



16838 - The Astrophysics of the Most Energetic Gamma-Ray Bursts

Cycle: 29, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Dr. Andrew S. Fruchter (PI) (Contact)	Space Telescope Science Institute	fruchter@stsci.edu
Dr. Kornpob Bhirombhakdi (CoI)	Space Telescope Science Institute	kbhirombhakdi@stsci.edu
Dr. Stephen Bradley Cenko (CoI)	NASA Goddard Space Flight Center	brad.cenko@nasa.gov
Dr. Antonino Cucchiara (CoI)	College of Marin	acucchiara@marin.edu
Virginia Cunningham (CoI)	University of Maryland	ginny.cunningham13@gmail.com
Dr. Benjamin Paul Gompertz (CoI) (ESA Member)	University of Birmingham	b.gompertz@bham.ac.uk
Dr. Tuomas Kangas (CoI) (ESA Member)	Royal Institute of Technology	tuomask@kth.se
Dr. John F. Graham (CoI)	Peking University	graham@pku.edu.cn
Dr. Kuntal Misra (CoI)	Aryabhata Research Institute of Observational Sci	kuntal@aries.res.in
Prof. Andrew James Levan (CoI) (ESA Member)	Radboud Universiteit Nijmegen	a.levan@astro.ru.nl
Dr. Asaf Pe'er (CoI)	Harvard University	apeer@cfa.harvard.edu
Dr. Daniel Perley (CoI) (ESA Member)	Liverpool John Moores University	d.a.perley@ljmu.ac.uk
Judith Racusin (CoI)	NASA Goddard Space Flight Center	judith.racusin@nasa.gov
Prof. Nial Rahil Tanvir (CoI) (ESA Member)	University of Leicester	nrt3@star.le.ac.uk
Dr. Resmi Lekshmi (CoI)	Indian Institute of Space Science and Technology	l.resmi@gmail.com

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) LATGRB	WFC3/IR WFC3/UVIS	1	28-Jul-2022 10:00:17.0	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	(1) LATGRB	WFC3/IR WFC3/UVIS	2	28-Jul-2022 10:00:18.0	yes
03	(1) LATGRB	WFC3/IR WFC3/UVIS	2	28-Jul-2022 10:00:19.0	yes
04	(1) LATGRB	WFC3/IR WFC3/UVIS	2	28-Jul-2022 10:00:20.0	yes
A1	(2) GRB-220101A	WFC3/UVIS	1	28-Jul-2022 10:00:20.0	yes
A2	(2) GRB-220101A	WFC3/IR	1	28-Jul-2022 10:00:21.0	yes
A4	(2) GRB-220101A	WFC3/IR	1	28-Jul-2022 10:00:21.0	yes
A3	(2) GRB-220101A	WFC3/UVIS	1	28-Jul-2022 10:00:22.0	yes

11 Total Orbits Used

ABSTRACT

The Fermi Large Area Telescope (LAT) has found a sample of highly relativistic gamma-ray bursts (GRBs), which may be among the most energetic bursts ever discovered. Here we propose to use Chandra and HST to follow the late time X-ray and optical light curves of a LAT detected burst that also has excellent early multiwavelength coverage. Our observations, in conjunction with the Fermi data, will allow us to measure the energy, bulk Lorentz factor, and probe the jet physics of the explosion. Recent work on some of the most powerful GRBs has begun to substantially constrain physical models of the central engine. Our observations may greatly strengthen these constraints as well as provide new insight into the relativistic physics of the bursts.

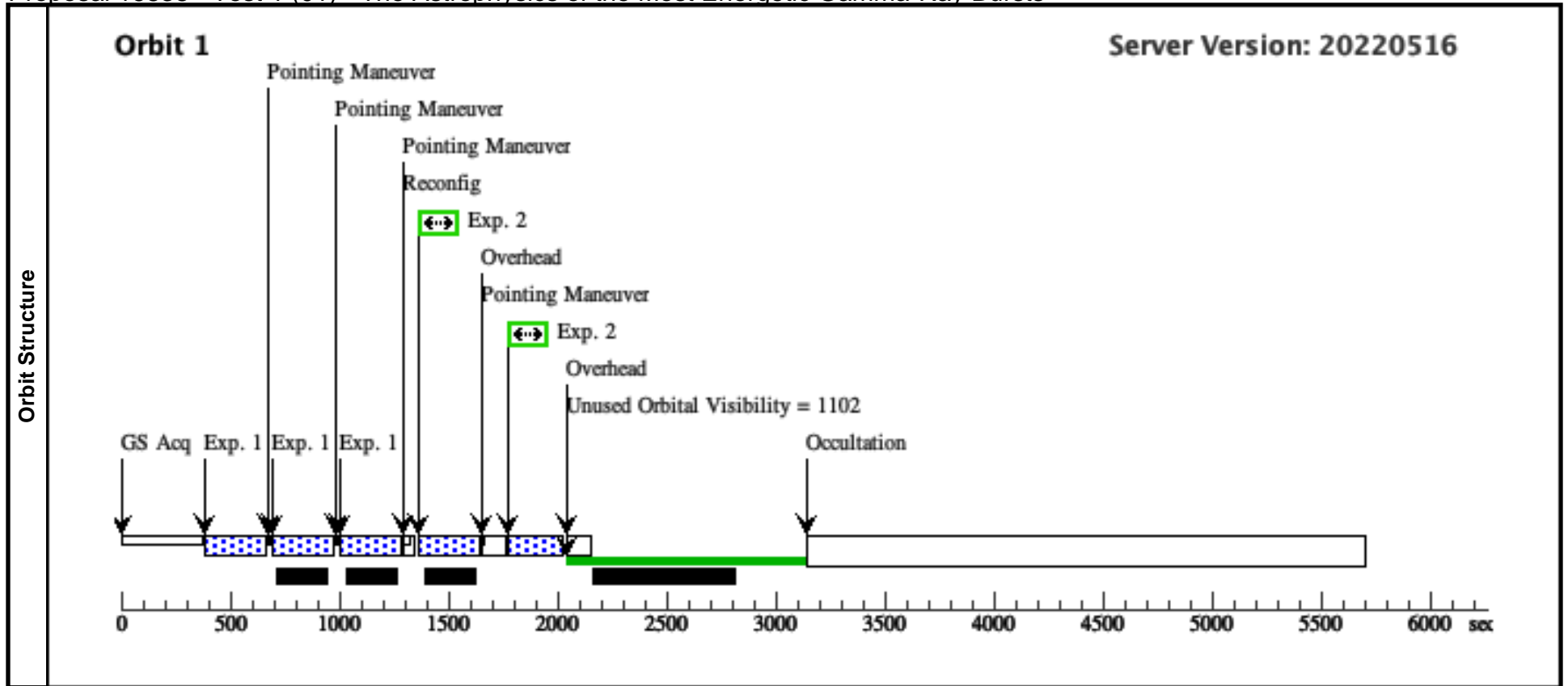
OBSERVING DESCRIPTION

We expect to perform two or three visits with HST on the target GRB. Our default plan is to use both F606W and F160W though the choice of bands will depend on the redshift of the burst and the likelihood of the underlying SN affecting our photometry as well as on the filters used in ground-based follow-up. We will dither to insure good subpixel phase coverage and to reduce issues with bad pixels.

Proposal 16838 - Test 1 (01) - The Astrophysics of the Most Energetic Gamma-Ray Bursts

Thu Jul 28 14:00:22 GMT 2022

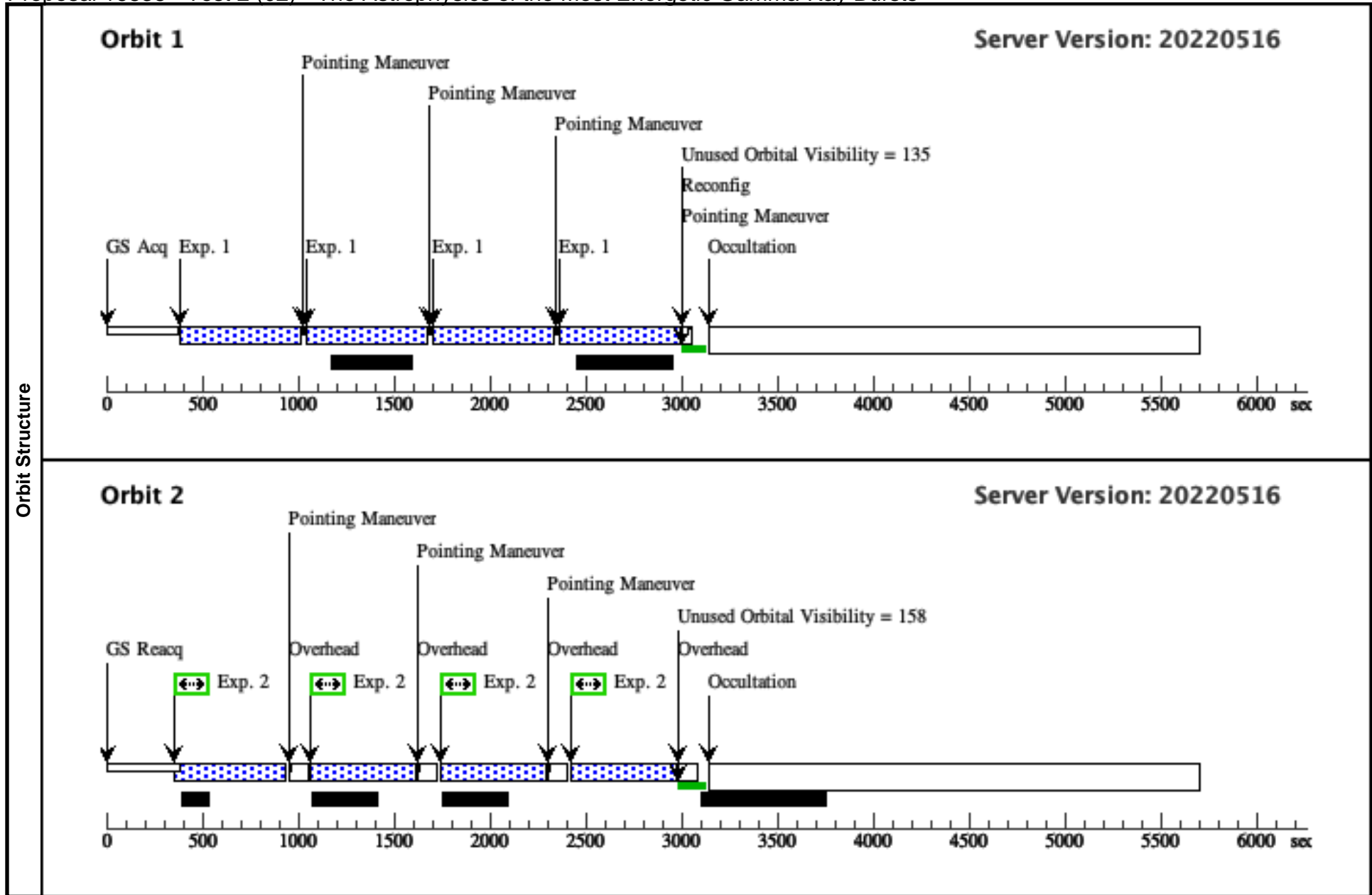
Visit	Proposal 16838, Test 1 (01), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: ON HOLD <i>On Hold Comments: ToO</i>									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(3)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false					(2)	
	(4)	Pattern Type=WFC3-IR-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.605 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false					(1)		
Generic Targets	#	Name	Criteria	Description						
	(1)	LATGRB	Triggered for observation by Chandra	GAMMA RAY BURSTER						
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F160W	(1) LATGRB	WFC3/IR, MULTIACCUM, IR-UVIS	F160W	SAMP-SEQ=STEP5 0; NSAMP=10		Pattern 4, Exps 1-1 in Test 1 (01) (4)	249.23203 Secs (747.696 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[1]
2	F606W	(1) LATGRB	WFC3/UVIS, ACCUM, UVIS2	F606W	FLASH=12		Pattern 3, Exps 2-2 in Test 1 (01) (3)	250 Secs (500 Secs) [=>(Pattern 1)] [=>(Pattern 2)]	[1]	



Proposal 16838 - Test 2 (02) - The Astrophysics of the Most Energetic Gamma-Ray Bursts

Thu Jul 28 14:00:22 GMT 2022

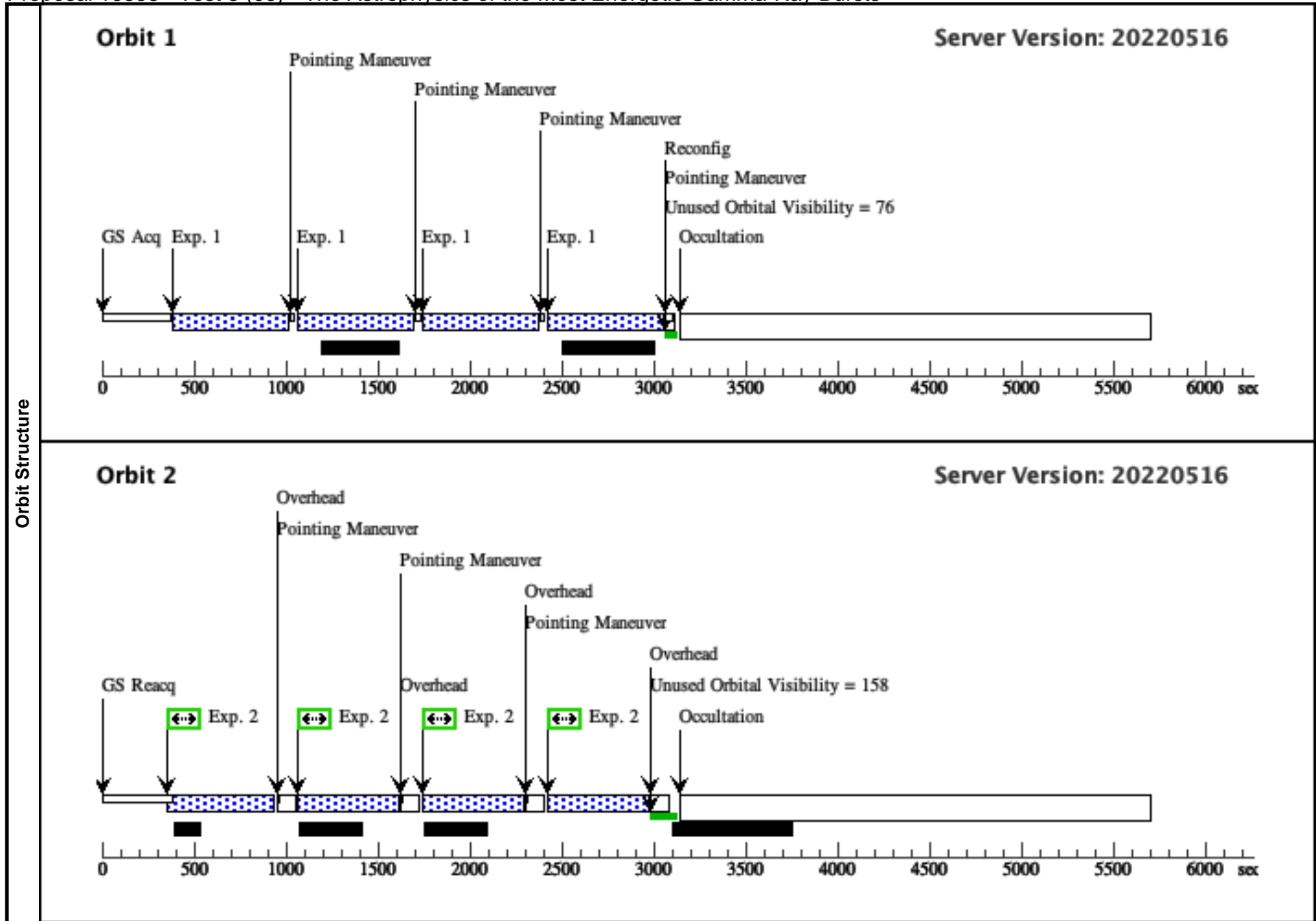
Visit	Proposal 16838, Test 2 (02), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: ON HOLD <i>On Hold Comments: ToO</i>									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
(2)		Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER 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				(2)			
(5)	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)				
Generic Targets	#	Name	Criteria	Description						
	(1)	LATGRB	Triggered for observation by Chandra	GAMMA RAY BURSTER						
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F160W	(1) LATGRB	WFC3/IR, MULTIACCUM, IR-UVIS	F160W	SAMP-SEQ=STEP100; NSAMP=12		Pattern 5, Exps 1-1 in Test 2 (02) (5)	599.232292 Secs (2396.929 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1]
2	F606W	(1) LATGRB	WFC3/UVIS, ACCUM, UVIS2	F606W			Pattern 2, Exps 2-2 in Test 2 (02) (2)	550 Secs (2200 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[2]	



Proposal 16838 - Test 3 (03) - The Astrophysics of the Most Energetic Gamma-Ray Bursts

Thu Jul 28 14:00:22 GMT 2022

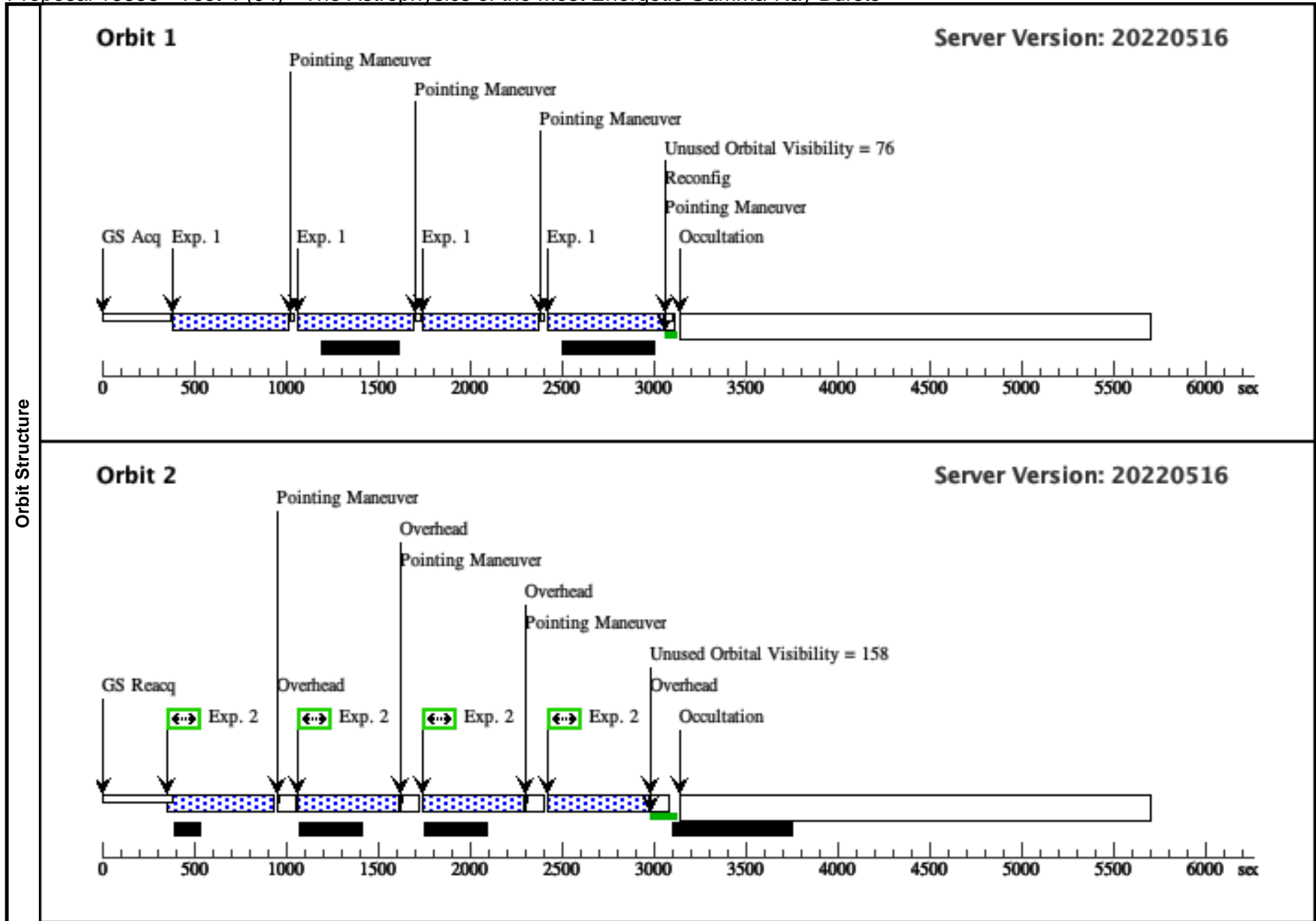
Visit	Proposal 16838, Test 3 (03), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: ON HOLD <i>On Hold Comments: ToO</i>									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(2)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER 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					(2)	
	(6)	Pattern Type=WFC3-IR-DITHER-BOX-UVIS Purpose=DITHER Number Of Points=4 Point Spacing=23.02 Line Spacing=35.212	Coordinate Frame=POS-TARG Pattern Orientation=0.713 Angle Between Sides=89.287 Center Pattern=true					(1)		
Generic Targets	#	Name	Criteria	Description						
	(1)	LATGRB	Triggered for observation by Chandra	GAMMA RAY BURSTER						
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F160W	(1) LATGRB	WFC3/IR, MULTIACCUM, IR-UVIS	F160W	SAMP-SEQ=STEP100; NSAMP=12		Pattern 6, Exps 1-1 in Test 3 (03) (6)	599.232292 Secs (2396.929 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1]
2	F606W	(1) LATGRB	WFC3/UVIS, ACCUM, UVIS2	F606W			Pattern 2, Exps 2-2 in Test 3 (03) (2)	550 Secs (2200 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[2]	



Proposal 16838 - Test 4 (04) - The Astrophysics of the Most Energetic Gamma-Ray Bursts

Thu Jul 28 14:00:23 GMT 2022

Visit	Proposal 16838, Test 4 (04), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: ON HOLD <i>On Hold Comments: ToO</i>									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
(2)		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				(2)			
(6)	Pattern Type=WFC3-IR-DITHER-BOX-UVIS Purpose=DITHER Number Of Points=4 Point Spacing=23.02 Line Spacing=35.212	Coordinate Frame=POS-TARG Pattern Orientation=0.713 Angle Between Sides=89.287 Center Pattern=true				(1)				
Generic Targets	#	Name	Criteria	Description						
	(1)	LATGRB	Triggered for observation by Chandra	GAMMA RAY BURSTER						
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F160W	(1) LATGRB	WFC3/IR, MULTIACCUM, IR-UVIS	F160W	SAMP-SEQ=STEP100; NSAMP=12		Pattern 6, Exps 1-1 in Test 4 (04) (6)	599.232292 Secs (2396.929 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1]
2	F606W	(1) LATGRB	WFC3/UVIS, ACCUM, UVIS2	F606W			Pattern 2, Exps 2-2 in Test 4 (04) (2)	550 Secs (2200 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[2]	



Proposal 16838 - First Epoch Optical (A1) - The Astrophysics of the Most Energetic Gamma-Ray Bursts

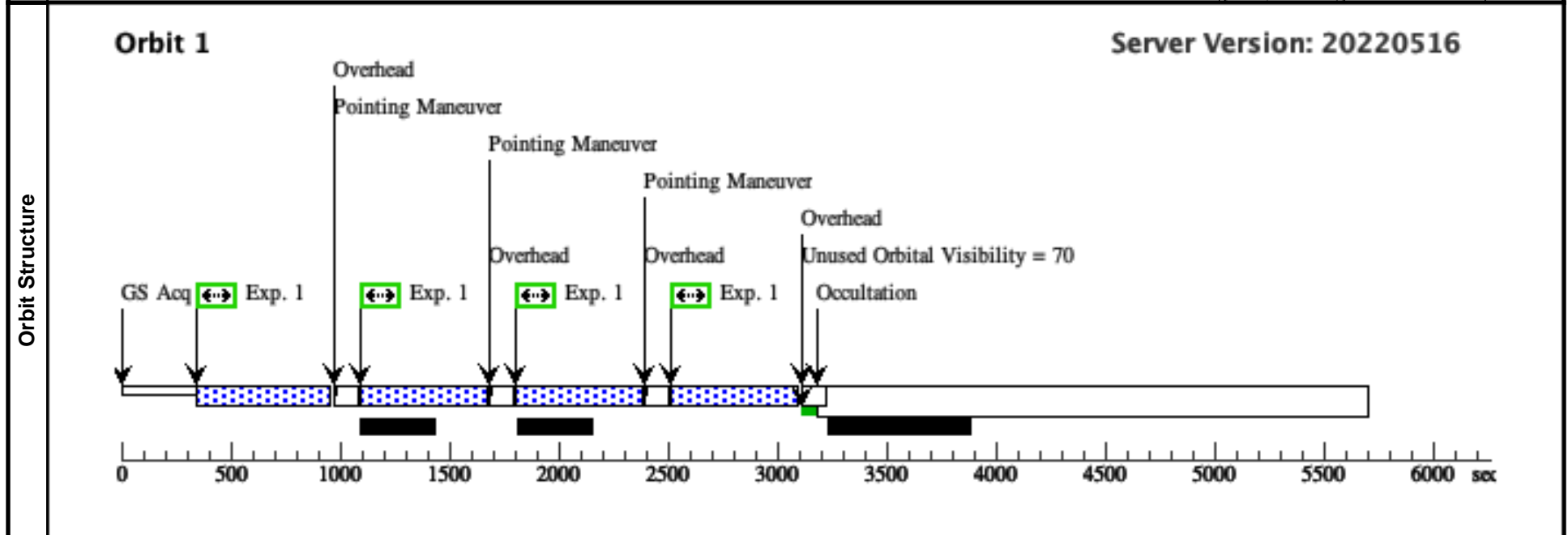
Thu Jul 28 14:00:23 GMT 2022

Visit	Proposal 16838, First Epoch Optical (A1), completed		
	Diagnostic Status: No Diagnostics		
	Scientific Instruments: WFC3/UVIS		
	Special Requirements: BETWEEN 07-FEB-2022:00:00:00 AND 10-FEB-2022:00:00:00		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(2)	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)

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	GRB-220101A	RA: 00 05 24.8160 (1.3534000d) Dec: +31 46 8.30 (31.76897d) Equinox: J2000		V=24	Reference Frame: ICRS
	<i>Comments:</i> Category=EXT-STAR Description=[GAMMA RAY BURSTER] Extended=NO					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(2) GRB-220101A	WFC3/UVIS, ACCUM, UVIS2	F775W	FLASH=6	POS TARG 40,-25	Pattern 2, Exps 1-1 in First Epoch Optical (A1) (2)	580 Secs (2320 Secs)	
									[=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1]



Proposal 16838 - First Epoch IR (A2) - The Astrophysics of the Most Energetic Gamma-Ray Bursts

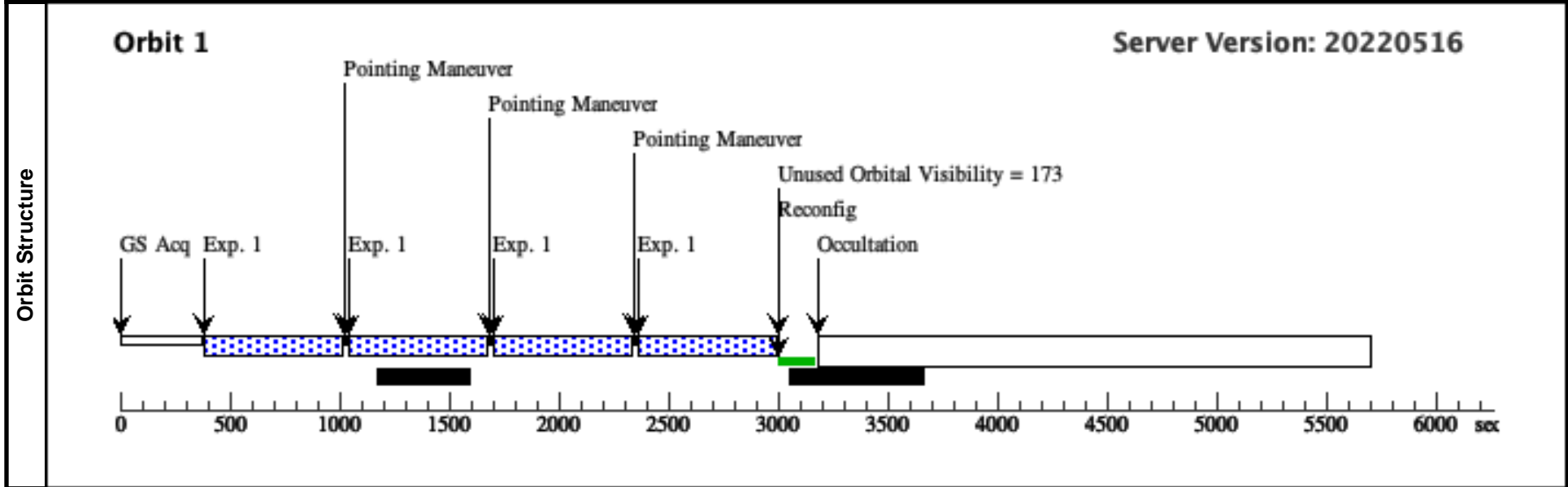
Thu Jul 28 14:00:23 GMT 2022

Visit	Proposal 16838, First Epoch IR (A2), completed Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: AFTER A1 BY 0 D TO 2 D; GROUP A2.A1 WITHIN 2D		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(5)	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)

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	GRB-220101A	RA: 00 05 24.8160 (1.3534000d) Dec: +31 46 8.30 (31.76897d) Equinox: J2000		V=24	Reference Frame: ICRS
	<i>Comments:</i> Category=EXT-STAR Description=[GAMMA RAY BURSTER] Extended=NO					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(2) GRB-220101A	WFC3/IR, MULTIACCUM, IR	F125W	SAMP-SEQ=STEP100; NSAMP=12			Pattern 5, Exps 1-1 in First Epoch IR (A2) (5)	599.232292 Secs (2396.929 Secs)	[1]
									[=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	



Proposal 16838 - Second Epoch IR (A4) - The Astrophysics of the Most Energetic Gamma-Ray Bursts

Thu Jul 28 14:00:23 GMT 2022

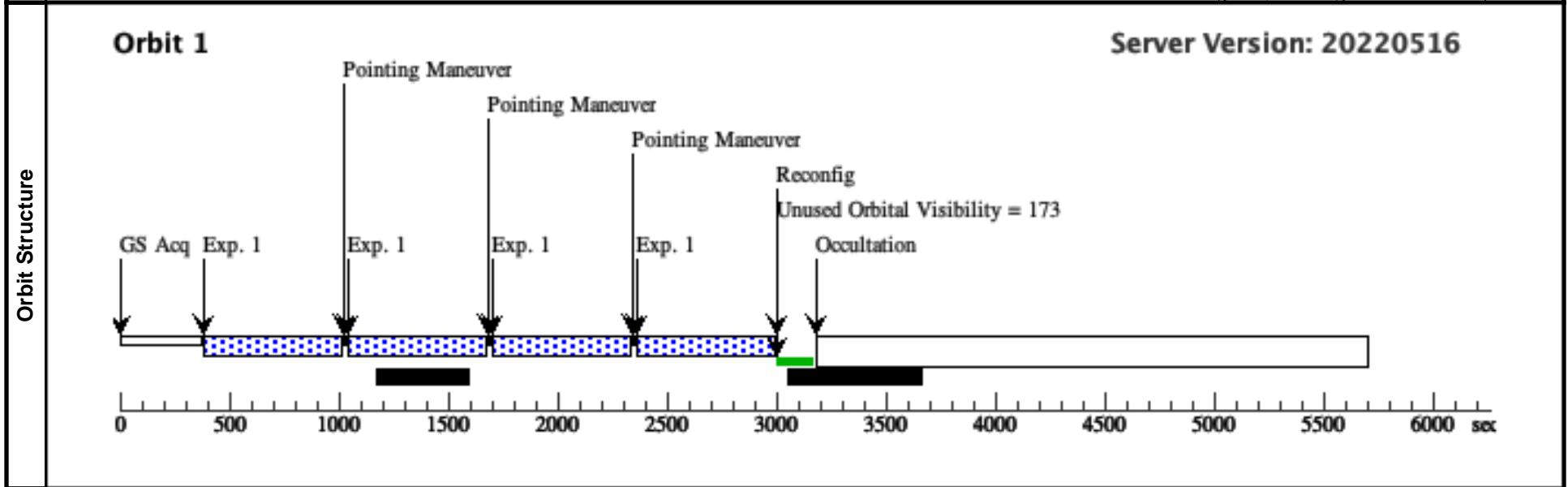
Visit	Proposal 16838, Second Epoch IR (A4) Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: ORIENT 225.93D TO 225.93 D		
--------------	--	--	--

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(5)	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)

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	GRB-220101A	RA: 00 05 24.8160 (1.3534000d) Dec: +31 46 8.30 (31.76897d) Equinox: J2000		V=24	Reference Frame: ICRS

Comments:
 Category=EXT-STAR
 Description=[GAMMA RAY BURSTER]
 Extended=NO

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(2) GRB-220101A	(2) GRB-220101A	WFC3/IR, MULTIACCUM, IR	F125W	SAMP-SEQ=STEP100; NSAMP=12		Pattern 5, Exps 1-1 in Second Epoch IR (A4) (5)	599.232292 Secs (2396.929 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]



Proposal 16838 - Second Epoch Optical (A3) - The Astrophysics of the Most Energetic Gamma-Ray Bursts

Thu Jul 28 14:00:23 GMT 2022

Visit	Proposal 16838, Second Epoch Optical (A3) Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 225.95D TO 225.95 D										
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
(2)		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)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes	Miscellaneous			
	(2)	GRB-220101A	RA: 00 05 24.8160 (1.3534000d) Dec: +31 46 8.30 (31.76897d) Equinox: J2000				V=24	Reference Frame: ICRS			
Comments: Category=EXT-STAR Description=[GAMMA RAY BURSTER] Extended=NO											
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	(2) GRB-220101A	WFC3/UVIS, ACCUM, UVIS1	F775W	FLASH=7	POS TARG -40,25	Pattern 2, Exps 1-1 i n Second Epoch Opti cal (A3) (2)	550 Secs (2200 Secs)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]		[1]

