17909 - Rest-Frame [O III] Imaging of Post-Starburst TDE Hosts with Extended Emission Line Regions

Cycle: 32, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Dr. Jason Hinkle (PI) (Contact)	**University of Illinois at Urbana - Champaign**
Prof. Benjamin John Shappee (CoI)	University of Hawaii

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) ASASSN-14LI-HOST	ACS/WFC	4	05-May-2026 12:00:13.0	yes
02	(2) IPTF16FNL-HOST	ACS/WFC	3	05-May-2026 12:00:14.0	yes
03	(3) ASASSN-19DJ-HOST	ACS/WFC	1	05-May-2026 12:00:14.0	yes
2A	(2) IPTF16FNL-HOST	ACS/WFC	2	05-May-2026 12:00:15.0	yes

10 Total Orbits Used

ABSTRACT

Post-starburst galaxies, with little current star formation but evidence of a recent large burst, are promising probes of the transition between star-forming and quiescent galaxies. The cause of the rapid quenching of star formation is debated, with gas-rich mergers, stellar feedback, and active galactic nucleus (AGN) feedback all plausible explanations. Recent studies have discovered extended [O III] emission line regions (EELRs) in several post-starburst galaxies, inconsistent with current AGN activity but compatible with AGN activity over the past several thousand years. Interestingly, many post-starburst galaxies with EELRs have also been hosts to recent tidal disruption events (TDEs), a transient class for which post-

starburst galaxies are highly overrepresented as host galaxies. Here we propose to obtain an epoch of narrow-band rest-frame [O III] (FR505N) and medium-band continuum (FR647M) imaging of three post-starburst TDE hosts with observed EELRs to more finely map their spatial distribution. These observations require the use of the ramp filters on ACS/WFC. The high spatial resolution [O III] images will address important questions about the interplay between AGN activity and the nature of post-starburst galaxies. We will (1) test the possibility that TDEs power the EELRs through a search for shells of emission, (2) constrain the AGN active lifetime from the most distant EELR, and (3) provide insight into the connection between diverse forms of nuclear SMBH activity like AGNs, TDEs, and quasi-periodic eruptions.

OBSERVING DESCRIPTION

This program aims to observe extended emission line regions (EELRs) in three nearby TDE host galaxies. The three host galaxies are those of ASASSN-14li, iPTF16fl, and ASASSN-19dj. Each has exisiting IFU data showing the prescence and distribution of known EELRs. These HST ACS/WFC data will dramatically increase the spatial resolution with which we can measure the difuse [O III] flux in addition to modestly expanding the field of view allowing us to observe more distant EELRs.

We will use the FR505N ramp filter of ACS/WFC to obtain rest-frame [O III] imaging for these host galaixes. For the redshifts of the hosts, ASASSN-14li (z = 0.0206), iPTF16fnl (z = 0.016328), and ASASSN-19dj (z = 0.022346), the strong [O III] line at lambda = 5007 is at an observed wavelength of 5110 A, 5089 A, and 5119 A respectively, all accessible to FR505N. Given the low equivalent widths of some known EELRs, we additionally will use the FR647M ramp filter to measure the spatial distribution of the stellar continuum emission, which can then be subtracted to yield an [O III]-only image.

The known EELR positions for ASASSN-14li and ASASSN-19dj allow for any orientation to capture the EELRs within the monochromatic extent of the ramp filters. However, the known positions of EELRs in the host galaxy of iPTF16fnl means that some orientation angles will exclude known regions. Using APT and the WFC1-MRAMPQ aperture for the FR505N filter, we find that orient ranges of 75 - 130 degrees and 255 - 310 degrees will include the known EELRs within the monochromatic extent of FR505N. Other orientations will miss more distant EELRs and are therefore not feasible. We have maximized the acceptable orient range to increase the schedulability of the observations.

Visit

Proposal 17909, ASASSN-14li_imaging (01), completed Tue May 05 16:00:15 GMT 2026

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Diagnostics

(ASASSN-14li_imaging (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(ASASSN-14li_imaging (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(ASASSN-14li_imaging (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(ASASSN-14li_imaging (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(14li-line1 (01.001)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(14li-line2 (01.002)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(14li-line3 (01.003)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(14li-continuum (01.004)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.125 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=135 Angle Between Sides= Center Pattern=false		(1), (2), (4)
(3)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.125 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=135 Angle Between Sides= Center Pattern=false		(3)

Fixed Targets

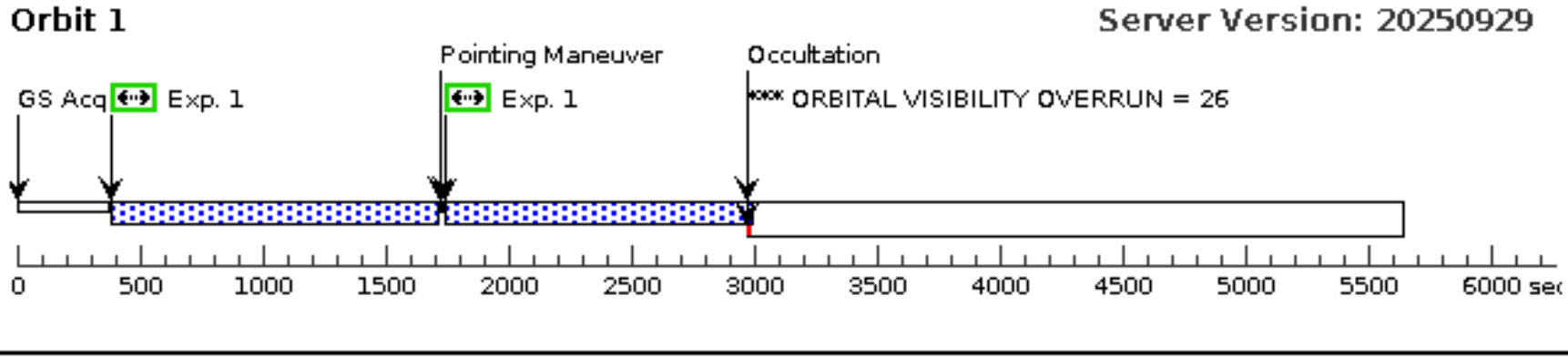
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	ASASSN-14LI-HOST	RA: 12 48 15.2300 (192.0634583d) Dec: +17 46 26.44 (17.77401d) Equinox: J2000		V=15.45+/-0.05 Host-galaxy V-band magnitude estimated from ASAS-SN light curve.	Reference Frame: ICRS

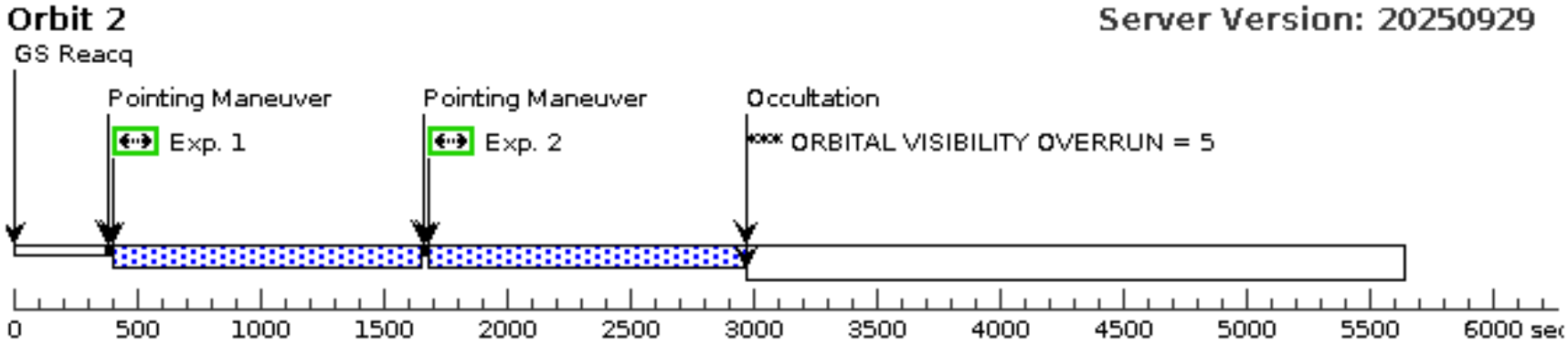
Comments:
Category=GALAXY
Description=[ELLIPTICAL, SHELL]
Extended=YES

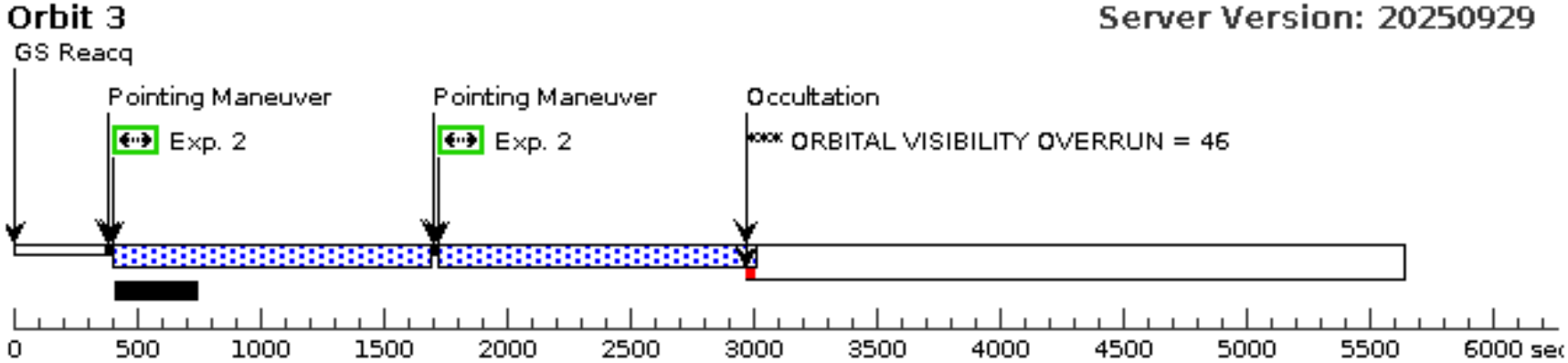
Exposures

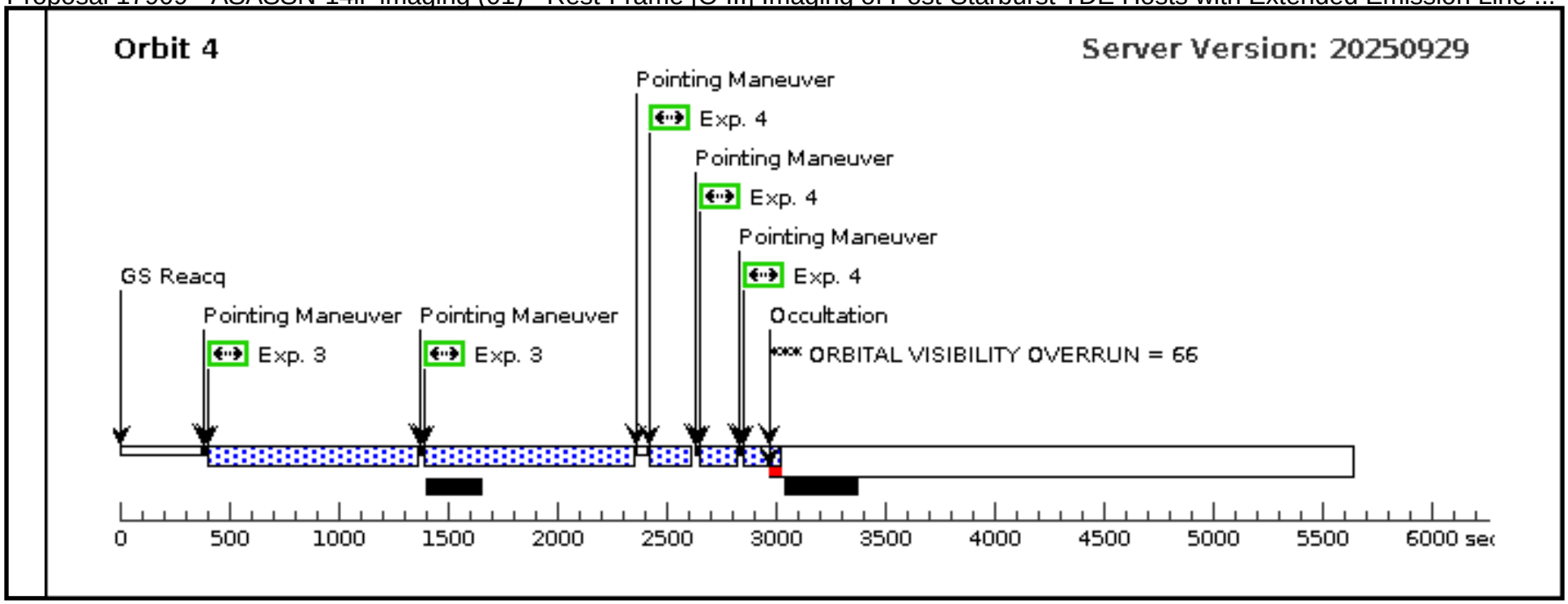
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	14li-line1 (ACS.rf.1941959)	(1) ASASSN-14LI-HOST	ACS/WFC, ACCUM, WFC1-MRAMPQ	FR505N 5110 A	FLASH=20		Pattern 2, Exps 1-1 in ASASSN-14li_imaging (01) (2)	1115 Secs (3345 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	 ***[1]*** ***[2]***
2	14li-line2 (ACS.rf.1941959)	(1) ASASSN-14LI-HOST	ACS/WFC, ACCUM, WFC1-MRAMPQ	FR505N 5110 A	FLASH=20		Pattern 2, Exps 2-2 in ASASSN-14li_imaging (01) (2)	1156 Secs (3468 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	 ***[2]*** ***[3]***
3	14li-line3 (ACS.rf.1941959)	(1) ASASSN-14LI-HOST	ACS/WFC, ACCUM, WFC1-MRAMPQ	FR505N 5110 A	FLASH=20		Pattern 3, Exps 3-3 in ASASSN-14li_imaging (01) (3)	826 Secs (1652 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	 ***[4]***
4	14li-continuum (ACS.rf.1942233)	(1) ASASSN-14LI-HOST	ACS/WFC, ACCUM, WFC1-IRAMPQ	FR647M 5750 A	FLASH=20		Pattern 2, Exps 4-4 in ASASSN-14li_imaging (01) (2)	37 Secs (111 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	 ***[4]***

Orbit Structure





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Occultation
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Visit

Proposal 17909, iPTF16fnl_imaging (02), failed Tue May 05 16:00:15 GMT 2026

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 75D TO 130 D; ORIENT 255D TO 310 D

Diagnostics

(iPTF16fnl_imaging (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(iPTF16fnl_imaging (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(iPTF16fnl_imaging (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(16fnl-line1 (02.001)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(16fnl-line2 (02.002)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(16fnl-line3 (02.003)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(16fnl-continuum (02.004)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.125 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=135 Angle Between Sides= Center Pattern=false		(1), (2), (3), (4)

Fixed Targets

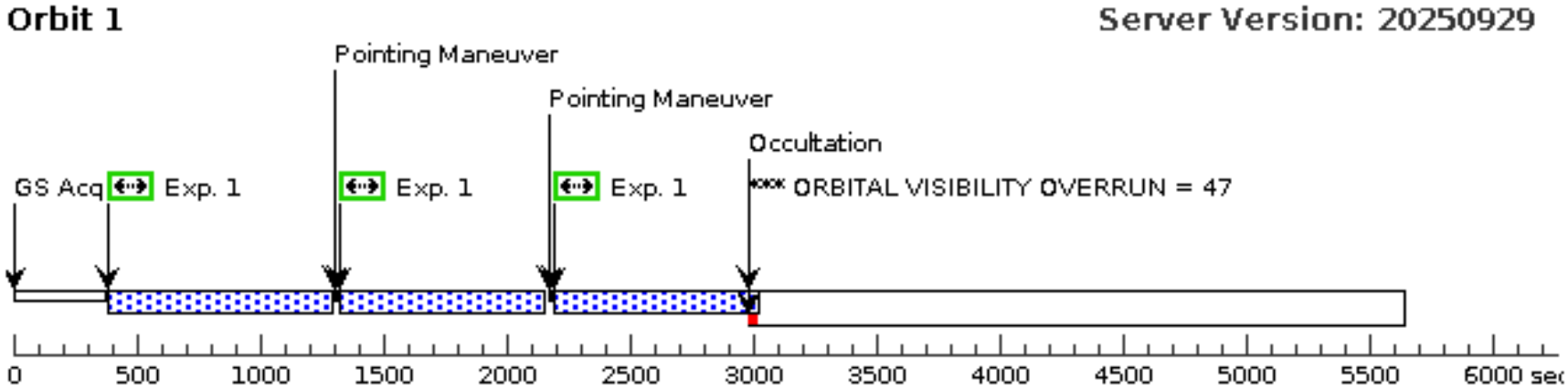
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	IPTF16FNL-HOST	RA: 00 29 57.0420 (7.4876750d) Dec: +32 53 37.51 (32.89375d) Equinox: J2000		V=15.33+/-0.05 Host-galaxy V-band magnitude estimated from ASAS-SN light curve.	Reference Frame: ICRS

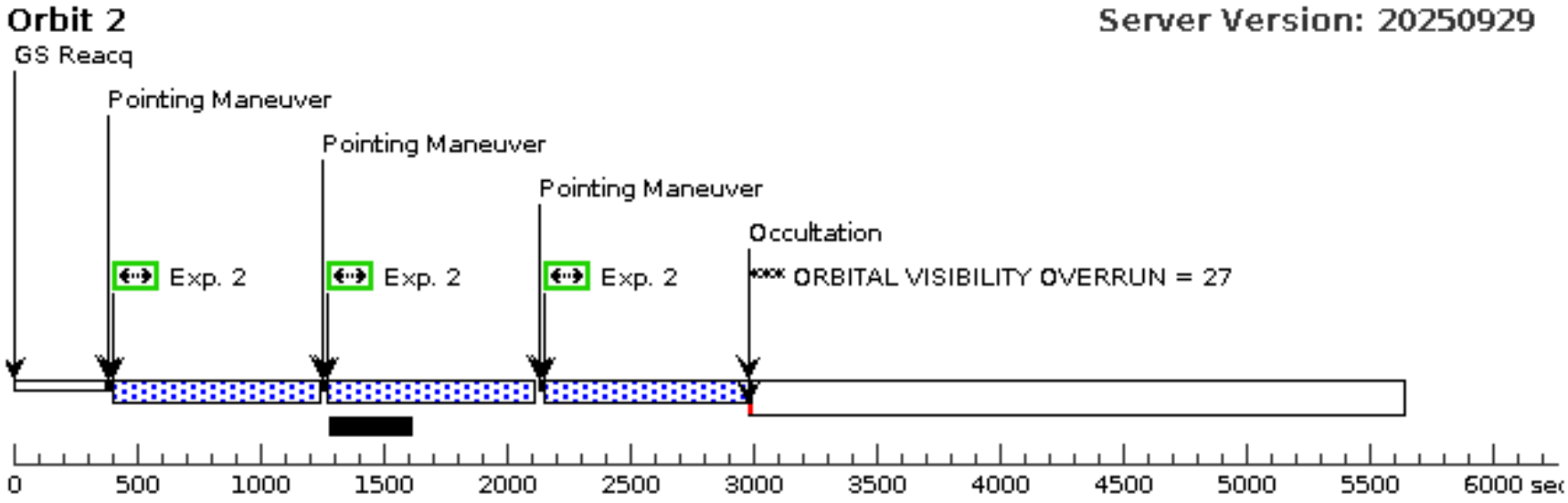
Comments:
Category=GALAXY
Description=[DISK, SHELL]
Extended=YES

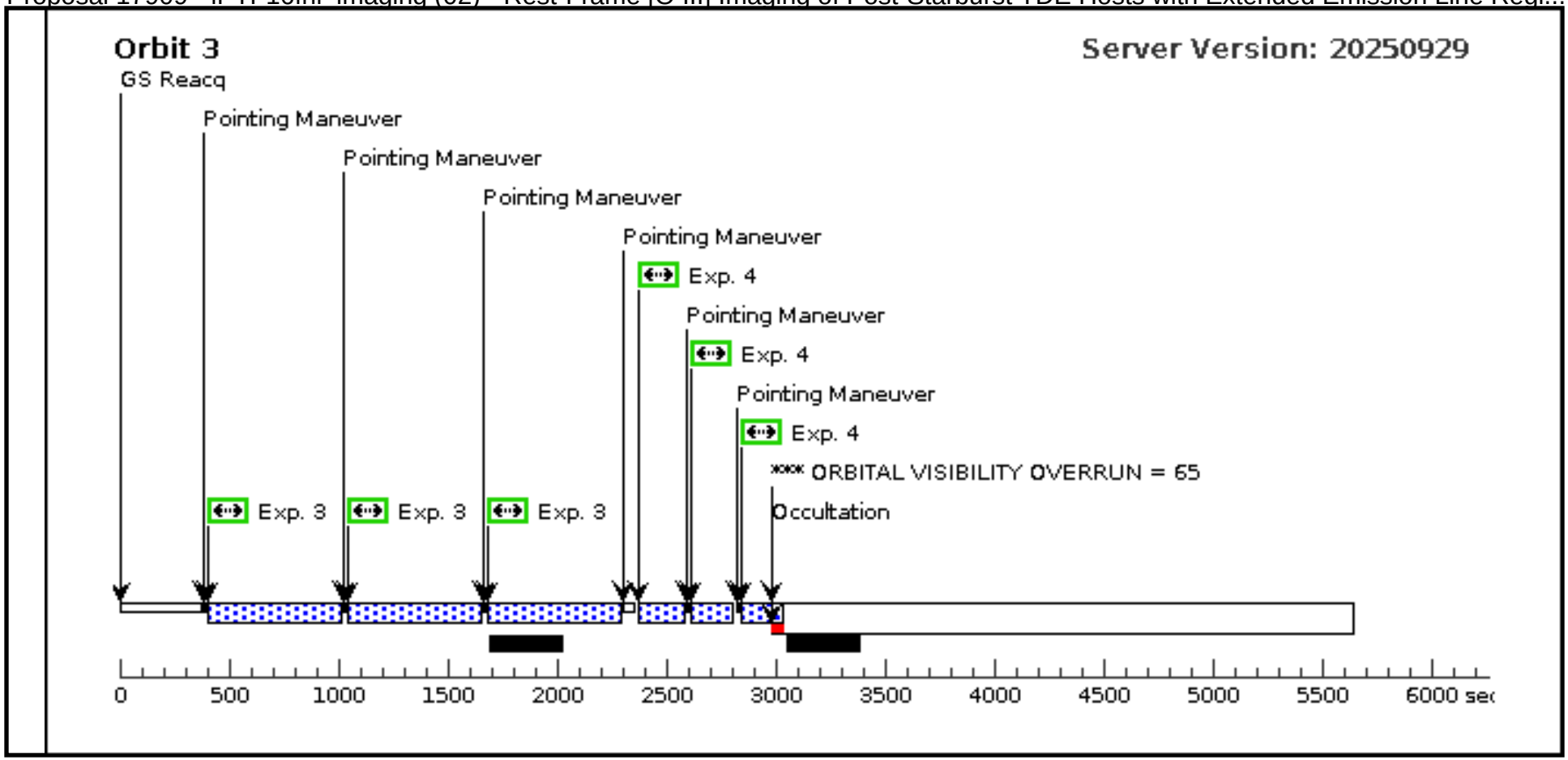
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	16fnl-line1 (ACS.rf.194 1961)	(2) IPTF16FNL-HOST	ACS/WFC, ACCUM, WFC1-MRAMPQ	FR505N 5089 A	FLASH=20		Pattern 2, Exps 1-1 in iPTF16fnl_imaging (02) (2)	699 Secs (2097 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
2	16fnl-line2 (ACS.rf.194 1961)	(2) IPTF16FNL-HOST	ACS/WFC, ACCUM, WFC1-MRAMPQ	FR505N 5089 A	FLASH=20		Pattern 2, Exps 2-2 in iPTF16fnl_imaging (02) (2)	713 Secs (2139 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[2]***
3	16fnl-line3 (ACS.rf.194 1961)	(2) IPTF16FNL-HOST	ACS/WFC, ACCUM, WFC1-MRAMPQ	FR505N 5089 A	FLASH=20		Pattern 2, Exps 3-3 in iPTF16fnl_imaging (02) (2)	477 Secs (1431 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[3]***
4	16fnl-continuum (ACS.rf.194 2237)	(2) IPTF16FNL-HOST	ACS/WFC, ACCUM, WFC1-IRAMPQ	FR647M 5750 A	FLASH=20		Pattern 2, Exps 4-4 in iPTF16fnl_imaging (02) (2)	59 Secs (177 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[3]***

Orbit Structure



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Server Version: 20250929
GS Reacq
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Exp. 4
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Exp. 4
*** ORBITAL VISIBILITY OVERRUN = 65
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Exp. 3
Exp. 3
Exp. 3
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Visit

Proposal 17909, ASASSN-19dj_imaging (03), completed Tue May 05 16:00:16 GMT 2026

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Diagnostics

(ASASSN-19dj_imaging (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(19dj-line (03.001)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(19dj-continuum (03.002)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.125 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=135 Angle Between Sides= Center Pattern=false		(1), (2)

Fixed Targets

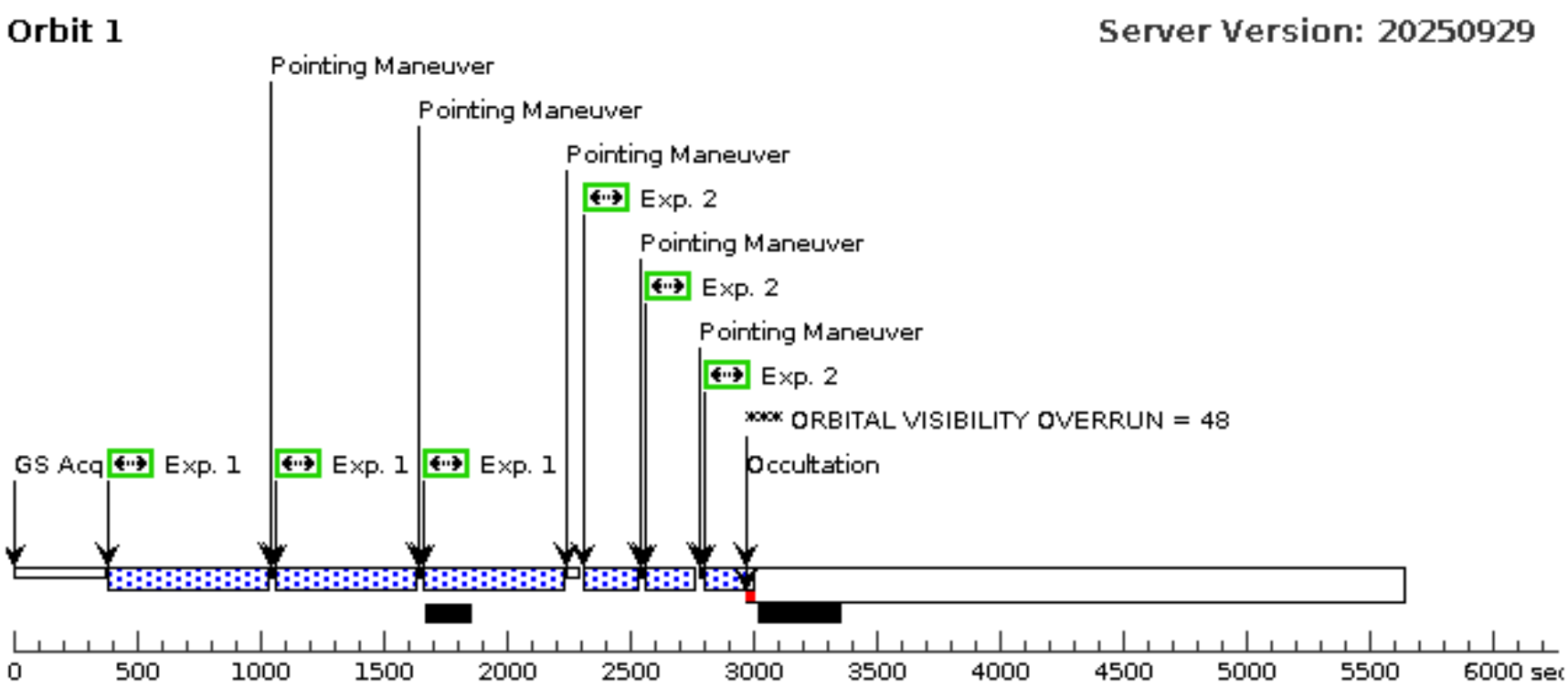
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	ASASSN-19DJ-HOST	RA: 08 13 16.9450 (123.3206042d) Dec: +22 38 54.03 (22.64834d) Equinox: J2000		V=14.89+/-0.05 Host-galaxy V-band magnitude estimated from ASAS-SN light curve.	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[ELLIPTICAL, SHELL]
Extended=YES

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	19dj-line (ACS.rf.1941962)	(3) ASASSN-19DJ-HOST	ACS/WFC, ACCUM, WFC1-MRAMPQ	FR505N 5119 A	FLASH=20		Pattern 2, Exps 1-1 in ASASSN-19dj_imaging (03) (2)	437 Secs (1311 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	 ***[1]***
2	19dj-continuum (ACS.rf.1942228)	(3) ASASSN-19DJ-HOST	ACS/WFC, ACCUM, WFC1-IRAMPQ	FR647M 5750 A	FLASH=20		Pattern 2, Exps 2-2 in ASASSN-19dj_imaging (03) (2)	70 Secs (210 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	 ***[1]***

Orbit Structure



Visit

Proposal 17909, iPTF16fnl_imaging (2A), implementation Tue May 05 16:00:16 GMT 2026

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 75D TO 130 D; ORIENT 255D TO 310 D

Diagnostics

(16fnl-line2 (2A.001)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(16fnl-line3 (2A.002)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

(16fnl-continuum (2A.003)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp filters as central wavelengths & transmission efficiencies vary within the apertures.

Patterns

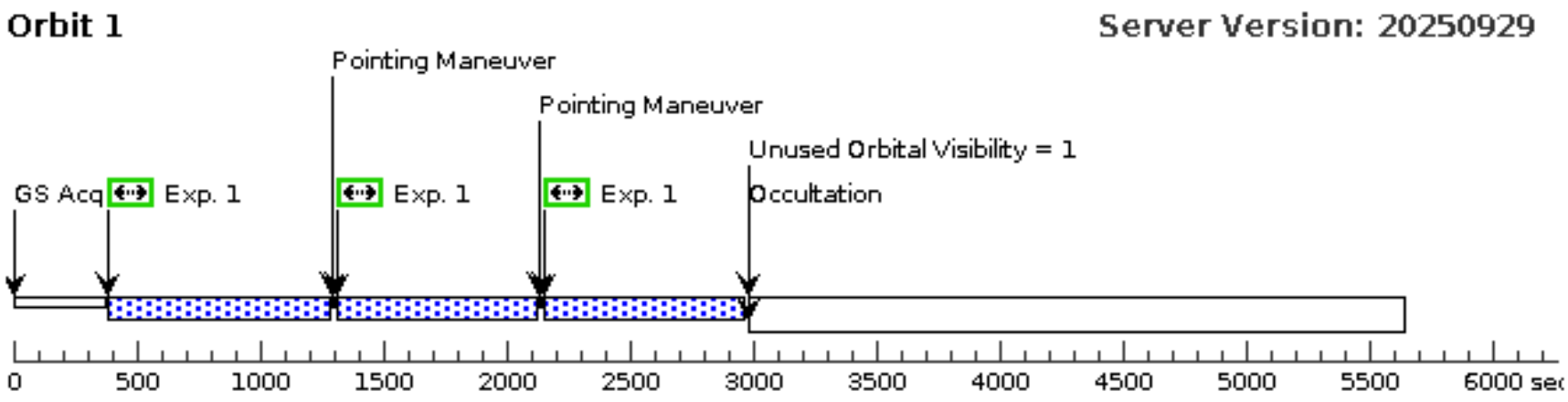
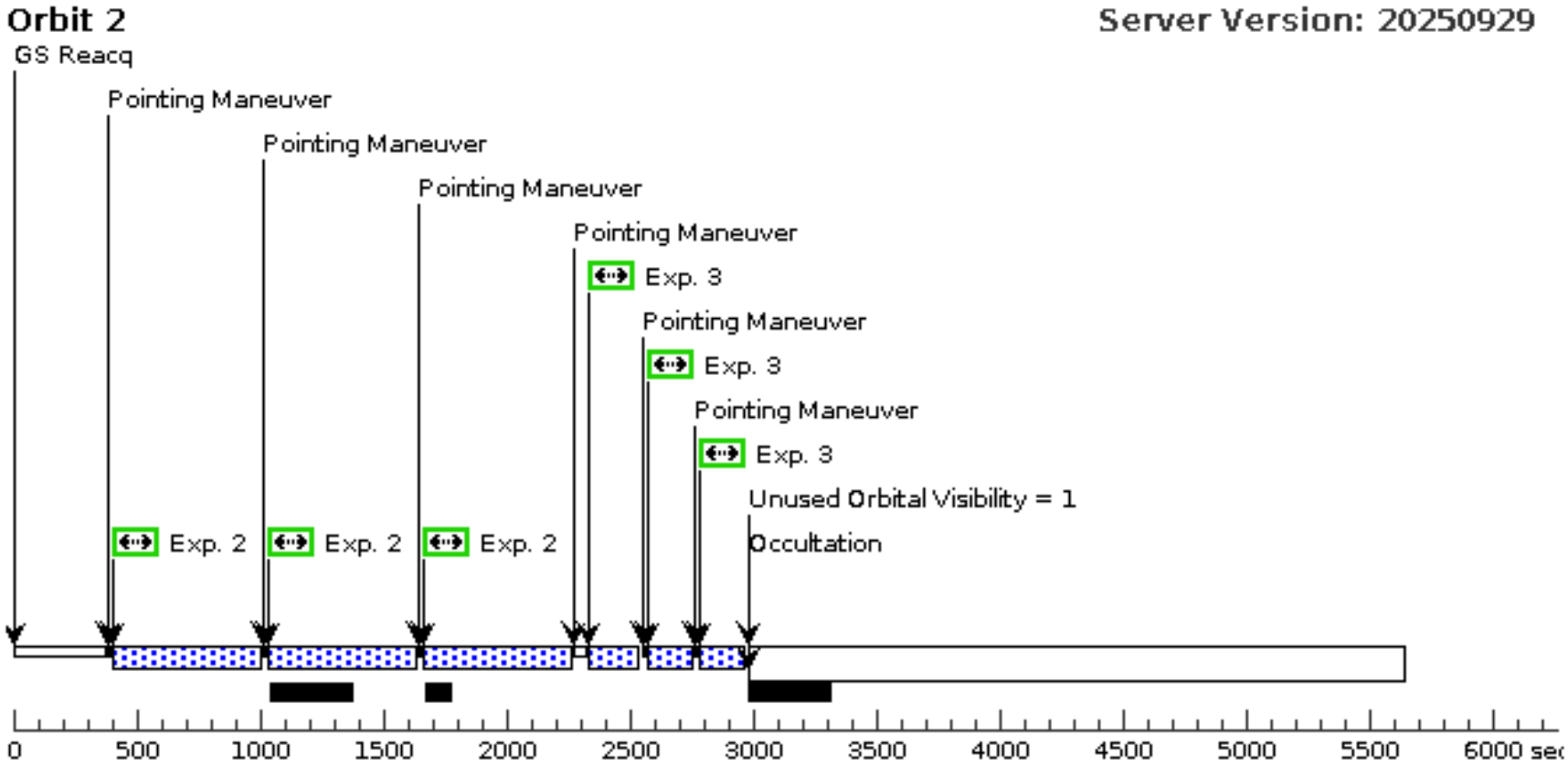
#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.125 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=135 Angle Between Sides= Center Pattern=false		(1), (2), (3)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	IPTF16FNL-HOST	RA: 00 29 57.0420 (7.4876750d) Dec: +32 53 37.51 (32.89375d) Equinox: J2000		V=15.33+/-0.05 Host-galaxy V-band magnitude estimated from ASAS-SN light curve.	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[DISK, SHELL]
Extended=YES

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	16fnl-line2 (ACS.rf.1941961)	(2) IPTF16FNL-HOST	ACS/WFC, ACCUM, WFC1-MRAMPQ	FR505N 5089 A	FLASH=20		Pattern 2, Exps 1-1 in iPTF16fnl_imaging (2A) (2)	713 Secs (2049 Secs) *[==>683.0 Secs (Pattern 1)]* *[==>683.0 Secs (Pattern 2)]* *[==>683.0 Secs (Pattern 3)]*	***[1]***
2	16fnl-line3 (ACS.rf.1941961)	(2) IPTF16FNL-HOST	ACS/WFC, ACCUM, WFC1-MRAMPQ	FR505N 5089 A	FLASH=20		Pattern 2, Exps 2-2 in iPTF16fnl_imaging (2A) (2)	477 Secs (1398 Secs) *[==>466.0 Secs (Pattern 1)]* *[==>466.0 Secs (Pattern 2)]* *[==>466.0 Secs (Pattern 3)]*	***[2]***
3	16fnl-continuum (ACS.rf.1942237)	(2) IPTF16FNL-HOST	ACS/WFC, ACCUM, WFC1-IRAMPQ	FR647M 5750 A	FLASH=20		Pattern 2, Exps 3-3 in iPTF16fnl_imaging (2A) (2)	59 Secs (144 Secs) *[==>48.0 Secs (Pattern 1)]* *[==>48.0 Secs (Pattern 2)]* *[==>48.0 Secs (Pattern 3)]*	***[2]***

Orbit Structure