



15270 - The Coolest Sample of Brown Dwarf Dynamical Masses

Cycle: 25, 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	17-Jul-2017 17:02:49.0	yes
02	(2) WISEJ090649.35+473538.5	ACS/WFC	1	17-Jul-2017 17:02:50.0	yes
03	(2) WISEJ090649.35+473538.5	ACS/WFC	1	17-Jul-2017 17:02:51.0	yes
04	(3) WISEJ095259.29+195508.1	ACS/WFC	1	17-Jul-2017 17:02:52.0	yes
05	(4) CFBDSIRJ1458+10AB	ACS/WFC	1	17-Jul-2017 17:02:52.0	yes
06	(5) WISEJ162208.93-095934.4	ACS/WFC	1	17-Jul-2017 17:02:53.0	yes
07	(6) WISEJ201547.05+664646.0	ACS/WFC	1	17-Jul-2017 17:02:53.0	yes
08	(6) WISEJ201547.05+664646.0	ACS/WFC	1	17-Jul-2017 17:02:54.0	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 15270 - Visit 01 - The Coolest Sample of Brown Dwarf Dynamical Masses

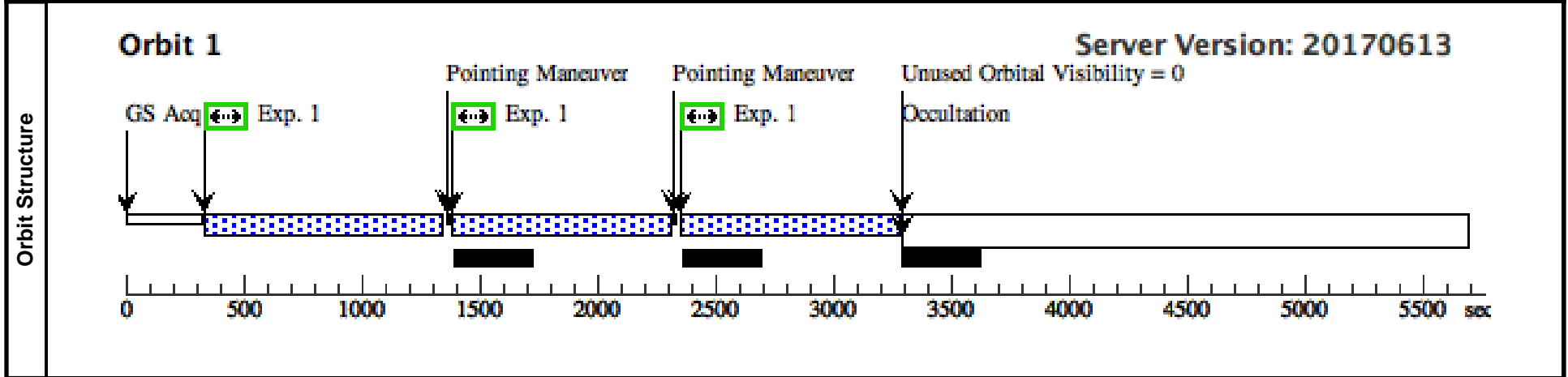
Mon Jul 17 21:02:55 GMT 2017

Visit	Proposal 15270, Visit 01		
	Diagnostic Status: No Diagnostics		
	Scientific Instruments: ACS/WFC		
	Special Requirements: BETWEEN 14-JUN-2018:00:00:00 AND 21-AUG-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
	(1)	WISEJ014656.66+423410.0	RA: 01 46 56.6400 (26.7360000d) Dec: +42 34 9.05 (42.56918d) Equinox: J2000		V=(?) J=20.7 mag	Reference Frame: ICRS

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 Visit 01 (1)	700 Secs (2421 Secs) [=>807.0 Secs (Pattern 1)] [=>807.0 Secs (Pattern 2)] [=>807.0 Secs (Pattern 3)]	[1]



Proposal 15270 - Visit 02 - The Coolest Sample of Brown Dwarf Dynamical Masses

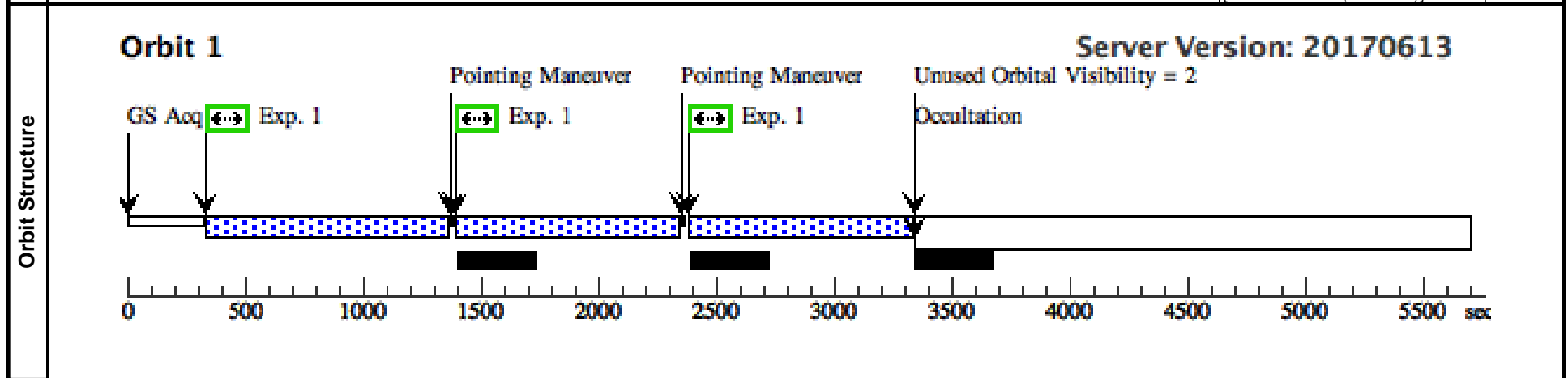
Mon Jul 17 21:02:55 GMT 2017

Visit	Proposal 15270, Visit 02 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: BEFORE 29-DEC-2017:00:00:00		
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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
	(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

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 Visit 02 (1)	700 Secs (2466 Secs) [=>822.0 Secs (Pattern 1)] [=>822.0 Secs (Pattern 2)] [=>822.0 Secs (Pattern 3)]



Proposal 15270 - Visit 03 - The Coolest Sample of Brown Dwarf Dynamical Masses

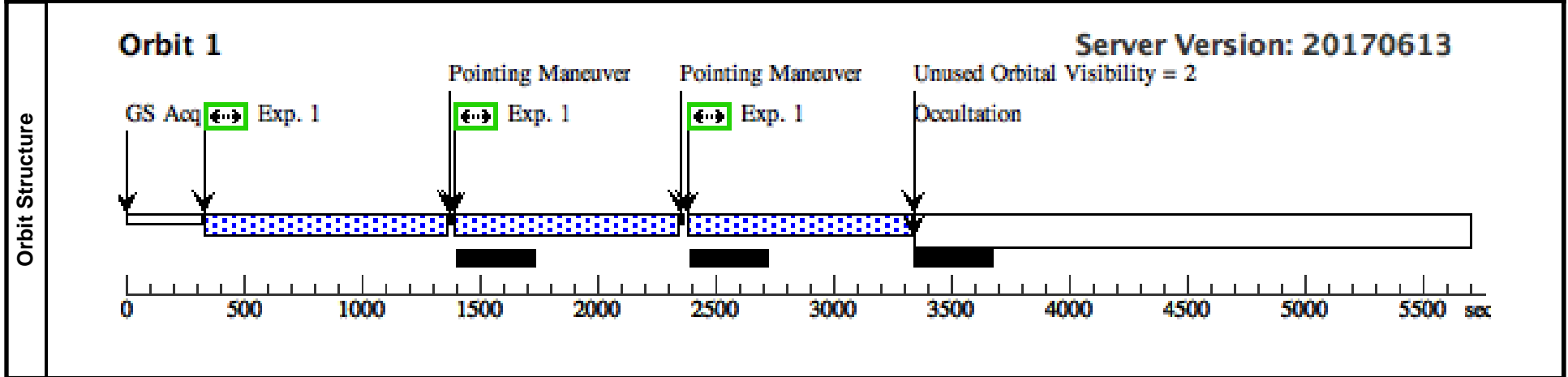
Mon Jul 17 21:02:55 GMT 2017

Visit	Proposal 15270, Visit 03 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: BETWEEN 14-MAY-2018:00:00:00 AND 13-JUN-2018:00:00:00		
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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

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 Visit 03 (1) 700 Secs (2466 Secs) [=>822.0 Secs (Pattern 1)] [=>822.0 Secs (Pattern 2)] [=>822.0 Secs (Pattern 3)]	[1]



Proposal 15270 - Visit 04 - The Coolest Sample of Brown Dwarf Dynamical Masses

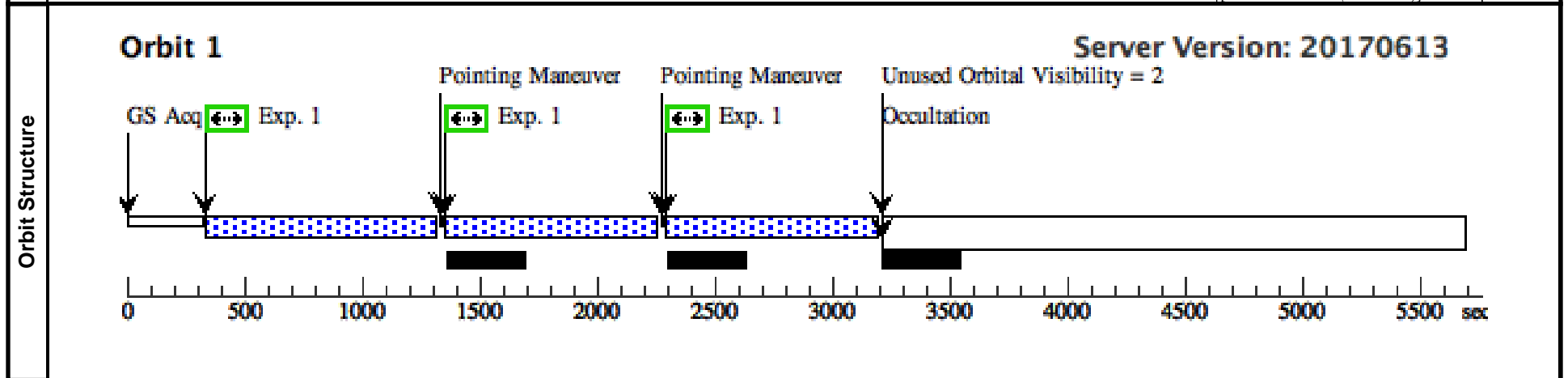
Mon Jul 17 21:02:55 GMT 2017

Visit	Proposal 15270, Visit 04		
	Diagnostic Status: No Diagnostics		
	Scientific Instruments: ACS/WFC		
	Special Requirements: BETWEEN 07-MAR-2018:00:00:00 AND 24-APR-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	

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

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 Visit 04 (1)	700 Secs (2337 Secs) [=>779.0 Secs (Pattern 1)] [=>779.0 Secs (Pattern 2)] [=>779.0 Secs (Pattern 3)]



Proposal 15270 - Visit 05 - The Coolest Sample of Brown Dwarf Dynamical Masses

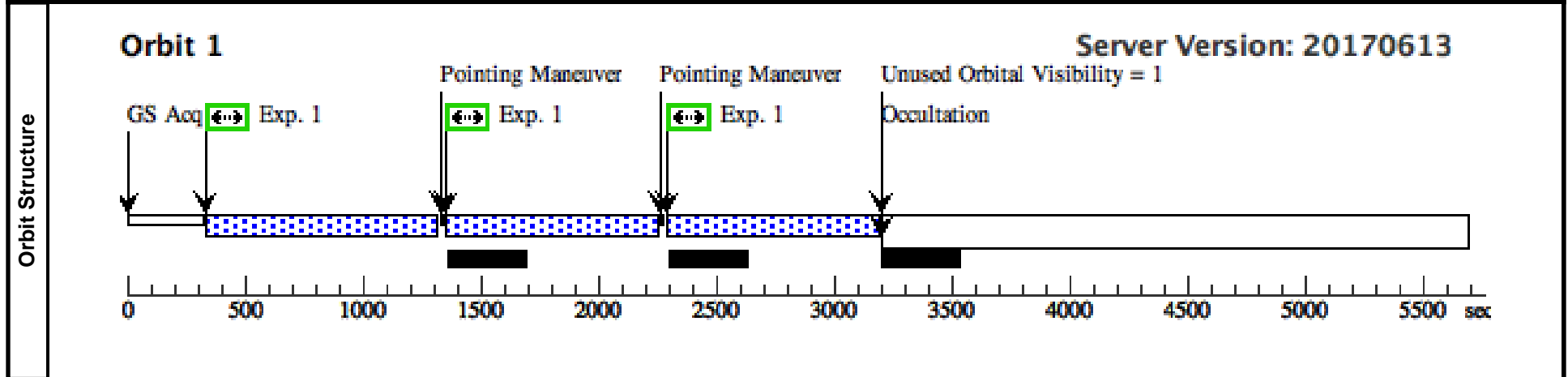
Mon Jul 17 21:02:55 GMT 2017

Visit	Proposal 15270, Visit 05 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: BETWEEN 07-JUN-2018:00:00:00 AND 18-SEP-2018:00:00:00		
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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
	(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

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 Visit 05 (1)	700 Secs (2331 Secs) [=>777.0 Secs (Pattern 1)] [=>777.0 Secs (Pattern 2)] [=>777.0 Secs (Pattern 3)]



Proposal 15270 - Visit 06 - The Coolest Sample of Brown Dwarf Dynamical Masses

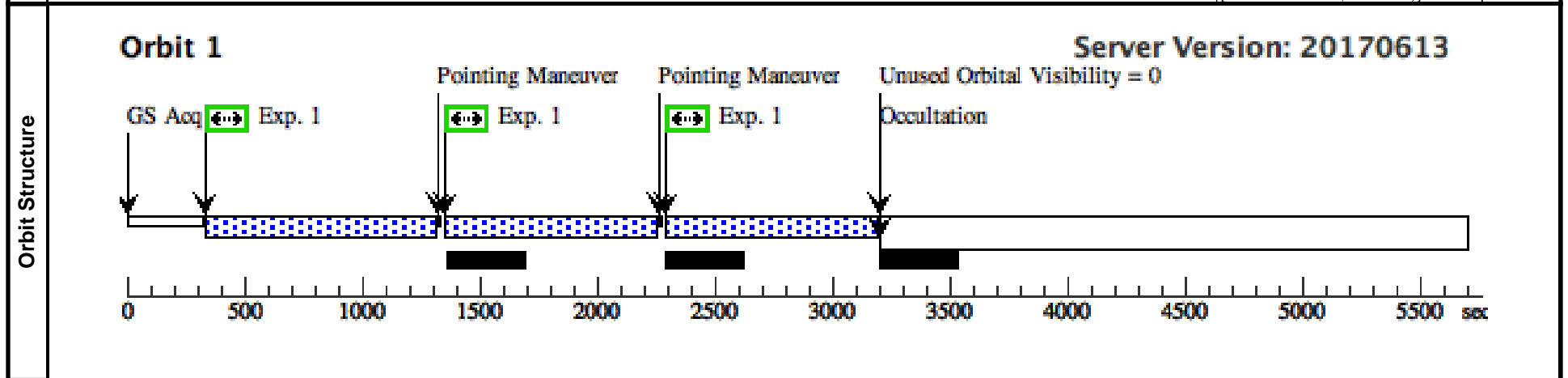
Mon Jul 17 21:02:55 GMT 2017

Visit	Proposal 15270, Visit 06 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: BETWEEN 09-JUN-2018:00:00:00 AND 10-OCT-2018:00:00:00		
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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

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 Visit 06 (1)	700 Secs (2328 Secs) [==>776.0 Secs (Pattern 1)] [==>776.0 Secs (Pattern 2)] [==>776.0 Secs (Pattern 3)]	[1]



Proposal 15270 - Visit 07 - The Coolest Sample of Brown Dwarf Dynamical Masses

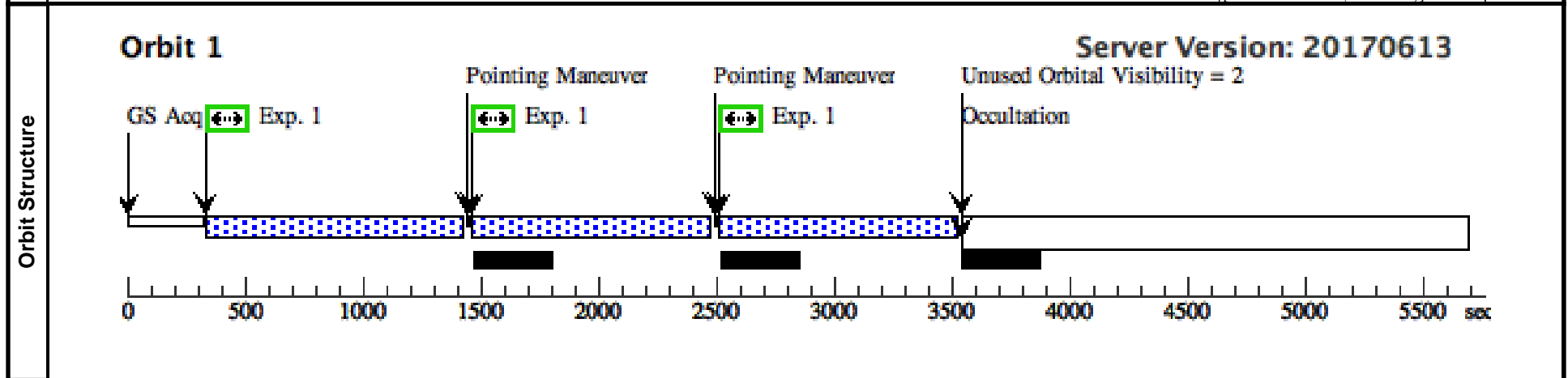
Mon Jul 17 21:02:55 GMT 2017

Visit	Proposal 15270, Visit 07 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: BEFORE 05-OCT-2017:00:00:00		
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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+66464.60	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

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 Visit 07 (1) 700 Secs (2667 Secs) [=>889.0 Secs (Pattern 1)] [=>889.0 Secs (Pattern 2)] [=>889.0 Secs (Pattern 3)]	[1]



Proposal 15270 - Visit 08 - The Coolest Sample of Brown Dwarf Dynamical Masses

Mon Jul 17 21:02:55 GMT 2017

Visit	Proposal 15270, Visit 08 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: BETWEEN 02-MAR-2018:00:00:00 AND 16-MAY-2018:00:00:00		
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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+66464.60	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

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 Visit 08 (1) 700 Secs (2667 Secs) [=>889.0 Secs (Pattern 1)] [=>889.0 Secs (Pattern 2)] [=>889.0 Secs (Pattern 3)]	[1]

