15468 - Backyard Worlds

Cycle: 25, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Jacqueline Kelly Faherty (PI) (Contact)	**American Museum of Natural History**	**jfaherty@amnh.org**
Dr. Daniella Carolina Bardalez Gagliuffi (CoI)	American Museum of Natural History	dbardalezgagliuffi@amnh.org
Dr. Adam Schneider (CoI)	Arizona State University	aschneid10@gmail.com
Dr. Marc Jason Kuchner (CoI)	NASA Goddard Space Flight Center	marc.kuchner@nasa.gov
Dr. Sarah E Logsdon (CoI)	NASA Goddard Space Flight Center	sarah.e.logsdon@nasa.gov
Dr. Jonathan Gagne (CoI)	Carnegie Institution of Washington	jgagne@carnegiescience.edu
Dr. Aaron Meisner (CoI)	National Optical Astronomy Observatory, AURA	aaron.m.meisner@gmail.com

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) WISE0014+7951	WFC3/IR	1	26-Nov-2018 11:00:22.0	yes
02	(2) WISE0830+2837	WFC3/IR	1	26-Nov-2018 11:00:24.0	yes
03	(3) WISE1516+7217	WFC3/IR	1	26-Nov-2018 11:00:25.0	yes
53	(3) WISE1516+7217	WFC3/IR	1	26-Nov-2018 11:00:26.0	yes
04	(4) WISE1525+6053	WFC3/IR	1	26-Nov-2018 11:00:27.0	yes
05	(5) WISE0830-6323	WFC3/IR	1	26-Nov-2018 11:00:28.0	yes

6 Total Orbits Used

ABSTRACT

Over the past five years, our view of the local solar neighborhood has changed drastically thanks to the Wide Field Infrared Survey Explorer (WISE). Not only did WISE redefine the five closest systems to the Sun with the discovery of Luhman16AB and WISE0855, but it also revealed the Sun's closest fly by and it defined an entirely new class of extremely cold and close compact objects: the Y dwarfs. At present, all but two of the Y dwarfs were discovered through a WISE single epoch photometric identification. As a whole, these objects are of critical importance to identifying the efficiency of star formation at the lowest masses. As individuals, each of these objects represents a unique probe into the complex chemistry present in the coldest photospheres produced in the Universe. Every single Y dwarf discovered is an observational treasure but the ones that are closest to the Sun are the gold standard for planetary characterization studies. In February 2017, we launched a citizen science project called Backyard Worlds: Planet 9 with the intention of scanning the entire sky using not just photometric information but positional as well to identify the coldest, closest, and fastest moving objects near the Sun. In this Mid-Cycle HST proposal, we have identified 5 tantalizingly fast moving objects that appear to be extremely cold hence potentially among the Sun's nearest neighbors. We ask for five orbits with HST to obtain critical F125W and F105W photometry which will allow us to decipher the nature of each target and prioritize for a JWST cycle 1 follow-up.

OBSERVING DESCRIPTION

Our observations are straightforward and have been proven successful by prior HST Y dwarf follow-up programs (see results and summary of Y dwarf HST observations of known Y dwarfs in Schneider et al. 2015). We used known Y dwarfs and their F105W as well as F125W filter measurements from JWST to scale the estimates for our new candidate objects. Assuming a required S/N=30, as well as a (F125W-W2)=7 and a (F105W-F125W)=0, we estimate a requirement of 0.5 orbit per filter per target for a total of 5 orbits.

Visit

Proposal 15468, W0014+7951 (01), completed Mon Nov 26 16:00:28 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Comments: F105W and F125W observations of W0014+7951.

Patterns

#	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		(1-2)

Fixed Targets

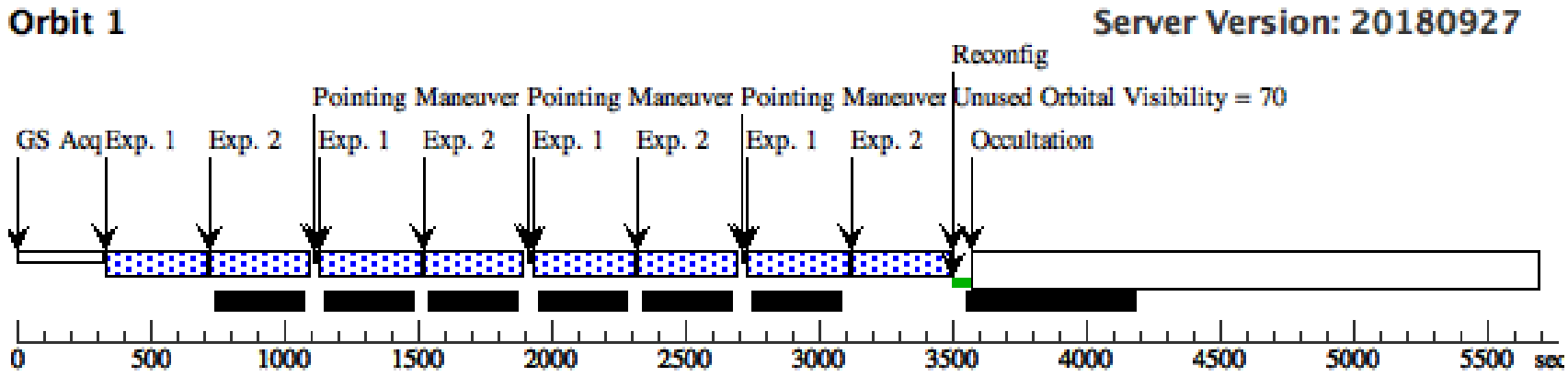
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WISE0014+7951	RA: 00 14 49.9600 (3.7081667d) Dec: +79 51 16.10 (79.85447d) Equinox: J2000	Proper Motion RA: 3702.9 mas/yr Proper Motion Dec: -987.2 mas/yr Epoch of Position: 2010.5	V=23.135	Reference Frame: ICRS

Comments: No V-magnitude is available. The magnitude listed is the estimated F125W magnitude.
Category=STAR
Description=[BROWN DWARF]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F105W-01	(1) WISE0014+7951	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=15; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W0014+7951 (01) (1)	352.939501 Secs (1411.758 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*
2	F125W-01	(1) WISE0014+7951	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=15; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W0014+7951 (01) (1)	352.939501 Secs (1411.758 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15468, W0830+2837 (02), completed Mon Nov 26 16:00:28 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Comments: F105W and F125W observations of W0830+2837.

Patterns

#	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		(1-2)

Fixed Targets

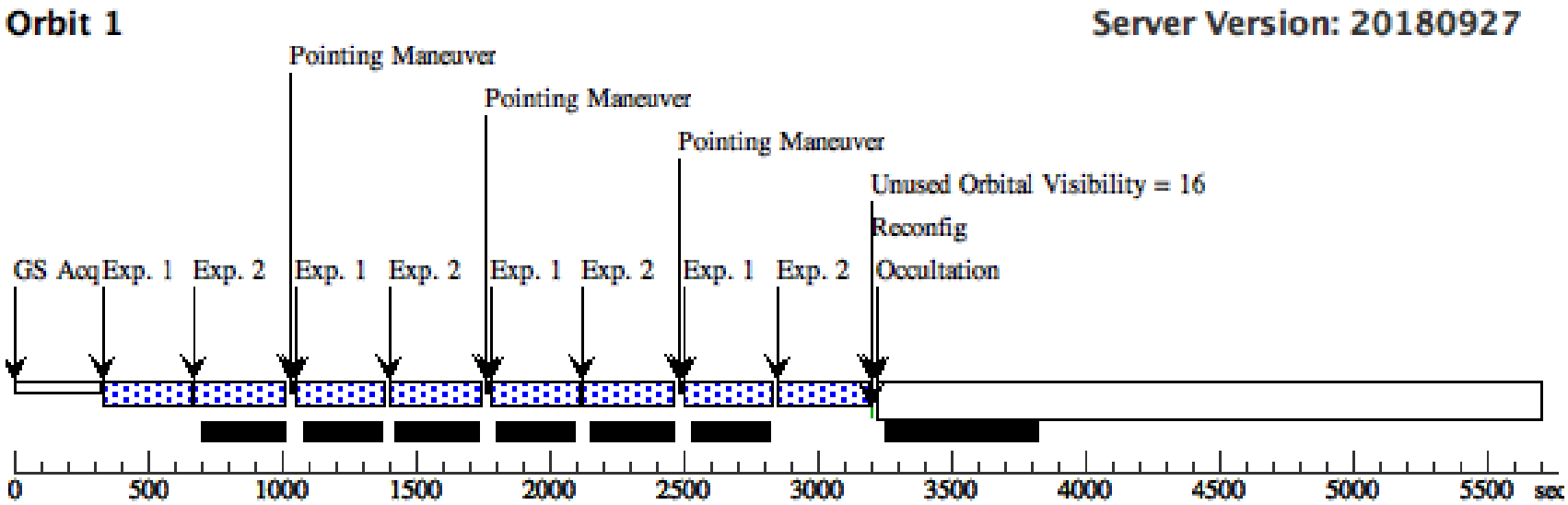
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	WISE0830+2837	RA: 08 30 11.9500 (127.5497917d) Dec: +28 37 16.00 (28.62111d) Equinox: J2000	Proper Motion RA: -99.7 mas/yr Proper Motion Dec: -2155.1 mas/yr Epoch of Position: 2010.5	V=22.839	Reference Frame: ICRS

Comments: No V-magnitude is available. The magnitude listed is the estimated F125W magnitude.
Category=STAR
Description=[BROWN DWARF]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F105W-01	(2) WISE0830+2837	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=13; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W0830+2837 (02) (1)	302.938471 Secs (1211.754 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	 ***[1]***
2	F125W-01	(2) WISE0830+2837	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=14; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W0830+2837 (02) (1)	327.938986 Secs (1311.756 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	 ***[1]***

Orbit Structure



Visit

Proposal 15468, W1516+7217 (03), failed Mon Nov 26 16:00:28 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Comments: F105W and F125W observations of W1516+7217.

Patterns

#	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		(1-2)

Fixed Targets

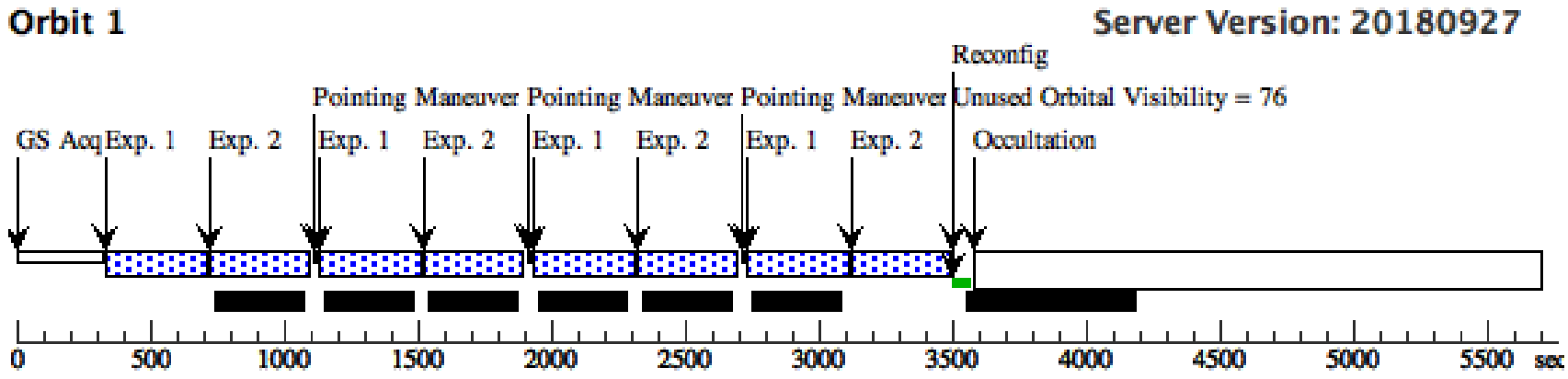
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	WISE1516+7217	RA: 15 16 20.3900 (229.0849583d) Dec: +72 17 45.40 (72.29594d) Equinox: J2000	Proper Motion RA: -527.1 mas/yr Proper Motion Dec: 975.3 mas/yr Epoch of Position: 2010.5	V=23.036	Reference Frame: ICRS

Comments: No V-magnitude is available. The magnitude listed is the estimated F125W magnitude.
Category=STAR
Description=[BROWN DWARF]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F105W-01	(3) WISE1516+7217	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=15; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W1516+7217 (03) (1)	352.939501 Secs (1411.758 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*
2	F125W-01	(3) WISE1516+7217	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=15; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W1516+7217 (03) (1)	352.939501 Secs (1411.758 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15468, W1516+7217 (53) Mon Nov 26 16:00:29 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Comments: F105W and F125W observations of W1516+7217. (Repeat. HOPR 91421)

Patterns

#	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		(1-2)

Fixed Targets

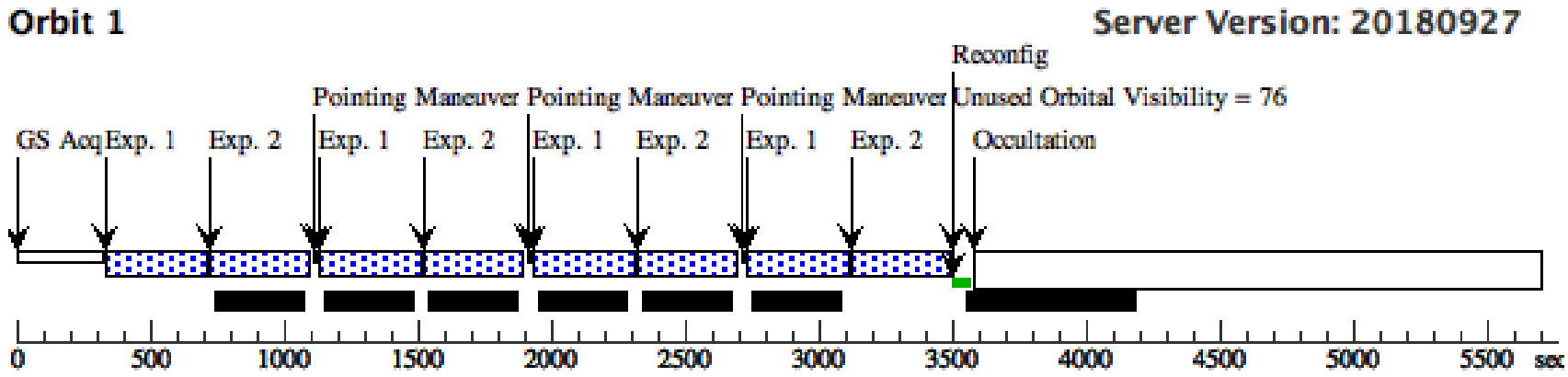
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	WISE1516+7217	RA: 15 16 20.3900 (229.0849583d) Dec: +72 17 45.40 (72.29594d) Equinox: J2000	Proper Motion RA: -527.1 mas/yr Proper Motion Dec: 975.3 mas/yr Epoch of Position: 2010.5	V=23.036	Reference Frame: ICRS

Comments: No V-magnitude is available. The magnitude listed is the estimated F125W magnitude.
Category=STAR
Description=[BROWN DWARF]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F105W-01	(3) WISE1516+7217	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=15; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W1516+7217 (53) (1)	352.939501 Secs (1411.758 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*
2	F125W-01	(3) WISE1516+7217	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=15; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W1516+7217 (53) (1)	352.939501 Secs (1411.758 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15468, W1526+6053 (04), completed Mon Nov 26 16:00:29 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Comments: F105W and F125W observations of W1526+6053.

Patterns

#	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		(1-2)

Fixed Targets

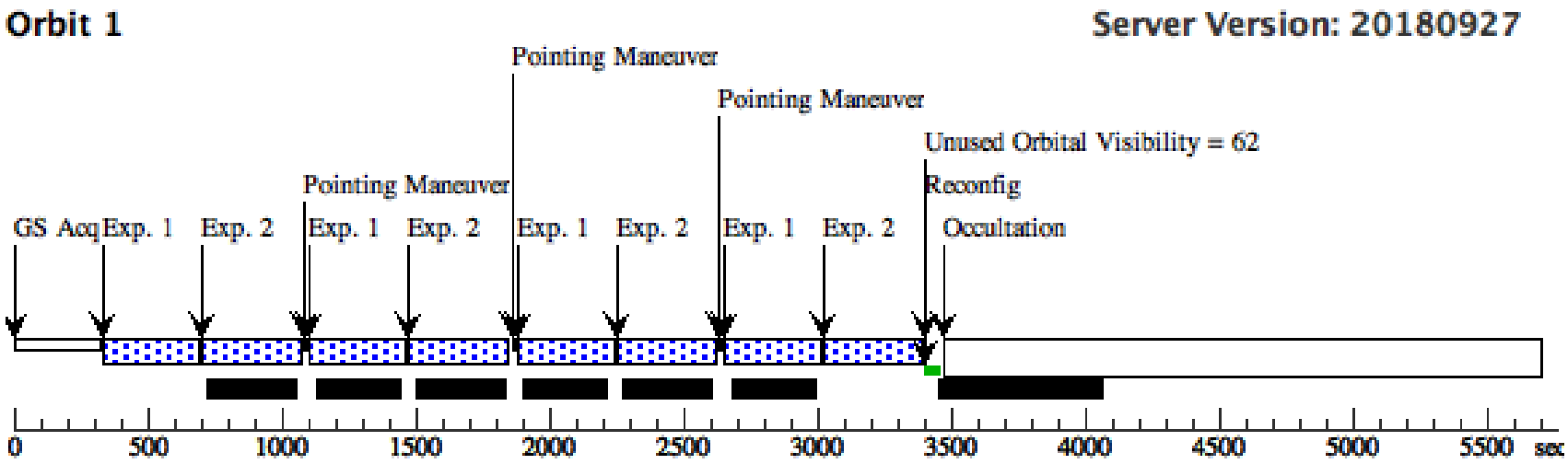
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	WISE1525+6053	RA: 15 25 29.0900 (231.3712083d) Dec: +60 53 56.50 (60.89903d) Equinox: J2000	Proper Motion RA: -386.0 mas/yr Proper Motion Dec: 817.5 mas/yr Epoch of Position: 2010.5	V=22.888	Reference Frame: ICRS

Comments: No V-magnitude is available. The magnitude listed is the estimated F125W magnitude.
Category=STAR
Description=[BROWN DWARF]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F105W-01	(4) WISE1525+6053	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=14; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W1526+6053 (04) (1)	327.938986 Secs (1311.756 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2	F125W-01	(4) WISE1525+6053	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=15; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W1526+6053 (04) (1)	352.939501 Secs (1411.758 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure



Visit

Proposal 15468, W0830-6323 (05), completed Mon Nov 26 16:00:29 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Comments: F105W and F125W observations of W0830-6323.

Patterns

#	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		(1-2)

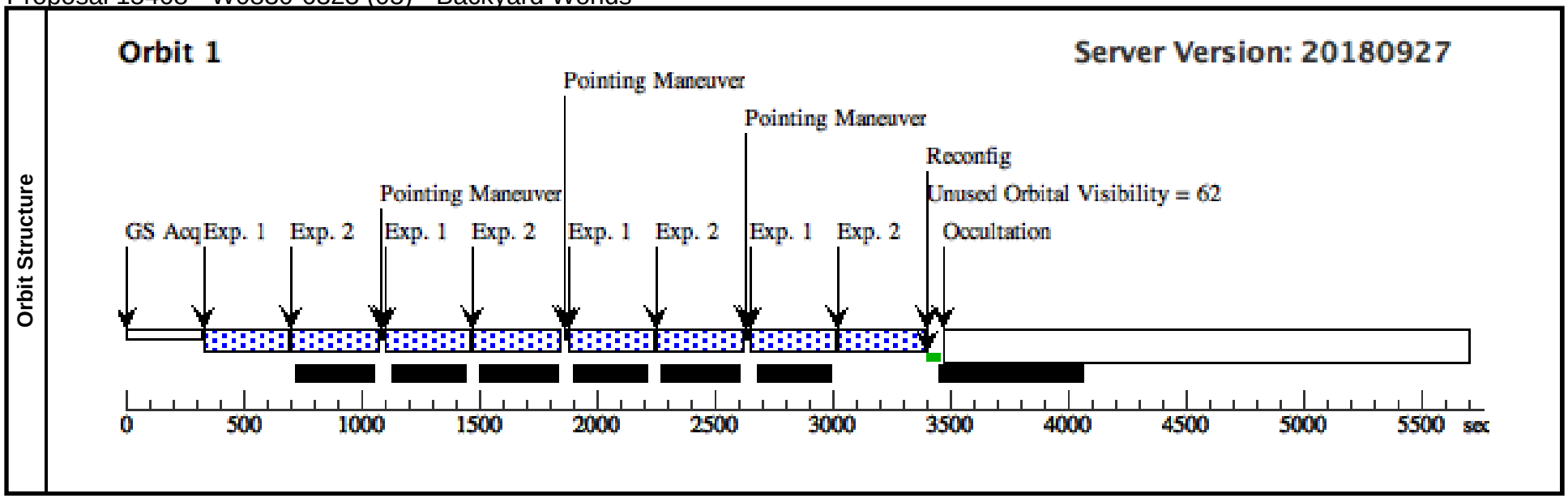
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	WISE0830-6323	RA: 08 30 19.9700 (127.5832083d) Dec: -63 23 5.40 (-63.38483d) Equinox: J2000	Proper Motion RA: -19.7 mas/yr Proper Motion Dec: 666.1 mas/yr Epoch of Position: 2010.5	V=22.978	Reference Frame: ICRS

Comments: No V-magnitude is available. The magnitude listed is the estimated F125W magnitude.
Category=STAR
Description=[BROWN DWARF]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F105W-01	(5) WISE0830-6323	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=14; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W0830-6323 (05) (1)	327.938986 Secs (1311.756 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	 ***[1]***
2	F125W-01	(5) WISE0830-6323	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=15; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-2 in W0830-6323 (05) (1)	352.939501 Secs (1411.758 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	 ***[1]***


Orbit Structure
Orbit 1
Server Version: 20180927
Pointing Maneuver
Pointing Maneuver
Reconfig
Pointing Maneuver
Unused Orbital Visibility = 62
GS Acq
Exp. 1
Exp. 2
Exp. 1
Exp. 2
Exp. 1
Exp. 2
Exp. 1
Exp. 2
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec