



15508 - The Coolest Sample of Brown Dwarf Dynamical Masses

Cycle: 26, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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) WISEJ014656.66+423410.0	ACS/WFC	1	08-Nov-2018 11:00:12.0	yes
02	(2) WISEJ090649.35+473538.5	ACS/WFC	1	08-Nov-2018 11:00:13.0	yes
03	(2) WISEJ090649.35+473538.5	ACS/WFC	1	08-Nov-2018 11:00:13.0	yes
04	(3) WISEJ095259.29+195508.1	ACS/WFC	1	08-Nov-2018 11:00:14.0	yes
05	(4) CFBDSIRJ1458+10AB	ACS/WFC	1	08-Nov-2018 11:00:14.0	yes
06	(5) WISEJ162208.93-095934.4	ACS/WFC	1	08-Nov-2018 11:00:15.0	yes
07	(6) WISEJ201547.05+664646.0	ACS/WFC	1	08-Nov-2018 11:00:15.0	yes
08	(6) WISEJ201547.05+664646.0	ACS/WFC	1	08-Nov-2018 11:00:16.0	yes

8 Total Orbits Used

ABSTRACT

We propose a 3-year orbit monitoring program to measure the first dynamical masses for brown dwarfs below 1100 K. With projected separations of only 1-2 AU, our targets are among the tightest substellar visual binaries ever found and are amenable to orbit determinations within only a few years. When combined with our parallax determinations, these data will yield dynamical masses with <10% uncertainties. Our targets have been discovered at the limits of existing facilities and thus promise to be the only viable objects in this temperature regime (350-1000 K) for direct mass measurements during the JWST era.

OBSERVING DESCRIPTION

The goal of our observations is to obtain precise relative astrometry (~ 3 -5 mas) for six brown dwarf binaries. Our data spanning 3 cycles will allow us to determine their orbits and thereby measure their dynamical masses. ACS/WFC enables a finer pixel scale than WFC3/IR and better sensitivity than WFC3/UVIS, both of which (high SNR, and better deblending of our tight 0.07"-0.11" binaries) are key to achieving our science goals.

We use a standard 3-position dither sequence to guard against cosmic rays and to sample different parts of the detector in case our target lands on a bad pixel in a single pointing. We set the exposure times to fill the time available in each visit, which will yield SNR of ~ 30 for our faintest target (WISE0146, J=20.7) and will still be far from saturating any other of our sources in F850LP (the brightest is J=16.4).

Proposal 15508 - WISEJ0146 Epoch 2 (01) - The Coolest Sample of Brown Dwarf Dynamical Masses

Thu Nov 08 16:00:16 GMT 2018

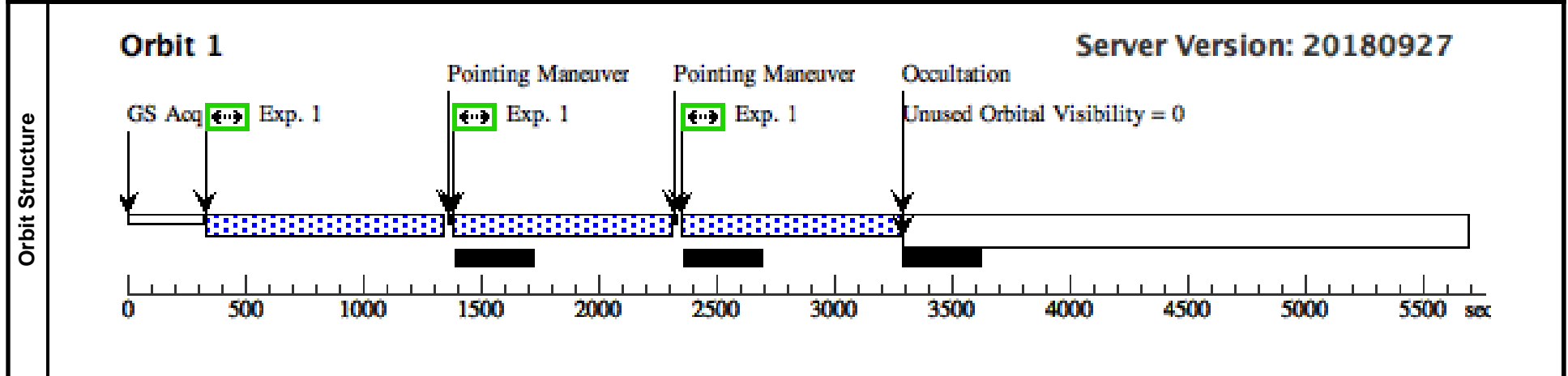
Visit	Proposal 15508, WISEJ0146 Epoch 2 (01), implementation		
	Diagnostic Status: No Diagnostics		
	Scientific Instruments: ACS/WFC		
	Special Requirements: BETWEEN 23-JUN-2019:00:00:00 AND 13-JUL-2019:00:00:00		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false	

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	WISEJ014656.66+42341.0.0	RA: 01 46 56.6400 (26.7360000d) Dec: +42 34 9.05 (42.56918d) Equinox: J2000		V=(?) J=20.7 mag	Reference Frame: ICRS

Comments:
 Category=STAR
 Description=(BROWN DWARF, T)

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(1) WISEJ014656.66+423410.0	ACS/WFC, ACCUM, WFC1-CTE	F850LP				Pattern 1, Exps 1-1 in WISEJ0146 Epoch 2 (01) (1)	700 Secs (2421 Secs) [=>807.0 Secs (Pattern 1)] [=>807.0 Secs (Pattern 2)] [=>807.0 Secs (Pattern 3)]



Proposal 15508 - WISEJ0906 Epoch 3 (02) - The Coolest Sample of Brown Dwarf Dynamical Masses

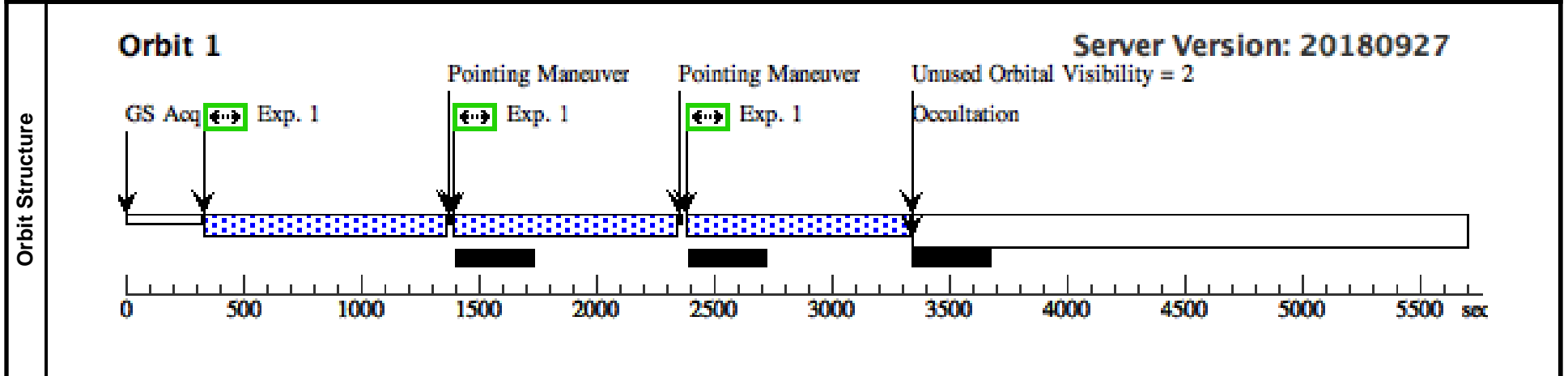
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Visit	Proposal 15508, WISEJ0906 Epoch 3 (02), implementation Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: BETWEEN 31-OCT-2018:00:00:00 AND 14-JAN-2019:00:00:00		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	WISEJ090649.35+473538.5	RA: 09 06 49.3310 (136.7055458d) Dec: +47 35 38.11 (47.59392d) Equinox: J2000	Epoch of Position: 2010.5589	V=(?) J=18.2 mag	Reference Frame: ICRS
	<i>Comments:</i> Category=STAR Description=(BROWN DWARF, T)					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(2) WISEJ090649.35+473538.5	ACS/WFC, ACCUM, WFC1-CTE	F850LP			Pattern 1, Exps 1-1 in WISEJ0906 Epoch 3 (02) (1)	700 Secs (2466 Secs)	
									[=>822.0 Secs (Pattern 1)]	[1]
									[=>822.0 Secs (Pattern 2)]	
									[=>822.0 Secs (Pattern 3)]	



Proposal 15508 - WISEJ0906 Epoch 4 (03) - The Coolest Sample of Brown Dwarf Dynamical Masses

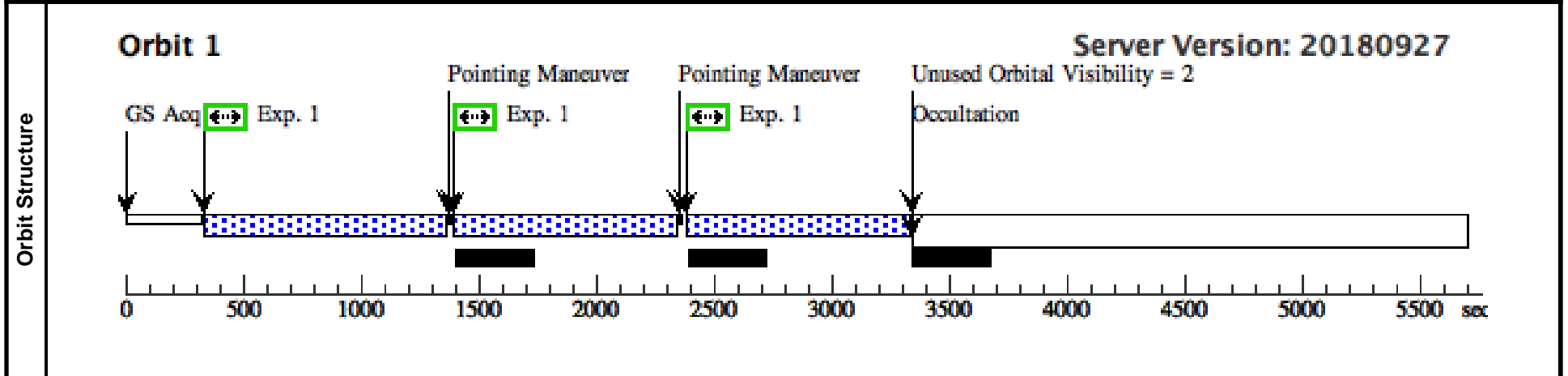
Thu Nov 08 16:00:16 GMT 2018

Visit	Proposal 15508, WISEJ0906 Epoch 4 (03), implementation Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: BETWEEN 31-MAY-2019:00:00:00 AND 13-JUN-2019:00:00:00		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=ACS-WFC-DITHER- LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	WISEJ090649.35+473538.5	RA: 09 06 49.3310 (136.7055458d) Dec: +47 35 38.11 (47.59392d) Equinox: J2000	Epoch of Position: 2010.5589	V=(?) J=18.2 mag	Reference Frame: ICRS
	<i>Comments:</i> Category=STAR Description=(BROWN DWARF, T)					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(2) WISEJ090649.35+473538.5	ACS/WFC, ACCUM, WFC1-CTE	F850LP			Pattern 1, Exps 1-1 in WISEJ0906 Epoch 4 (03) (1)	700 Secs (2466 Secs) [=>822.0 Secs (Pattern 1)] [=>822.0 Secs (Pattern 2)] [=>822.0 Secs (Pattern 3)]	[1]



Proposal 15508 - WISEJ0952 Epoch 2 (04) - The Coolest Sample of Brown Dwarf Dynamical Masses

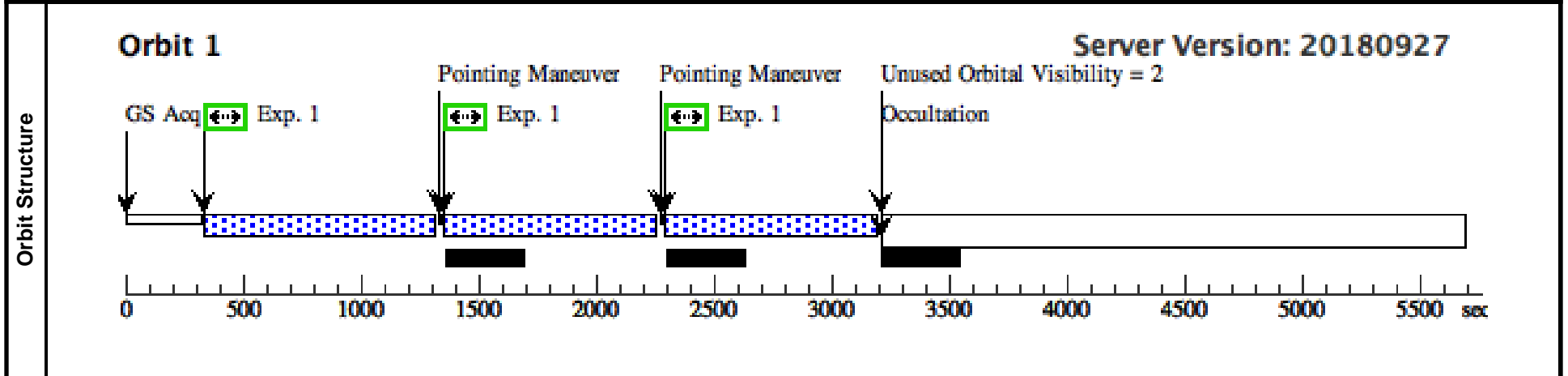
Thu Nov 08 16:00:17 GMT 2018

Visit	Proposal 15508, WISEJ0952 Epoch 2 (04), implementation		
	Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: BETWEEN 17-MAR-2019:00:00:00 AND 06-APR-2019:00:00:00		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=ACS-WFC-DITHER- LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(3)	WISEJ095259.29+195508.1	RA: 09 52 59.2927 (148.2470529d) Dec: +19 55 8.20 (19.91894d) Equinox: J2000	Epoch of Position: 2010.5589	V=(?) J=17.1 mag	Reference Frame: ICRS
	<i>Comments:</i> Category=STAR Description=(BROWN DWARF, T)					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(3) WISEJ095259.29+195508.1	ACS/WFC, ACCUM, WFC1-CTE	F850LP			Pattern 1, Exps 1-1 in WISEJ0952 Epoch 2 (04) (1)	700 Secs (2337 Secs)	
									[=>779.0 Secs (Pattern 1)]	[1]
									[=>779.0 Secs (Pattern 2)]	
									[=>779.0 Secs (Pattern 3)]	



Proposal 15508 - CFBDSIRJ1458 Epoch 2 (05) - The Coolest Sample of Brown Dwarf Dynamical Masses

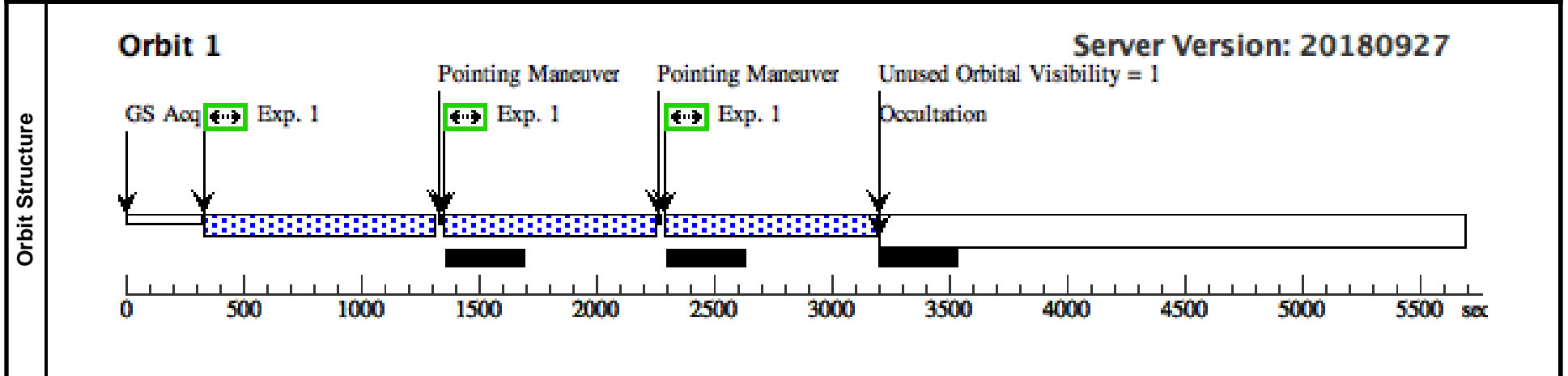
Thu Nov 08 16:00:17 GMT 2018

Visit	Proposal 15508, CFBDSIRJ1458 Epoch 2 (05), implementation Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: BETWEEN 19-JUN-2019:00:00:00 AND 09-JUL-2019:00:00:00		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(4)	CFBDSIRJ1458+10AB	RA: 14 58 29.3963 (224.6224846d) Dec: +10 13 41.65 (10.22824d) Equinox: J2000	Epoch of Position: 2010.5589	V=(?) z'(AB)=23.6 mag, J=19.7 mag	Reference Frame: ICRS
	<i>Comments:</i> Category=STAR Description=[BROWN DWARF, T]					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(4) CFBDSIRJ1458+10AB	ACS/WFC, ACCUM, WFC1-CTE	F850LP			Pattern 1, Exps 1-1 in CFBDSIRJ1458 Epoch 2 (05) (1)	700 Secs (2331 Secs) [==>777.0 Secs (Pattern 1)] [==>777.0 Secs (Pattern 2)] [==>777.0 Secs (Pattern 3)]	[1]



Proposal 15508 - WISEJ1622 Epoch 2 (06) - The Coolest Sample of Brown Dwarf Dynamical Masses

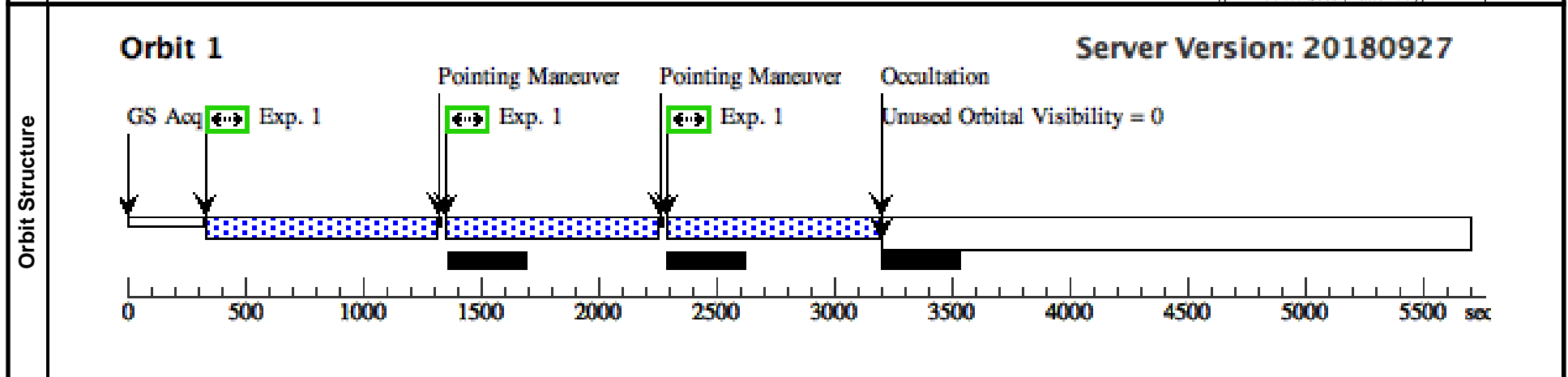
Thu Nov 08 16:00:17 GMT 2018

Visit	Proposal 15508, WISEJ1622 Epoch 2 (06), implementation		
	Diagnostic Status: No Diagnostics		
	Scientific Instruments: ACS/WFC		
	Special Requirements: BETWEEN 20-JUN-2019:00:00:00 AND 10-JUL-2019:00:00:00		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(5)	WISEJ162208.93-095934.4	RA: 16 22 8.9377 (245.5372404d) Dec: -09 59 34.77 (-9.99299d) Equinox: J2000	Epoch of Position: 2010.5589	V=(?) J=16.4 mag	Reference Frame: ICRS
	<i>Comments:</i> Category=STAR Description=(BROWN DWARF, T)					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(5) WISEJ162208.93-095934.4	ACS/WFC, ACCUM, WFC1-CTE	F850LP			Pattern 1, Exps 1-1 in WISEJ1622 Epoch 2 (06) (1)	700 Secs (2328 Secs) [=>776.0 Secs (Pattern 1)] [=>776.0 Secs (Pattern 2)] [=>776.0 Secs (Pattern 3)]	[1]



Proposal 15508 - WISEJ2015 Epoch 3 (07) - The Coolest Sample of Brown Dwarf Dynamical Masses

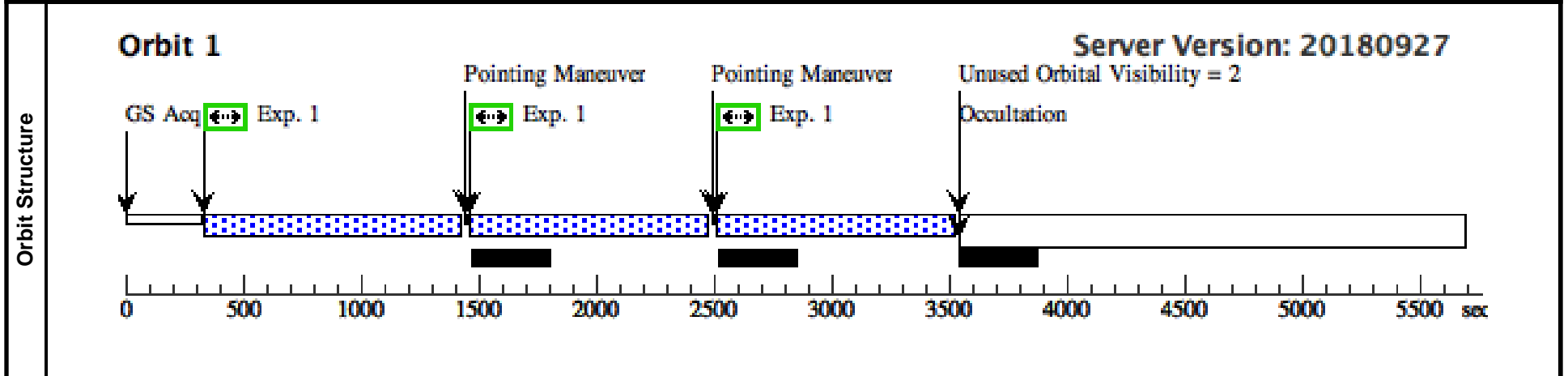
Thu Nov 08 16:00:17 GMT 2018

Visit	Proposal 15508, WISEJ2015 Epoch 3 (07), implementation		
	Diagnostic Status: No Diagnostics		
	Scientific Instruments: ACS/WFC		
	Special Requirements: BETWEEN 30-NOV-2018:00:00:00 AND 24-DEC-2018:00:00:00		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=ACS-WFC-DITHER- LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(6)	WISEJ201547.05+664646.0	RA: 20 15 46.4493 (303.9435387d) Dec: +66 46 45.19 (66.77922d) Equinox: J2000	Epoch of Position: 2010.5589	V=(?) J=16.9 mag	Reference Frame: ICRS
	<i>Comments:</i> Category=STAR Description=[BROWN DWARF, T]					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(6) WISEJ201547.05+664646.0	ACS/WFC, ACCUM, WFC1-CTE	F850LP			Pattern 1, Exps 1-1 in WISEJ2015 Epoch 3 (07) (1)	700 Secs (2667 Secs)	
									[=>889.0 Secs (Pattern 1)]	[1]
									[=>889.0 Secs (Pattern 2)]	
									[=>889.0 Secs (Pattern 3)]	



Proposal 15508 - WISEJ2015 Epoch 4 (08) - The Coolest Sample of Brown Dwarf Dynamical Masses

Thu Nov 08 16:00:17 GMT 2018

Visit	Proposal 15508, WISEJ2015 Epoch 4 (08), implementation Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: BETWEEN 04-JUL-2019:00:00:00 AND 25-JUL-2019:00:00:00		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(6)	WISEJ201547.05+664646.0	RA: 20 15 46.4493 (303.9435387d) Dec: +66 46 45.19 (66.77922d) Equinox: J2000	Epoch of Position: 2010.5589	V=(?) J=16.9 mag	Reference Frame: ICRS
	<i>Comments:</i> Category=STAR Description=[BROWN DWARF, T]					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(6) WISEJ201547.05+664646.0	ACS/WFC, ACCUM, WFC1-CTE	F850LP			Pattern 1, Exps 1-1 in WISEJ2015 Epoch 4 (08) (1)	700 Secs (2667 Secs)	
									[=>889.0 Secs (Pattern 1)]	[1]
									[=>889.0 Secs (Pattern 2)]	
									[=>889.0 Secs (Pattern 3)]	

