13950 - The Astrophysics of the Most Energetic Gamma-Ray Bursts

Cycle: 22, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Andrew S. Fruchter (PI) (Contact)	**Space Telescope Science Institute**	**fruchter@stsci.edu**
Dr. Rebekah Hounsell (CoI)	University of Illinois at Urbana - Champaign	rebekahhounsell@gmail.com
Dr. Daniel Perley (CoI) (ESA Member)	University of Copenhagen, Niels Bohr Institute	dperley@dark-cosmology.dk
Dr. Kuntal Misra (CoI)	Aryabhatta Research Institute of Observational Sci	kuntal@aries.res.in
Dr. John F. Graham (CoI) (ESA Member)	Max-Planck-Institut fur extraterrestrische Physik	graham@mpe.mpg.de
Dr. Asaf Peer (CoI) (ESA Member)	University College Cork	a.peer@ucc.ie
Dr. Stephen T. Holland (CoI)	Eureka Scientific Inc.	stephenastronomy@gmail.com
Prof. Nial R. Tanvir (CoI) (ESA Member)	University of Leicester	nrt3@star.le.ac.uk
Prof. Andrew J. Levan (CoI) (ESA Member)	The University of Warwick	a.j.levan@warwick.ac.uk
Dr. Stephen Bradley Cenko (CoI)	NASA Goddard Space Flight Center	brad.cenko@nasa.gov

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
02	(1) GRB-150314A	WFC3/UVIS	2	01-Apr-2016 21:02:03.0	yes
03	(1) GRB-150314A	WFC3/UVIS	4	01-Apr-2016 21:02:05.0	yes
06	(1) GRB-150314A	WFC3/UVIS	4	01-Apr-2016 21:02:07.0	yes
04	(1) GRB-150314A	WFC3/IR WFC3/UVIS	3	01-Apr-2016 21:02:08.0	yes
05	(1) GRB-150314A	WFC3/IR WFC3/UVIS	3	01-Apr-2016 21:02:09.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
07	(1) GRB-150314A	WFC3/IR	1	01-Apr-2016 21:02:10.0	yes

17 Total Orbits Used

ABSTRACT

The Large Area Telescope (LAT) of Fermi 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 and the bulk Lorentz factor of the explosion. Recent work on some of the most powerful GRBs begins to substantially constrain physical models of the progenitors. The energetics of the highly relativistic LAT bursts may greatly strengthen these constraints and provide new insight into the currently unknown mechanism that determines the energy of a GRB.

OBSERVING DESCRIPTION

We plan five visits with HST: the first an orbit long, the second and third each two orbits long, with the fourth and fith three orbits long. The first visit will occur about around twenty days after outburst. The second will be around forty days after outburst. The third 80 days and the fourth 160. The exact times will be scaled according to the decay seen from the ground. The fith visit will be taken at least nine months after the burst to allow an accurate host subtraction. We will use the UVIS camera on WFC3 because WFC3 easily has as good sensitivity on point sources as ACS with smaller detector-induced noise sources (CTE, bias-striping, etc). We will choose the filter at the time of the ToO to match the best observed band from the ground (most likely a red band) and to avoid a SN contribution if possible.

Visit

Proposal 13950, GRB-150314A (02), completed Sat Apr 02 01:02:11 GMT 2016

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 31D TO 90 D; ORIENT 121D TO 180 D; ORIENT 211D TO 270 D; ORIENT 301D TO 360 D; BEFORE 01-APR-2015:00:00:00

Diagnostics

(GRB-150314A (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(GRB-150314A (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	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)

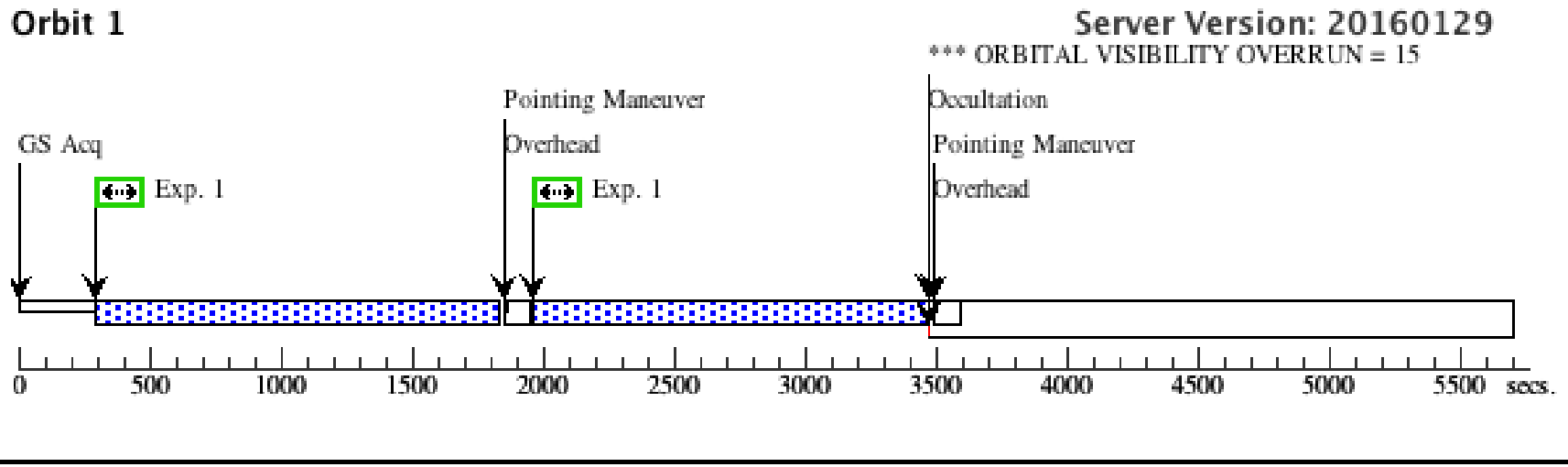
Fixed Targets

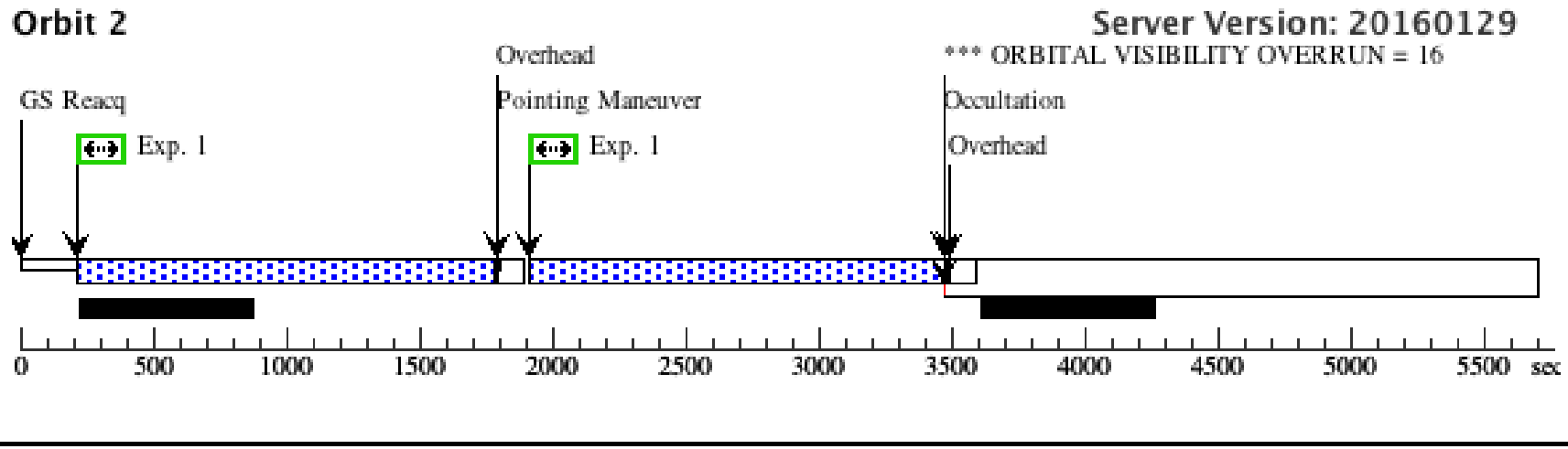
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB-150314A	RA: 08 26 40.9700 (126.6707083d) Dec: +63 50 3.29 (63.83425d) Equinox: J2000		V=22+/-1	Reference Frame: XRT

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F606W	(1) GRB-150314A	WFC3/UVIS, ACCUM, UVIS2	F606W		POS TARG 40,-25	Pattern 1, Exps 1-1 in GRB-150314A (02) (1)	1500 Secs (6160 Secs)	
								[==>1512.0 Secs (Pattern 1)] *[==>1512.0 Secs (Pattern 2)]*	***[1]***
								[==>1568.0 Secs (Pattern 3)] *[==>1568.0 Secs (Pattern 4)]*	***[2]***

Orbit Structure





Visit

Proposal 13950, Epoch 3 (03), completed Sat Apr 02 01:02:12 GMT 2016

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 112D TO 130 D

Diagnostics

(Epoch 3 (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN
(Epoch 3 (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN
(Epoch 3 (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN
(Epoch 3 (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(7)	Pattern Type=LINE Purpose=DITHER Number Of Points=2 Point Spacing=.1305 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)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB-150314A	RA: 08 26 40.9700 (126.6707083d) Dec: +63 50 3.29 (63.83425d) Equinox: J2000		V=22+/-1	Reference Frame: XRT

Exposures

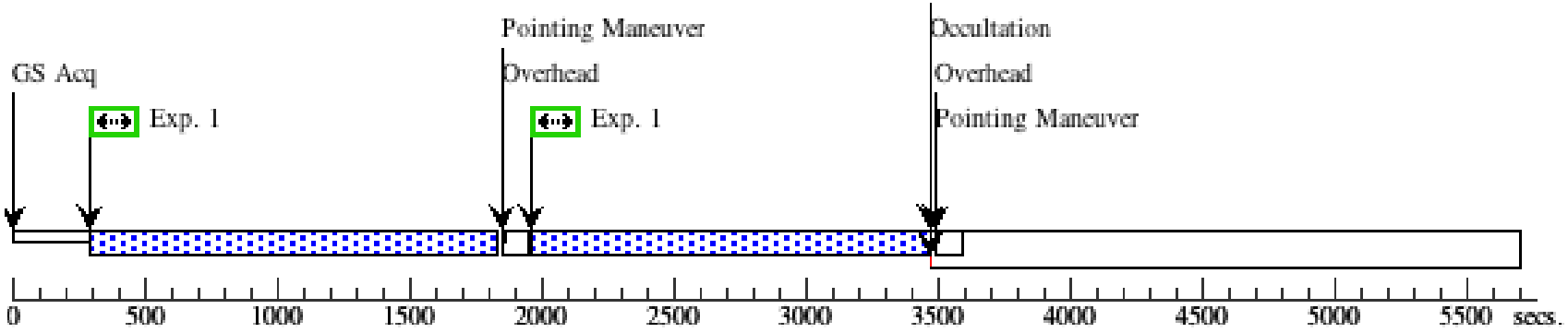
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F606W	(1) GRB-150314A	WFC3/UVIS, ACCUM, UVIS2	F606W		POS TARG 40,-25	Pattern 7, Exps 1-1 in Epoch 3 (03) (7)	1500 Secs (12432 Secs)	
								[==>1512.0 Secs (Pattern 1,1)] *[==>1512.0 Secs (Pattern 1,2)]*	***[1]***
								[==>1568.0 Secs (Pattern 1,3)] *[==>1568.0 Secs (Pattern 1,4)]*	***[2]***
								[==>1568.0 Secs (Pattern 2,1)] *[==>1568.0 Secs (Pattern 2,2)]*	***[3]***
								[==>1568.0 Secs (Pattern 2,3)] *[==>1568.0 Secs (Pattern 2,4)]*	***[4]***

Orbit Structure

Orbit 1

Server Version: 20160129

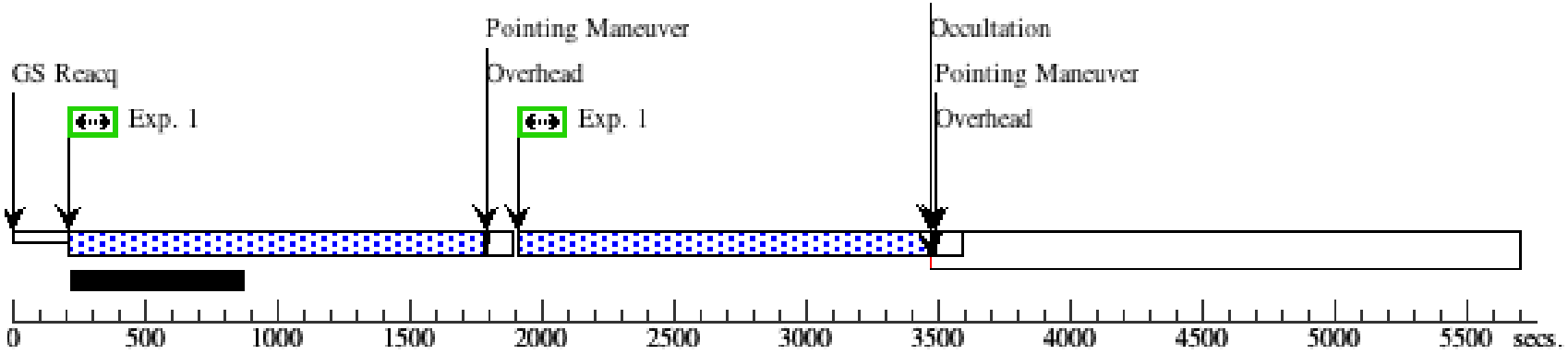
*** ORBITAL VISIBILITY OVERRUN = 15

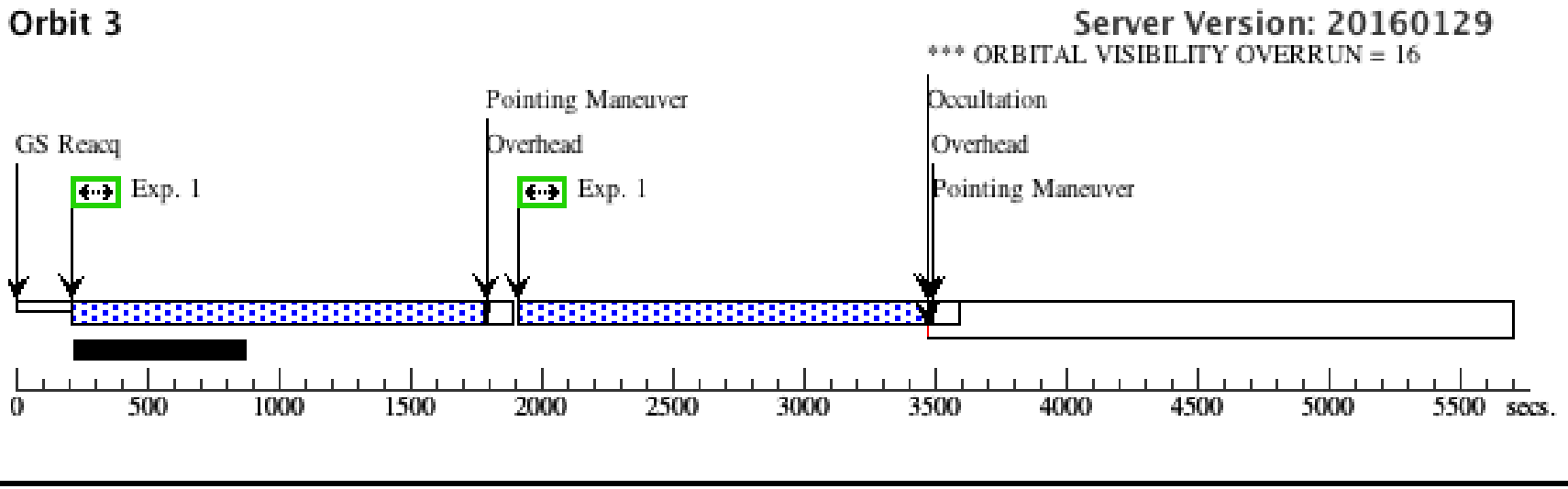


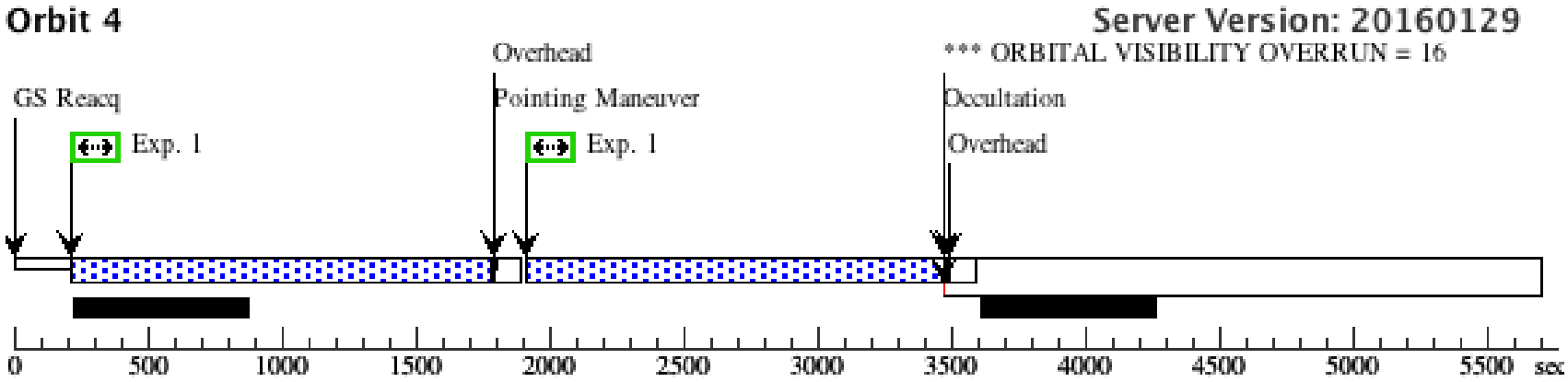
Orbit 2

Server Version: 20160129

*** ORBITAL VISIBILITY OVERRUN = 16




Orbit 3
Server Version: 20160129
*** ORBITAL VISIBILITY OVERRUN = 16
GS Reacq
Exp. 1
Pointing Maneuver
Overhead
Exp. 1
Occultation
Overhead
Pointing Maneuver
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 4
Server Version: 20160129
*** ORBITAL VISIBILITY OVERRUN = 16
GS Reacq
Exp. 1
Overhead
Pointing Maneuver
Exp. 1
Occultation
Overhead
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 13950, GRB 150314A UVIS Reference (06) Sat Apr 02 01:02:12 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 100D TO 112 D

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(7)	Pattern Type=LINE Purpose=DITHER Number Of Points=2 Point Spacing=.1305 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)

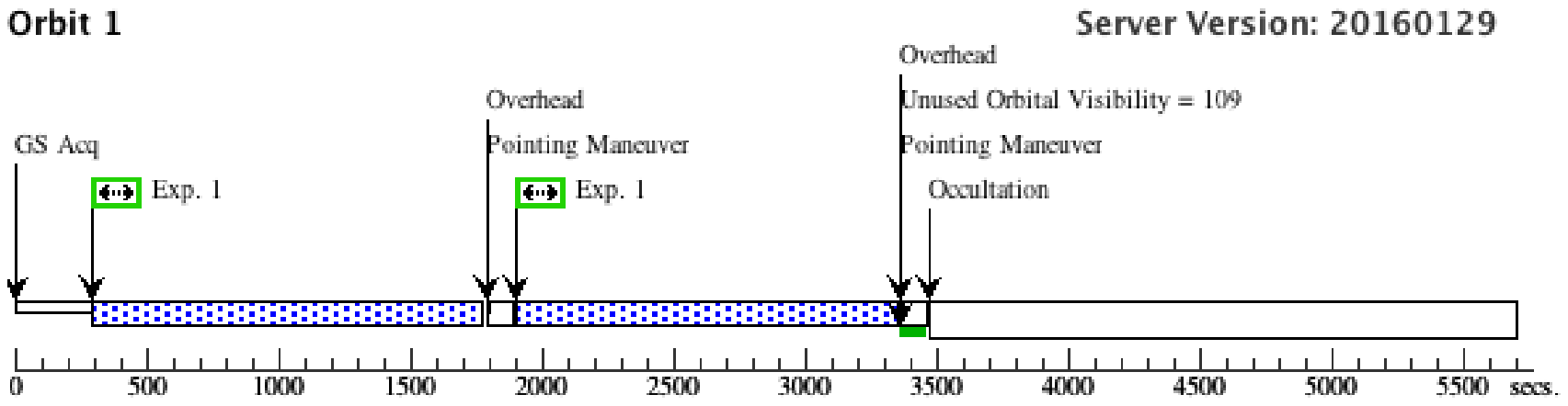
Fixed Targets

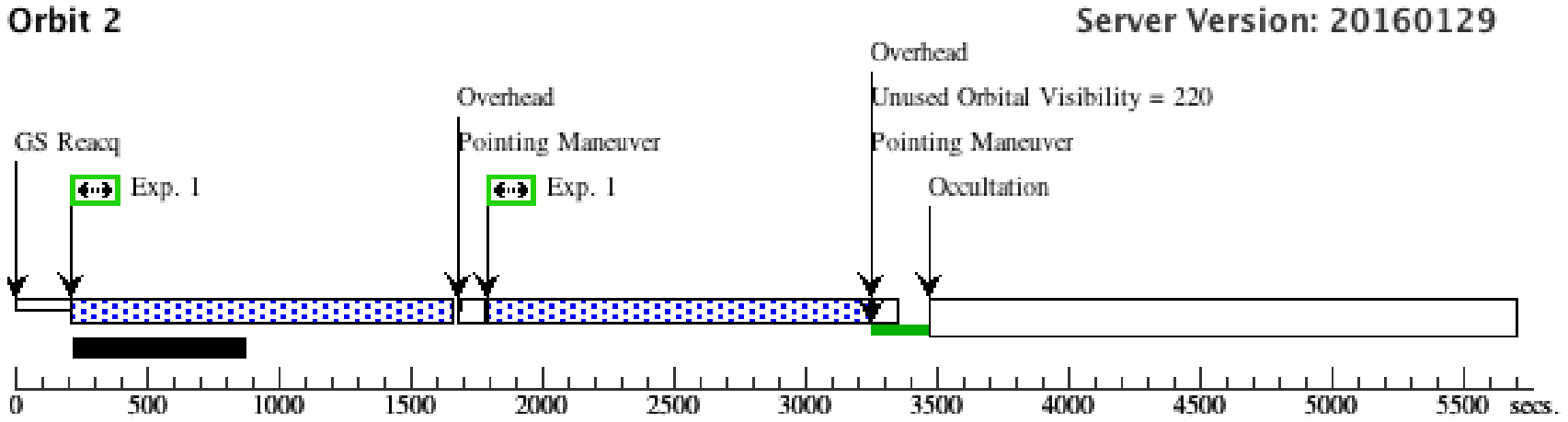
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB-150314A	RA: 08 26 40.9700 (126.6707083d) Dec: +63 50 3.29 (63.83425d) Equinox: J2000		V=22+/-1	Reference Frame: XRT

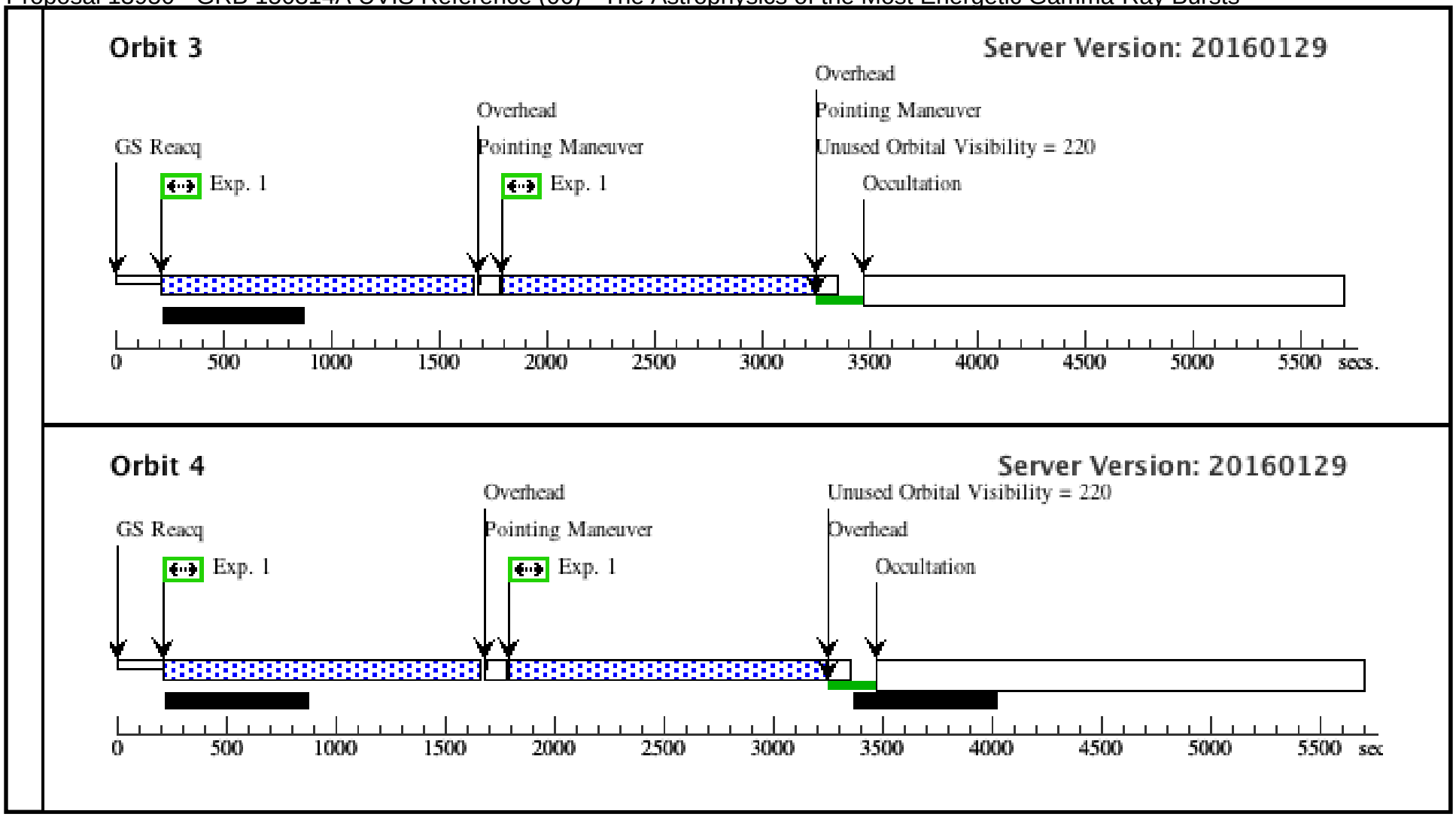
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F606W	(1) GRB-150314A	WFC3/UVIS, ACCUM, UVIS2	F606W		POS TARG 40,-25	Pattern 7, Exps 1-1 in GRB 150314A UVIS Reference (06) (7)	1450 Secs (11600 Secs)	
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]*	***[1]***
								[==>(Pattern 1,3)] *[==>(Pattern 1,4)]*	***[2]***
								[==>(Pattern 2,1)] *[==>(Pattern 2,2)]*	***[3]***
								[==>(Pattern 2,3)] *[==>(Pattern 2,4)]*	***[4]***

Orbit Structure






Orbit 3
Server Version: 20160129
GS Reacq
Exp. 1
Overhead
Pointing Maneuver
Exp. 1
Overhead
Pointing Maneuver
Unused Orbital Visibility = 220
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 4
Server Version: 20160129
GS Reacq
Exp. 1
Overhead
Pointing Maneuver
Exp. 1
Unused Orbital Visibility = 220
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 13950, Epoch 4 (04), withdrawn Sat Apr 02 01:02:12 GMT 2016

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: (none)

Comments: The F606W dither pattern is a place holder. If we use these exposure lengths we will want more dithers in F606W.

Diagnostics

(Epoch 4 (04)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 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)

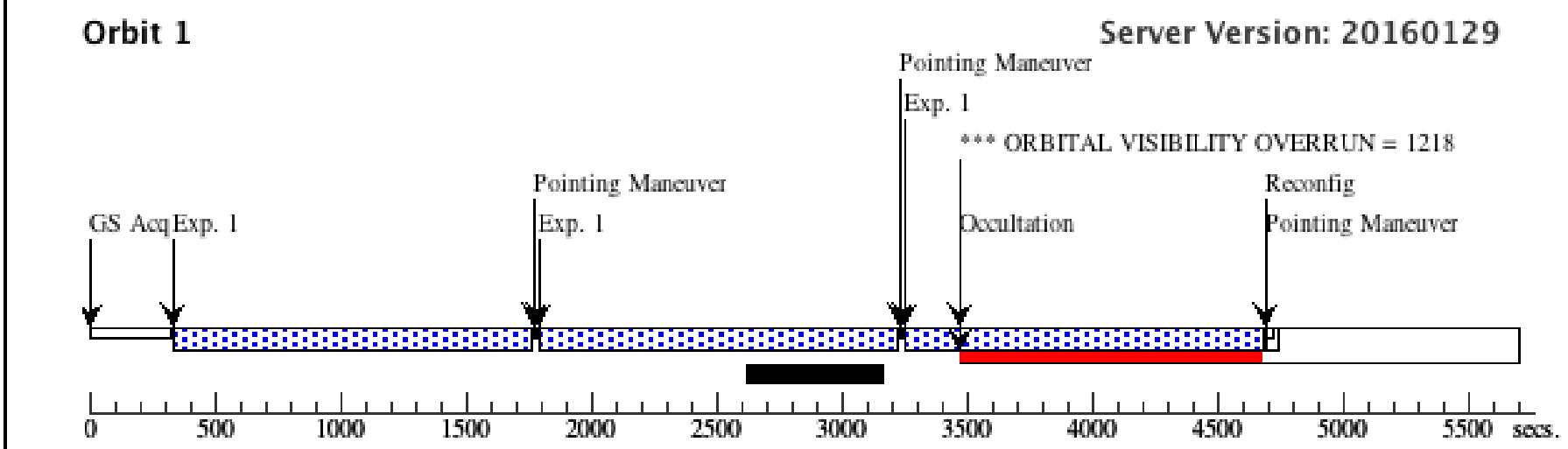
Fixed Targets

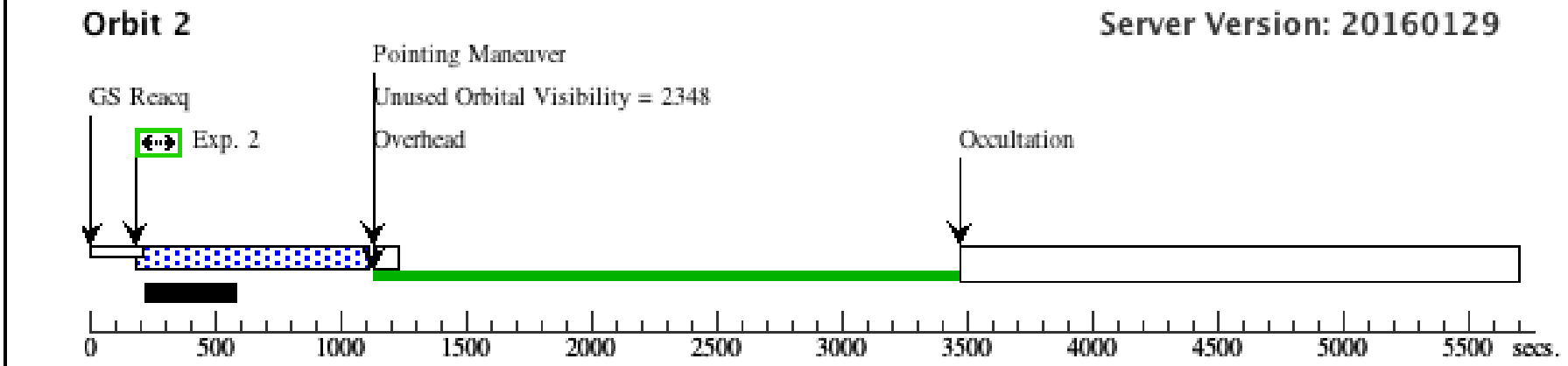
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB-150314A	RA: 08 26 40.9700 (126.6707083d) Dec: +63 50 3.29 (63.83425d) Equinox: J2000		V=22+/-1	Reference Frame: XRT

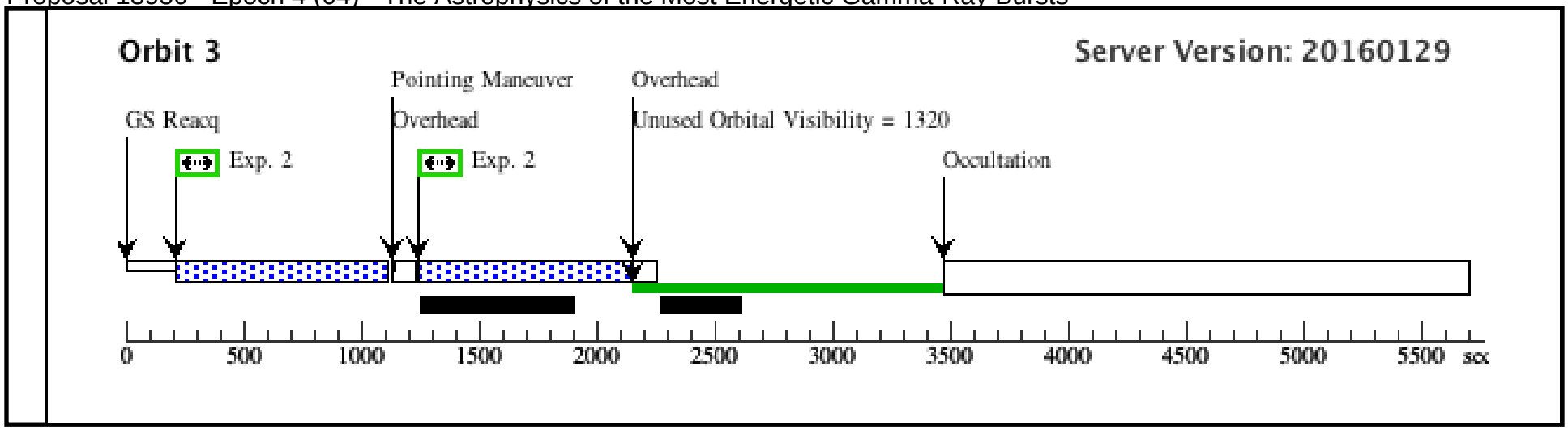
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F160W	(1) GRB-150314A	WFC3/IR, MULTIACCUM, IR-UVIS	F160W	NSAMP=14; SAMP-SEQ=STEP200		Pattern 4, Exps 1-1 in Epoch 4 (04) (4)	1399.231402 Secs (4197.694 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
2	F606W	(1) GRB-150314A	WFC3/UVIS, ACCUM, UVIS2	F606W			Pattern 3, Exps 2-2 in Epoch 4 (04) (3)	900 Secs (2700 Secs)	
								[==>(Pattern 1)]	***[2]***
								[==>(Pattern 2)] *[==>(Pattern 3)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20160129
Pointing Maneuver
Overhead
GS Reacq
Overhead
Unused Orbital Visibility = 1320
Exp. 2
Exp. 2
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 13950, Epoch 5 (05), withdrawn Sat Apr 02 01:02:12 GMT 2016

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: (none)

Comments: The F606W dither pattern is a place holder. If we use these exposure lengths we will want more dithers in F606W.

Diagnostics

(Epoch 5 (05)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 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)

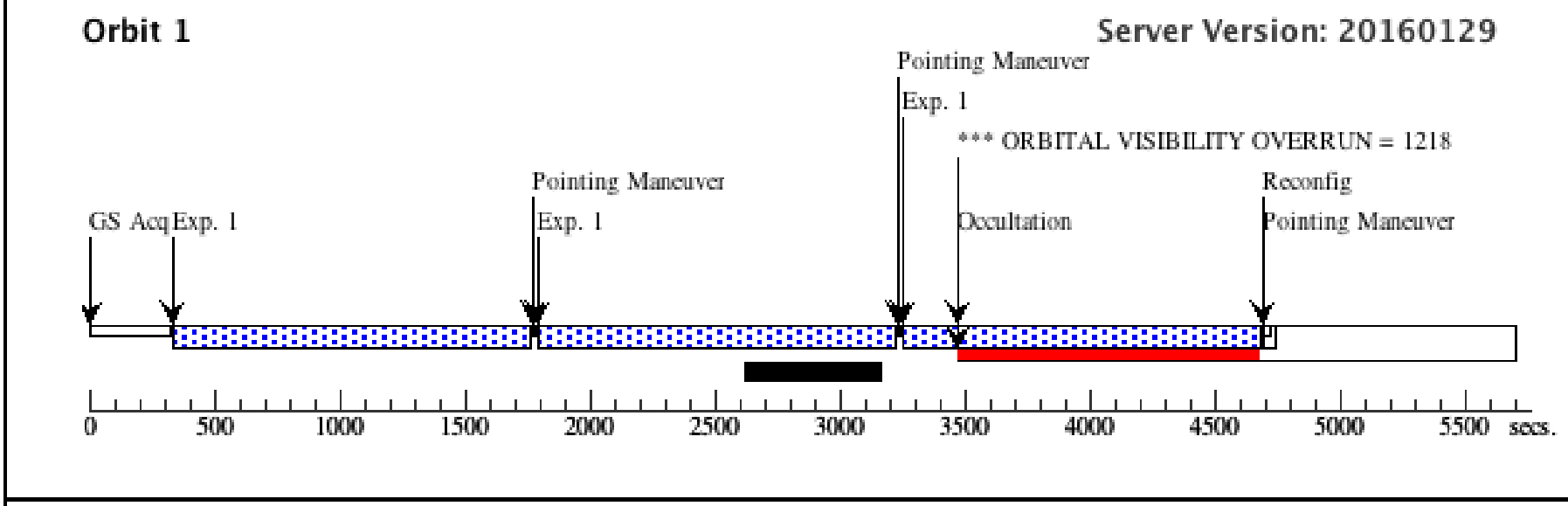
Fixed Targets

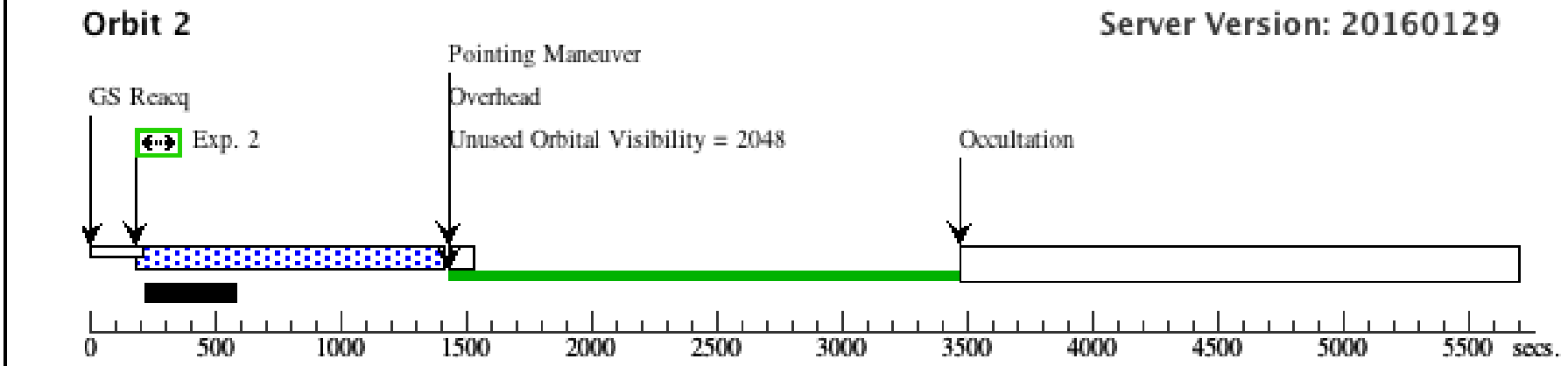
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB-150314A	RA: 08 26 40.9700 (126.6707083d) Dec: +63 50 3.29 (63.83425d) Equinox: J2000		V=22+/-1	Reference Frame: XRT

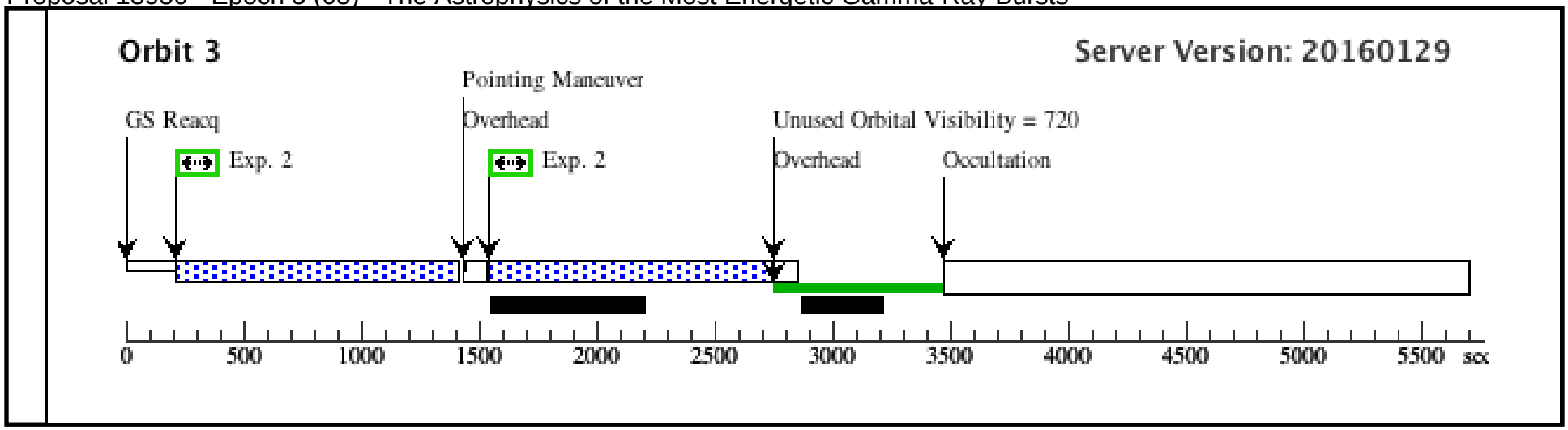
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F160W	(1) GRB-150314A	WFC3/IR, MULTIACCUM, IR-UVIS	F160W	NSAMP=14; SAMP-SEQ=STEP200		Pattern 4, Exps 1-1 in Epoch 5 (05) (4)	1399.231402 Secs (4197.694 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
2	F606W	(1) GRB-150314A	WFC3/UVIS, ACCUM, UVIS2	F606W			Pattern 3, Exps 2-2 in Epoch 5 (05) (3)	1200 Secs (3600 Secs)	
								[==>(Pattern 1)]	***[2]***
								[==>(Pattern 2)] *[==>(Pattern 3)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20160129
Pointing Maneuver
GS Reacq
Overhead
Unused Orbital Visibility = 720
Exp. 2
Exp. 2
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 13950, GRB 150314A IR FIELD (07) Sat Apr 02 01:02:12 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: BETWEEN 01-APR-2016 AND 01-JUN-2016

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	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
(1)	GRB-150314A	RA: 08 26 40.9700 (126.6707083d) Dec: +63 50 3.29 (63.83425d) Equinox: J2000		V=22+/-1	Reference Frame: XRT

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB-150314A	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=13; SAMP-SEQ=STEP100		Pattern 2, Exps 1-1 in GRB 150314A IR FIELD (07) (2)	699.232615 Secs (2796.93 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure