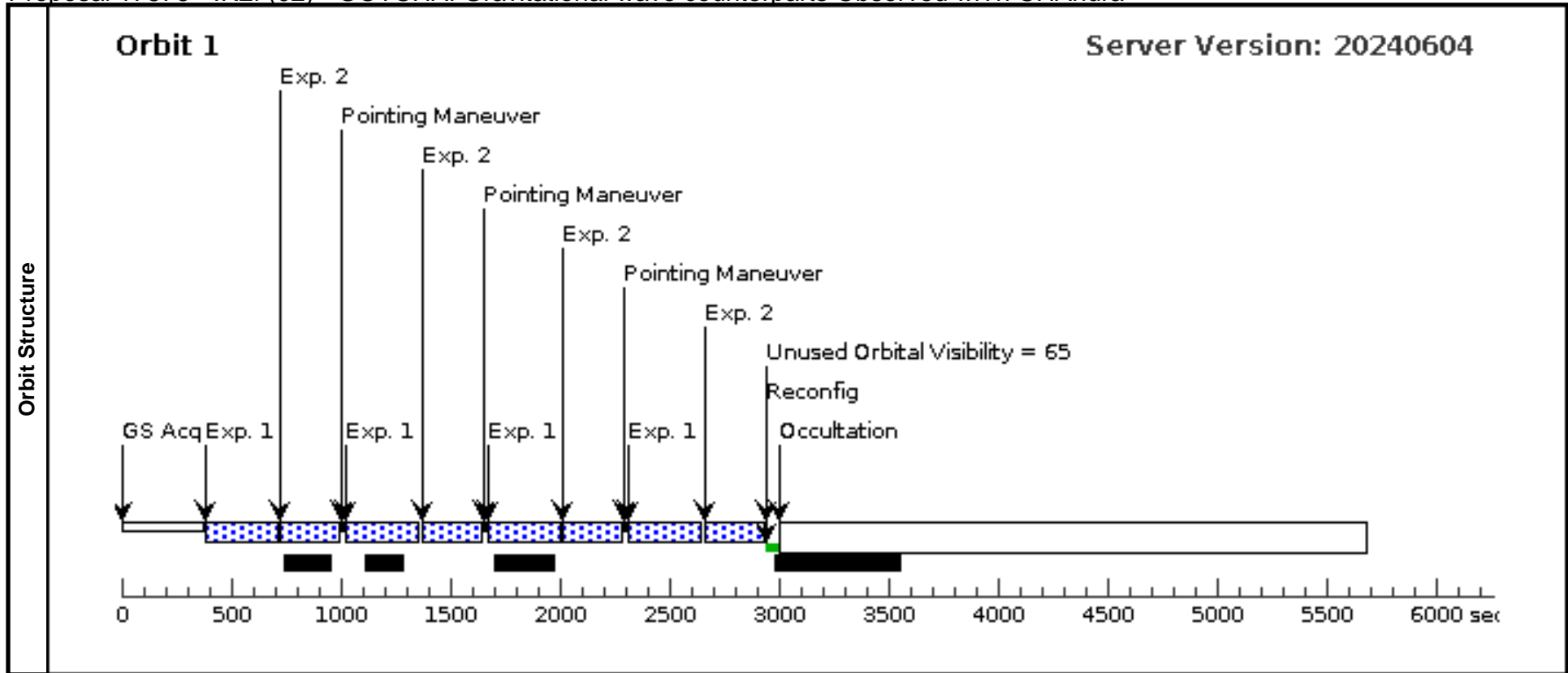
<b>Visit</b>	<b>Proposal 17876, UV3f (01), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: ON HOLD ; TOO RESPONSE TIME 21.0D <i>On Hold Comments: GW trigger</i>									
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>				<b>Secondary Pattern</b>			<b>Exposures</b>
(3)		Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112				Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false			(1-3)	
<b>Generic Targets</b>	<b>#</b>	<b>Name</b>	<b>Criteria</b>		<b>Description</b>					
	(1)	GW	GW counterpart							
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1	(1) GW	(1) GW	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=19; CR-SPLIT=NO		Pattern 3, Exps 1-3 in UV3f (01) (3)	120 Secs (428 Secs) [=>107.0 Secs (Pattern 1)] [=>107.0 Secs (Pattern 2)] [=>107.0 Secs (Pattern 3)] [=>107.0 Secs (Pattern 4)]	[1]
	2	(1) GW	(1) GW	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F606W	FLASH=19; CR-SPLIT=NO		Pattern 3, Exps 1-3 in UV3f (01) (3)	90 Secs (406 Secs) [=>101.5 Secs (Pattern 1)] [=>101.5 Secs (Pattern 2)] [=>101.5 Secs (Pattern 3)] [=>101.5 Secs (Pattern 4)]	[1]
	3	(1) GW	(1) GW	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=19; CR-SPLIT=NO		Pattern 3, Exps 1-3 in UV3f (01) (3)	120 Secs (428 Secs) [=>107.0 Secs (Pattern 1)] [=>107.0 Secs (Pattern 2)] [=>107.0 Secs (Pattern 3)] [=>107.0 Secs (Pattern 4)]	[1]



Proposal 17876 - IR2f (02) - GOTCHA! Gravitational wave counterparts Observed wiTh CHAndra

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<b>Visit</b>	<b>Proposal 17876, IR2f (02), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ON HOLD ; TOO RESPONSE TIME 21.0D <i>On Hold Comments: GW trigger</i>									
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>			<b>Secondary Pattern</b>			<b>Exposures</b>	
(1)		Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false					(1-2)		
<b>Generic Targets</b>	<b>#</b>	<b>Name</b>	<b>Criteria</b>	<b>Description</b>						
	(1)	GW	GW counterpart							
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1	(1) GW	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=7; SAMP-SEQ=SPAR S50			Pattern 1, Exps 1-2 in IR2f (02) (1)	302.934997 Secs (1211.74 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1]
	2	(1) GW	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=6; SAMP-SEQ=SPAR S50			Pattern 1, Exps 1-2 in IR2f (02) (1)	252.934546 Secs (1011.738 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1]



Proposal 17876 - IR1f (03) - GOTCHA! Gravitational wave counterparts Observed wiTh CHAndra

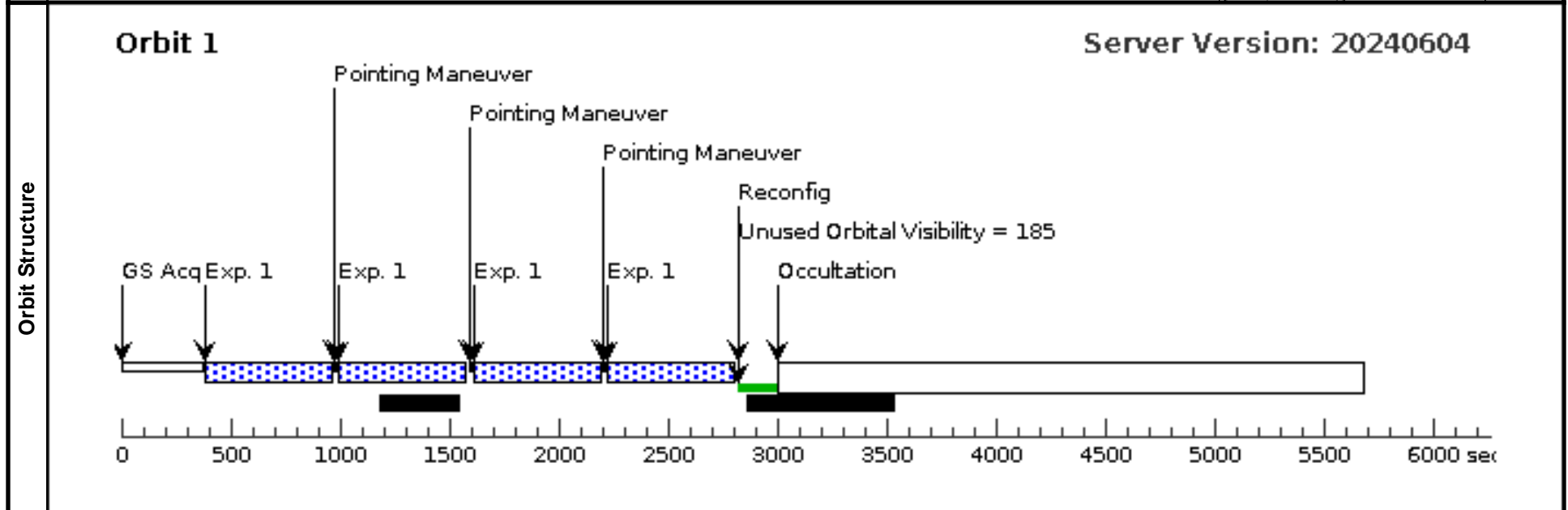
Mon Nov 25 22:00:56 GMT 2024

<b>Visit</b>	<b>Proposal 17876, IR1f (03), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ON HOLD ; TOO RESPONSE TIME 21.0D <i>On Hold Comments: GW trigger</i>		

<b>Patterns</b>	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	(1)

<b>Generic Targets</b>	#	Name	Criteria	Description
	(1)	GW	GW counterpart	

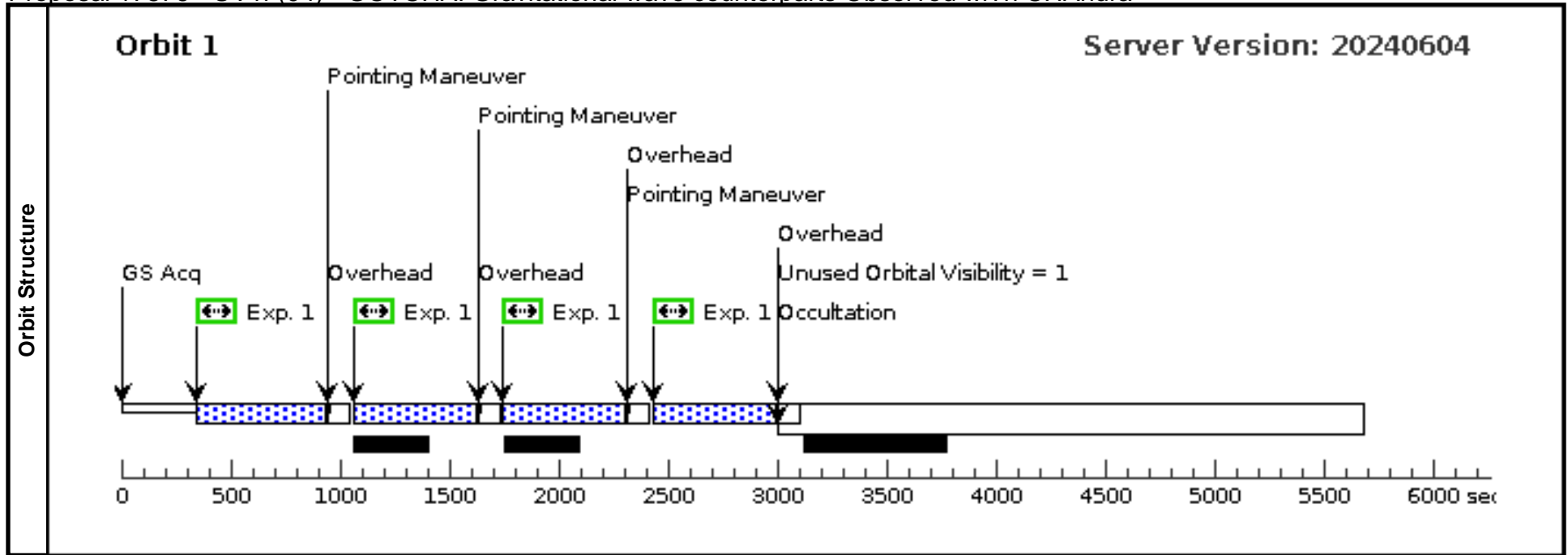
<b>Exposures</b>	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(1) GW	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50		Pattern 1, Exps 1-1 in IR1f (03) (1)	552.937252 Secs (2211.749 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1]



Proposal 17876 - UV1f (04) - GOTCHA! Gravitational wave counterparts Observed with CHAndra

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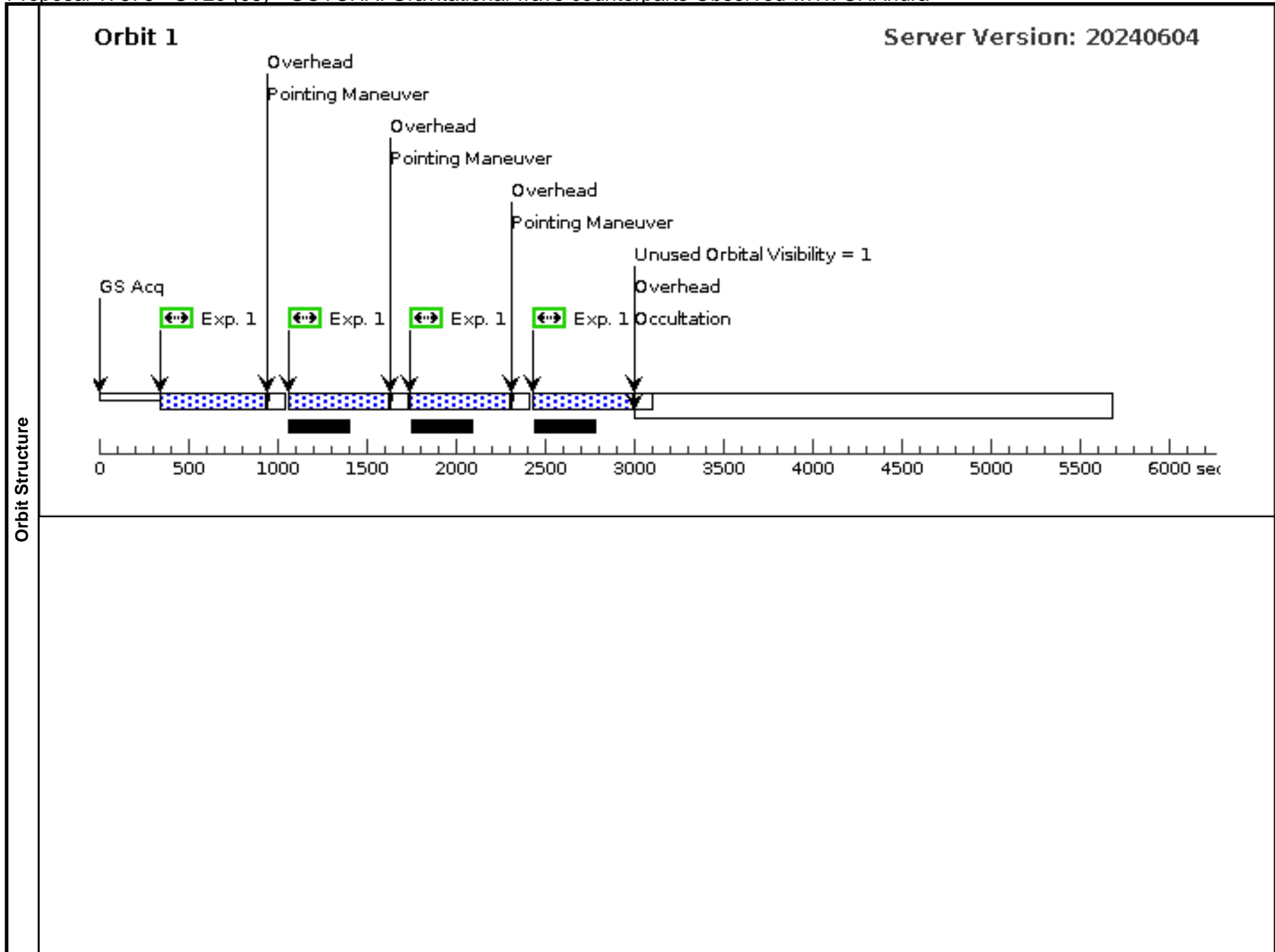
<b>Visit</b>	<b>Proposal 17876, UV1f (04), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: ON HOLD ; TOO RESPONSE TIME 21.0D <i>On Hold Comments: GW trigger</i>									
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>				<b>Secondary Pattern</b>			
(3)		Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112		Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false						(1)
<b>Generic Targets</b>	<b>#</b>	<b>Name</b>	<b>Criteria</b>		<b>Description</b>					
	(1)	GW	GW counterpart							
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1	(1) GW	(1) GW	WFC3/UVIS, ACCUM, UVIS	F606W			Pattern 3, Exps 1-1 in UV1f (04) (3)	550 Secs (2232 Secs) [=>558.0 Secs (Pattern 1)] [=>558.0 Secs (Pattern 2)] [=>558.0 Secs (Pattern 3)] [=>558.0 Secs (Pattern 4)]	[1]

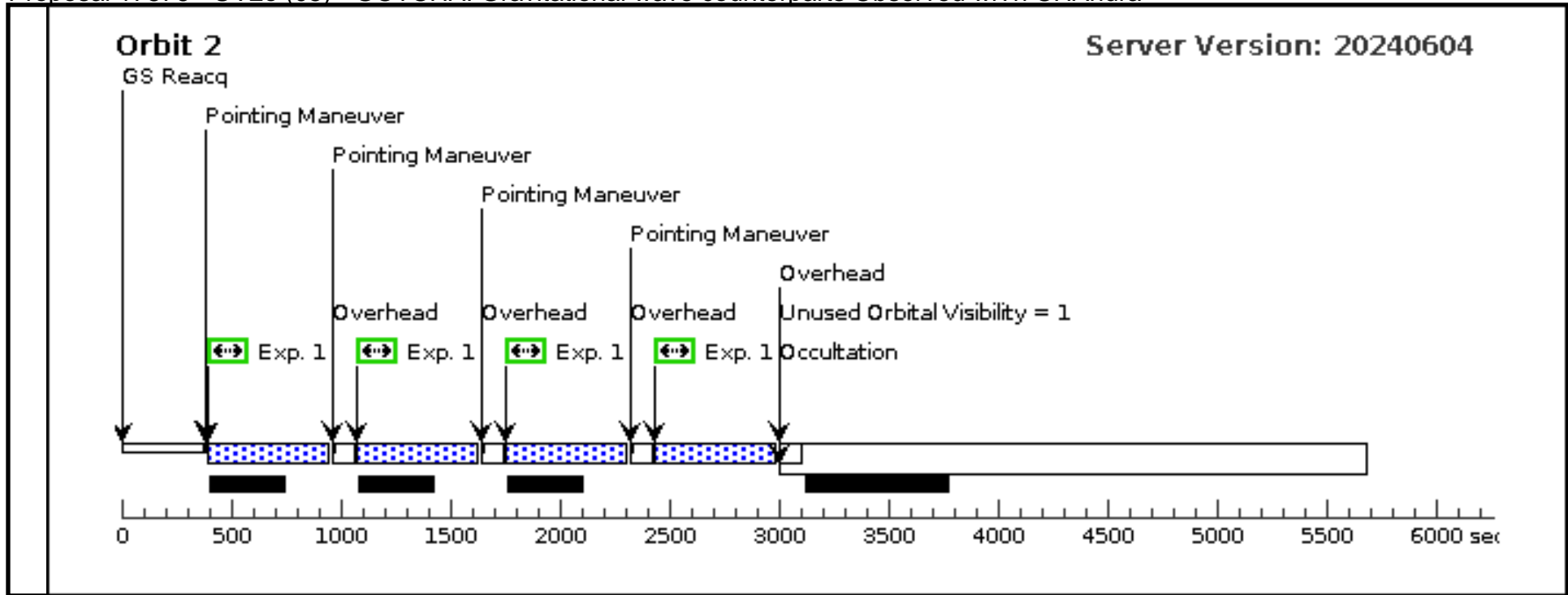


Proposal 17876 - UV2o (05) - GOTCHA! Gravitational wave counterparts Observed with CHAndra

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<b>Visit</b>	<b>Proposal 17876, UV2o (05), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: ON HOLD ; TOO RESPONSE TIME 21.0D <i>On Hold Comments: GW trigger</i>									
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>				<b>Secondary Pattern</b>			
(4)		Pattern Type=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	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false	(1)				
<b>Generic Targets</b>	<b>#</b>	<b>Name</b>	<b>Criteria</b>	<b>Description</b>						
	(1)	GW	GW counterpart							
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1	(1) GW	(1) GW	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=NO		Pattern 4, Exps 1-1 in UV2o (05) (4)	500 Secs (4444 Secs) [=>558.0 Secs (Pattern 1,1)] [=>558.0 Secs (Pattern 1,2)] [=>558.0 Secs (Pattern 1,3)] [=>558.0 Secs (Pattern 1,4)]	[1]
								[=>553.0 Secs (Pattern 2,1)] [=>553.0 Secs (Pattern 2,2)] [=>553.0 Secs (Pattern 2,3)] [=>553.0 Secs (Pattern 2,4)]	[2]	

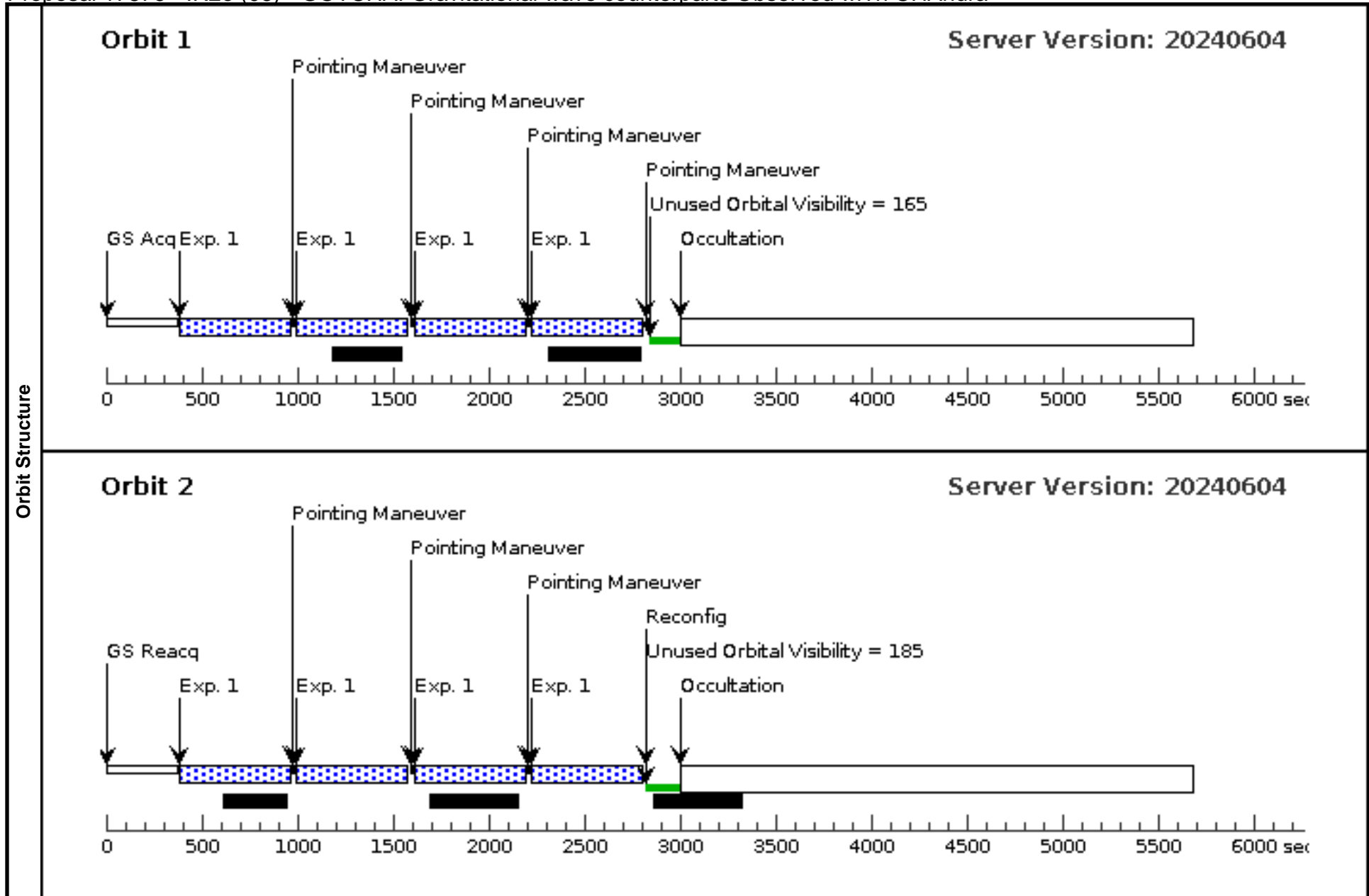




Proposal 17876 - IR2o (06) - GOTCHA! Gravitational wave counterparts Observed with CHAndra

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<b>Visit</b>	<b>Proposal 17876, IR2o (06), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: ON HOLD ; TOO RESPONSE TIME 21.0D <i>On Hold Comments: GW trigger</i>									
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>				<b>Secondary Pattern</b>			
(2)		Pattern Type=LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.7 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=42 Angle Between Sides= Center Pattern=false	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false	(1)				
<b>Generic Targets</b>	<b>#</b>	<b>Name</b>	<b>Criteria</b>	<b>Description</b>						
	(1)	GW	GW counterpart							
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1	(1) GW	(1) GW	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPAR S50		Pattern 2, Exps 1-1 i n IR2o (06) (2)	552.937252 Secs (4423.498 Secs) [=>(Pattern 1,1)] [=>(Pattern 1,2)] [=>(Pattern 1,3)] [=>(Pattern 1,4)]	[1]
								[=>(Pattern 2,1)] [=>(Pattern 2,2)] [=>(Pattern 2,3)] [=>(Pattern 2,4)]	[2]	



Proposal 17876 - UV1f (10) - GOTCHA! Gravitational wave counterparts Observed with CHAndra

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<b>Visit</b>	<b>Proposal 17876, UV1f (10), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: ON HOLD ; TOO RESPONSE TIME 21.0D <i>On Hold Comments: GW trigger</i>										
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>				<b>Secondary Pattern</b>			<b>Exposures</b>	
(3)		Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112				Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false			(1)		
<b>Generic Targets</b>	<b>#</b>	<b>Name</b>	<b>Criteria</b>		<b>Description</b>						
	(1)	GW	GW counterpart								
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>		<b>Orbit</b>
	1	(1) GW	(1) GW	WFC3/UVIS, ACCUM, UVIS	F814W	FLASH=9; CR-SPLIT=NO		Pattern 3, Exps 1-1 in UV1f (10) (3)	550 Secs (2212 Secs) [=>553.0 Secs (Pattern 1)] [=>553.0 Secs (Pattern 2)] [=>553.0 Secs (Pattern 3)] [=>553.0 Secs (Pattern 4)]		[1]

