



14621 - Probing the young circumplanetary environment of a directly-imaged exoplanet through a rare transit event

Cycle: 24, 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) -BET-PIC	WFC3/UVIS	2	22-Jan-2017 21:00:18.0	yes
02	(1) -BET-PIC	WFC3/UVIS	2	22-Jan-2017 21:00:21.0	yes
03	(1) -BET-PIC	WFC3/UVIS	2	22-Jan-2017 21:00:24.0	yes
51	(1) -BET-PIC	WFC3/UVIS	2	22-Jan-2017 21:00:28.0	yes

8 Total Orbits Used

ABSTRACT

Among the thousands of known exoplanets, Beta Pic b is the only directly imaged exoplanet with a nearly edge-on orbit that may transit its host star. We show that the latest astrometric measurements rule out a transit by the planet at >10 -sigma significance, but we are certain that the Hill sphere of the planet will transit. Unfortunately, Beta Pic will not be visible from the ground during the entire ingress of its Hill sphere. With a period of ~ 20 years and no other system like it, this Hill sphere transit provides a rare opportunity to study the evolving circumplanetary environment of a young and well-characterized exoplanet. Thus we propose a modest HST campaign to photometrically search for signatures of the planet's large scale circumplanetary material. The existence of such material is plausible given that Beta Pic's young age is similar to that of the ring-bearing J1407b system. Using the exquisite photometric precision offered by WFC3 in spatial scanning mode, the data may detect gaps in a circumplanetary disk, indicative of rings carved out by newly-formed satellites. Given the sparse observational data for circumplanetary environments, non-detections will also be valuable for constraining the timescales relevant to circumplanetary material and moon formation. If photometric variations are detected with HST, these results would have enormous significance to the community since ground-based facilities could subsequently be used to monitor egress at higher cadence.

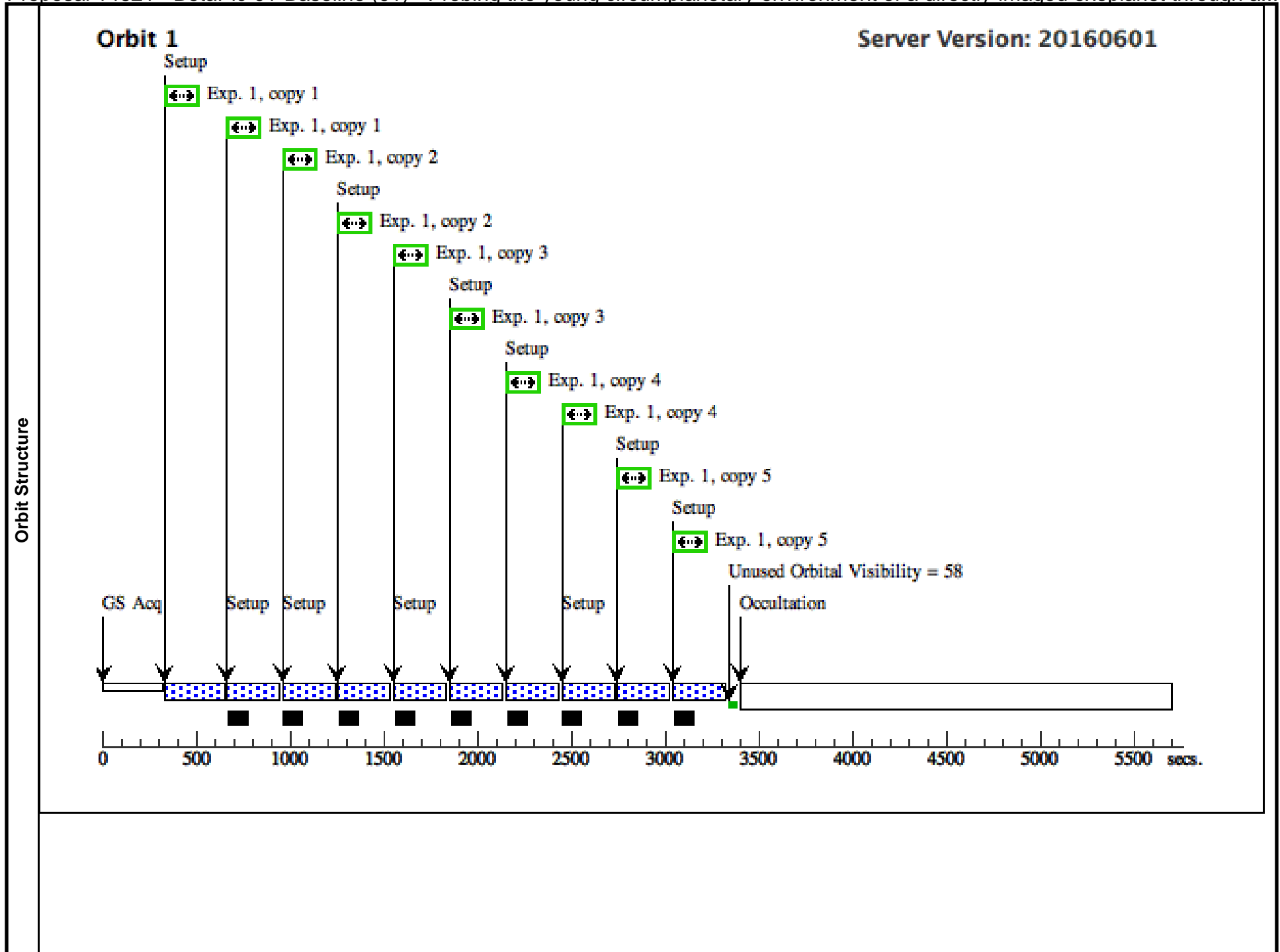
OBSERVING DESCRIPTION

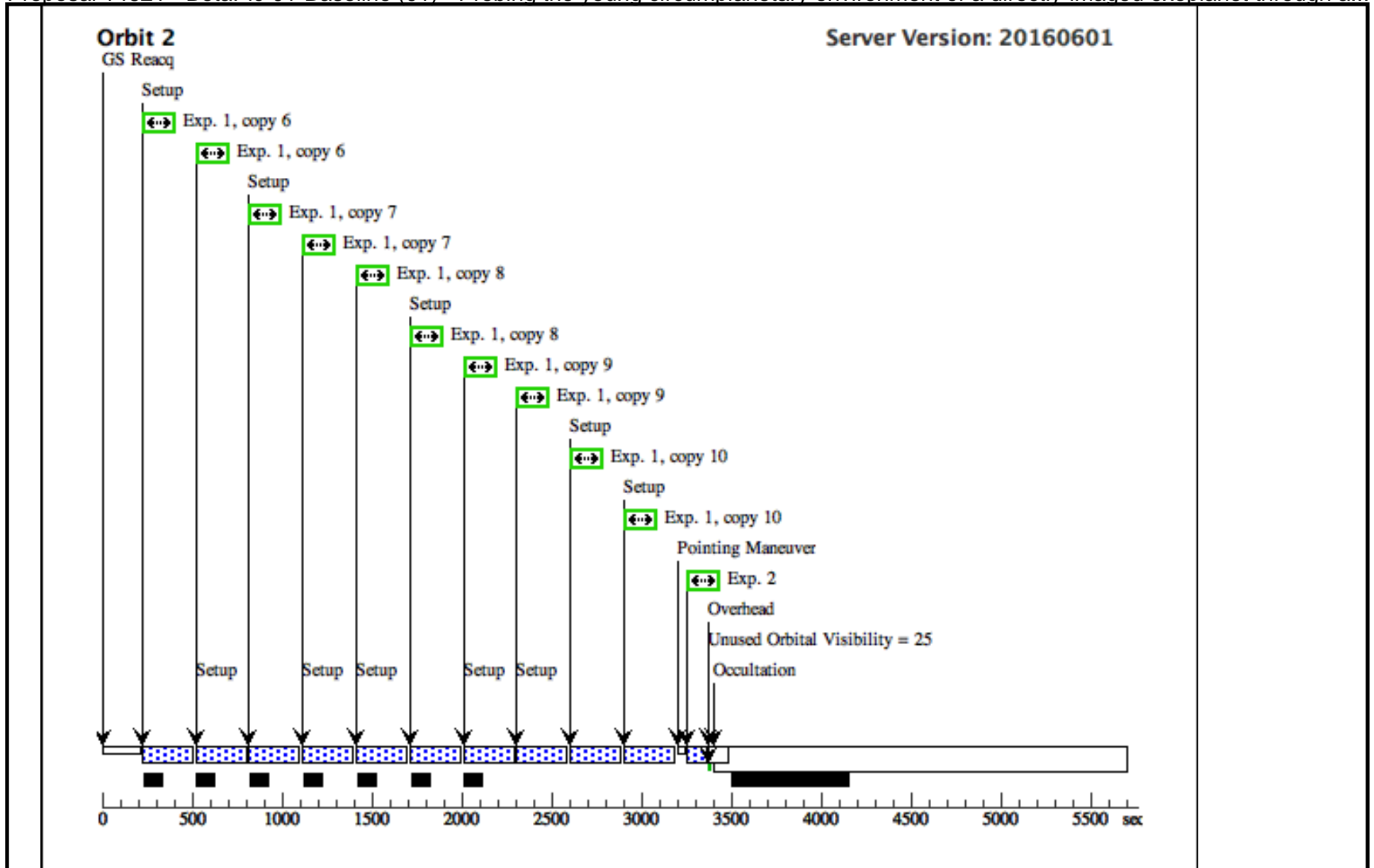
A search for signatures of Beta Pic b's large scale circumplanetary material.

Proposal 14621 - BetaPic-01-Baseline (01) - Probing the young circumplanetary environment of a directly-imaged exoplanet through a...

Mon Jan 23 02:00:29 GMT 2017

Visit	<p>Proposal 14621, BetaPic-01-Baseline (01), failed</p> <p>Diagnostic Status: No Diagnostics</p> <p>Scientific Instruments: WFC3/UVIS</p> <p>Special Requirements: SCHED 30%; ORIENT 140D TO 190 D; ORIENT 200D TO 220 D; ORIENT 320D TO 10 D; ORIENT 20D TO 40 D; BETWEEN 21-DEC-2016:00:00:00 AND 01-MAR-2017:00:00:00</p> <p><i>Comments: The Phase 2 observing plan differs from Phase 1 because of concerns about visit-to-visit repeatability using WFC3 in the IR mode. WFC3/UVIS has shown to be more repeatable (at the 0.1% level). ETC ID: WFC3UVIS.si.830752</i></p> <p><i>This visit uses spatial scanning at a rate of 0.5 arcsec/sec. Scanning is in both the forward and reverse directions. This visit has broad timing and orientation requirements.</i></p>																																																											
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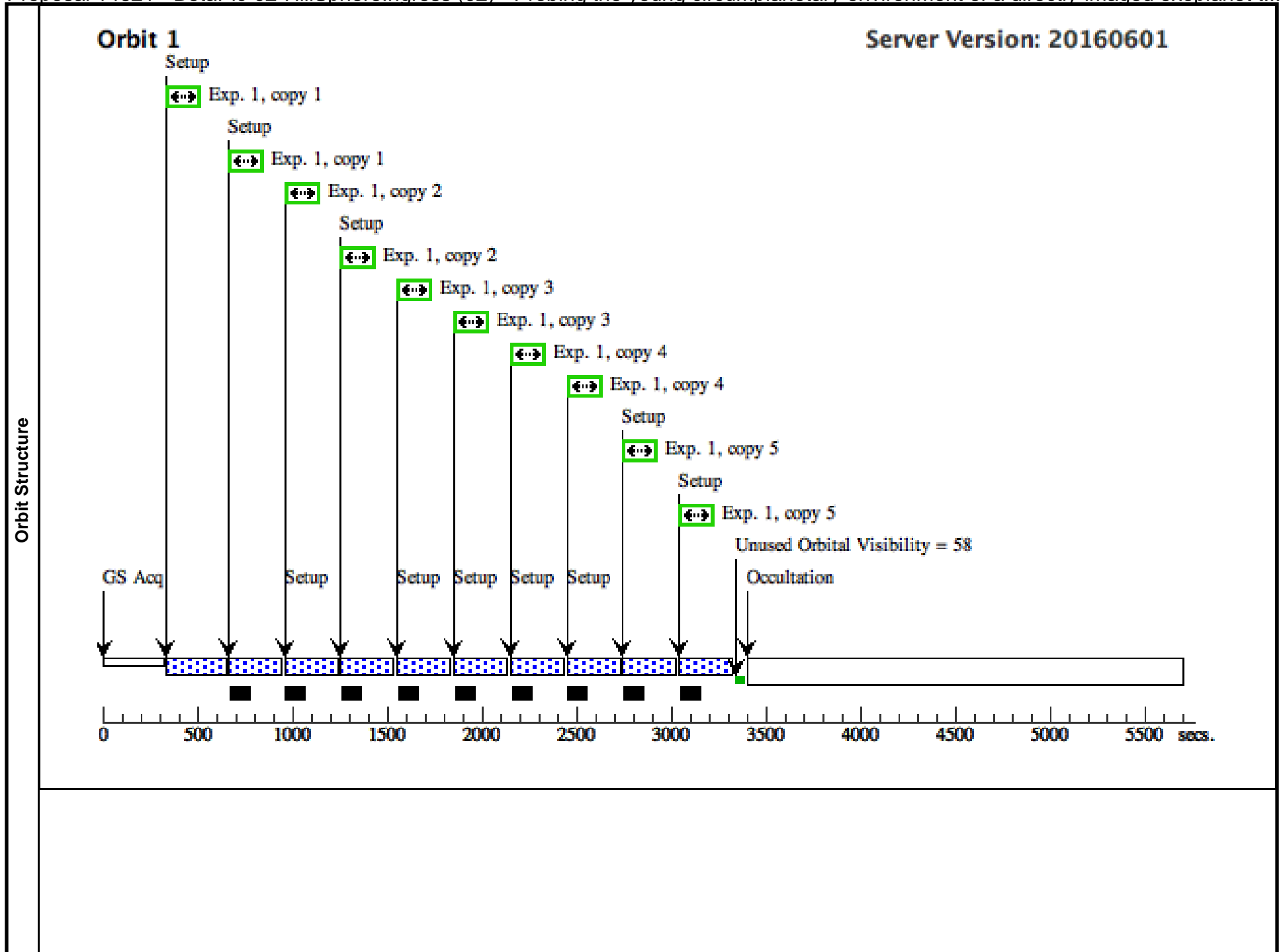
Proposal 14621 - BetaPic-02-HillSphereIngress (02) - Probing the young circumplanetary environment of a directly-imaged exoplanet t...

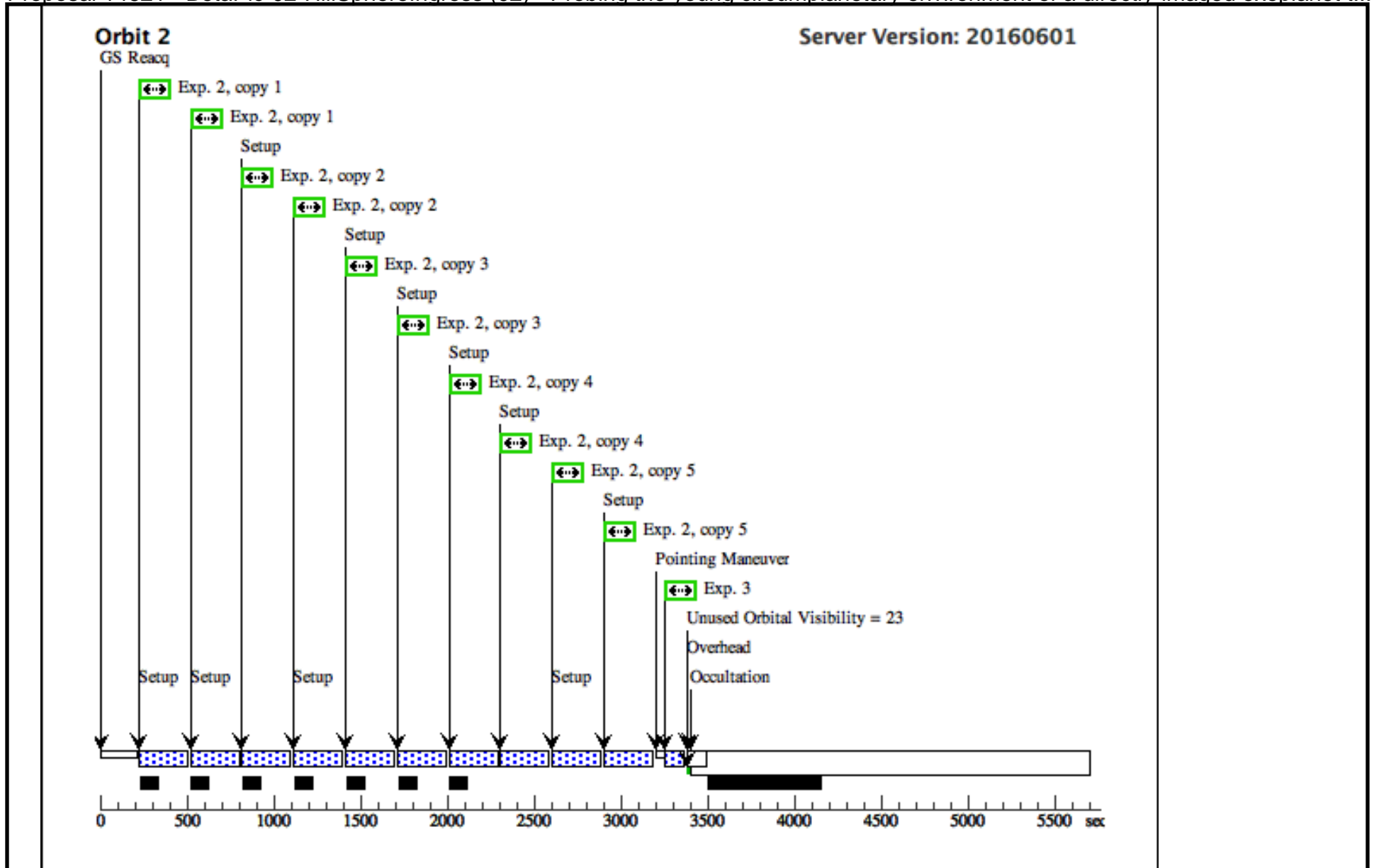
Mon Jan 23 02:00:29 GMT 2017

Visit	<p>Proposal 14621, BetaPic-02-HillSphereIngress (02), scheduling</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/UVIS</p> <p>Special Requirements: SCHED 30%; ORIENT 115D TO 220 D; ORIENT 300D TO 43 D; BETWEEN 15-JUN-2017:00:00:00 AND 03-JUL-2017:00:00:00</p> <p><i>Comments: The Phase 2 observing plan differs from Phase 1 because of concerns about visit-to-visit repeatability using WFC3 in the IR mode. WFC3/UVIS has shown to be more repeatable (at the 0.1% level). ETC ID: WFC3UVIS.si.830752</i></p> <p><i>This visit requires two consecutive orbits.</i></p> <p><i>This visit uses spatial scanning at a rate of 0.5 arcsec/sec.</i></p> <p><i>Scanning is in both the forward and reverse directions.</i></p> <p><i>This visit has broad timing and orientation requirements.</i></p>																	
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Proposal 14621 - BetaPic-02-HillSphereIngress (02) - Probing the young circumplanetary environment of a directly-imaged exoplanet t...

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	(WFC3UVI S.si.830752) (1) -BET-PIC	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F953N	BIN=NONE; CR-SPLIT=NO; FLASH=12	POS TARG -15,-15; SPATIAL SCAN 0.5 .3.7702 Degrees,Rou nd trip; GS ACQ SCENARI O BASE1B3	Same Guide Stars in BetaPic-02-HillSphe reIngress (02) Sequence 1-1 Non-In t in Same Guide Star s in BetaPic-02-HillS phereIngress (02)	110 Secs X 5 (1100 Secs) [==>(Copy 1, Forward)] [==>(Copy 1, Reverse)] [==>(Copy 2, Forward)] [==>(Copy 2, Reverse)] [==>(Copy 3, Forward)] [==>(Copy 3, Reverse)] [==>(Copy 4, Forward)] [==>(Copy 4, Reverse)] [==>(Copy 5, Forward)] [==>(Copy 5, Reverse)]	[1]
	2	(WFC3UVI S.si.830752) (1) -BET-PIC	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F953N	BIN=NONE; CR-SPLIT=NO; FLASH=12	POS TARG -15,-15; SPATIAL SCAN 0.5 .3.7702 Degrees,Rou nd trip; GS ACQ SCENARI O BASE1B3	Same Guide Stars in BetaPic-02-HillSphe reIngress (02) Sequence 2-3 Non-In t in Same Guide Star s in BetaPic-02-HillS phereIngress (02)	110 Secs X 5 (1100 Secs) [==>(Copy 1, Forward)] [==>(Copy 1, Reverse)] [==>(Copy 2, Forward)] [==>(Copy 2, Reverse)] [==>(Copy 3, Forward)] [==>(Copy 3, Reverse)] [==>(Copy 4, Forward)] [==>(Copy 4, Reverse)] [==>(Copy 5, Forward)] [==>(Copy 5, Reverse)]	[2]
	3	(1) -BET-PIC	WFC3/UVIS, ACCUM, UVIS	F953N	BIN=NONE; CR-SPLIT=NO; FLASH=12	POS TARG 0,-5	Same Guide Stars in BetaPic-02-HillSphe reIngress (02) Sequence 2-3 Non-In t in Same Guide Star s in BetaPic-02-HillS phereIngress (02)	110 Secs (110 Secs) [==>]	[2]





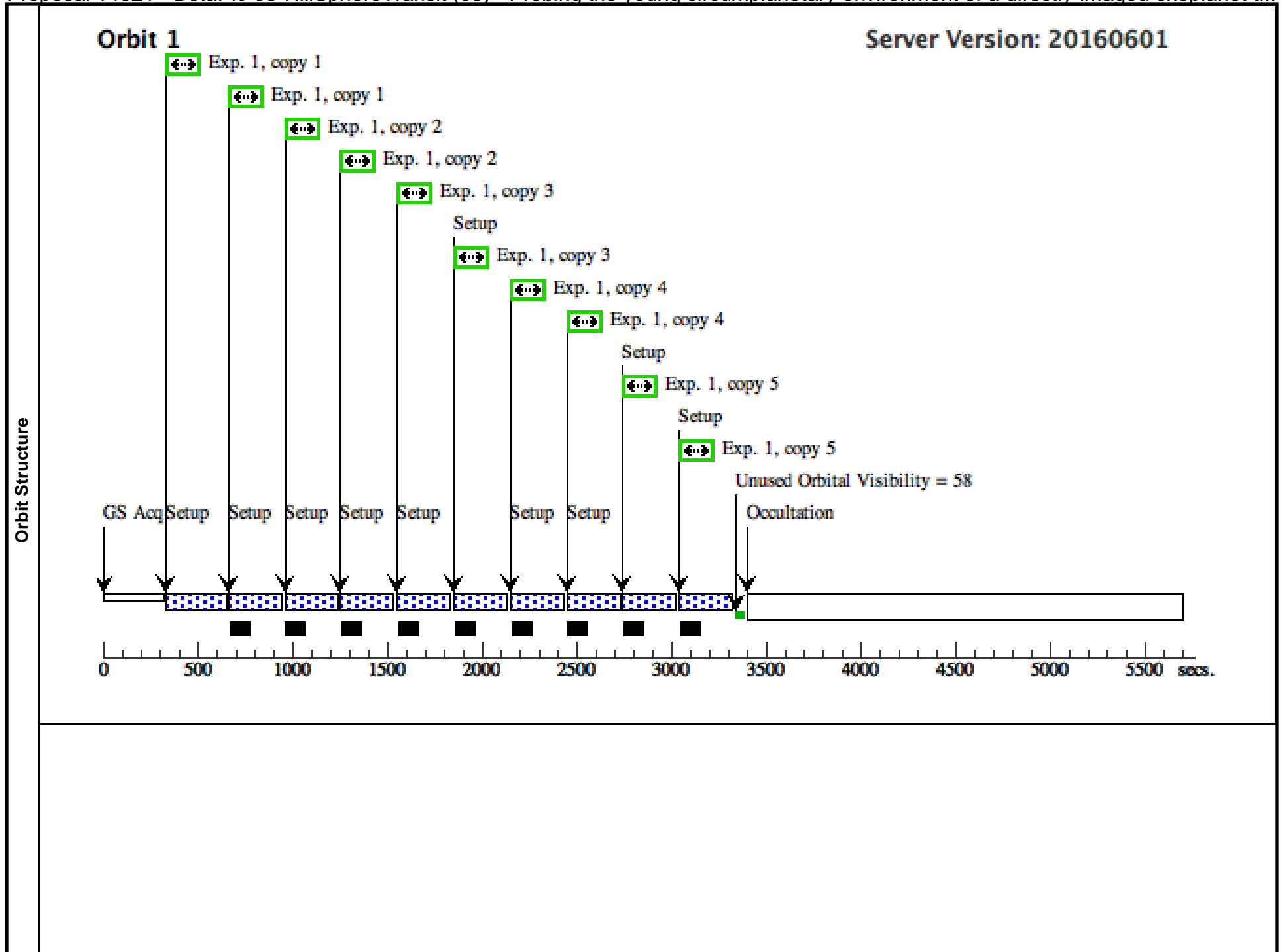
Proposal 14621 - BetaPic-03-HillSphereTransit (03) - Probing the young circumplanetary environment of a directly-imaged exoplanet t...

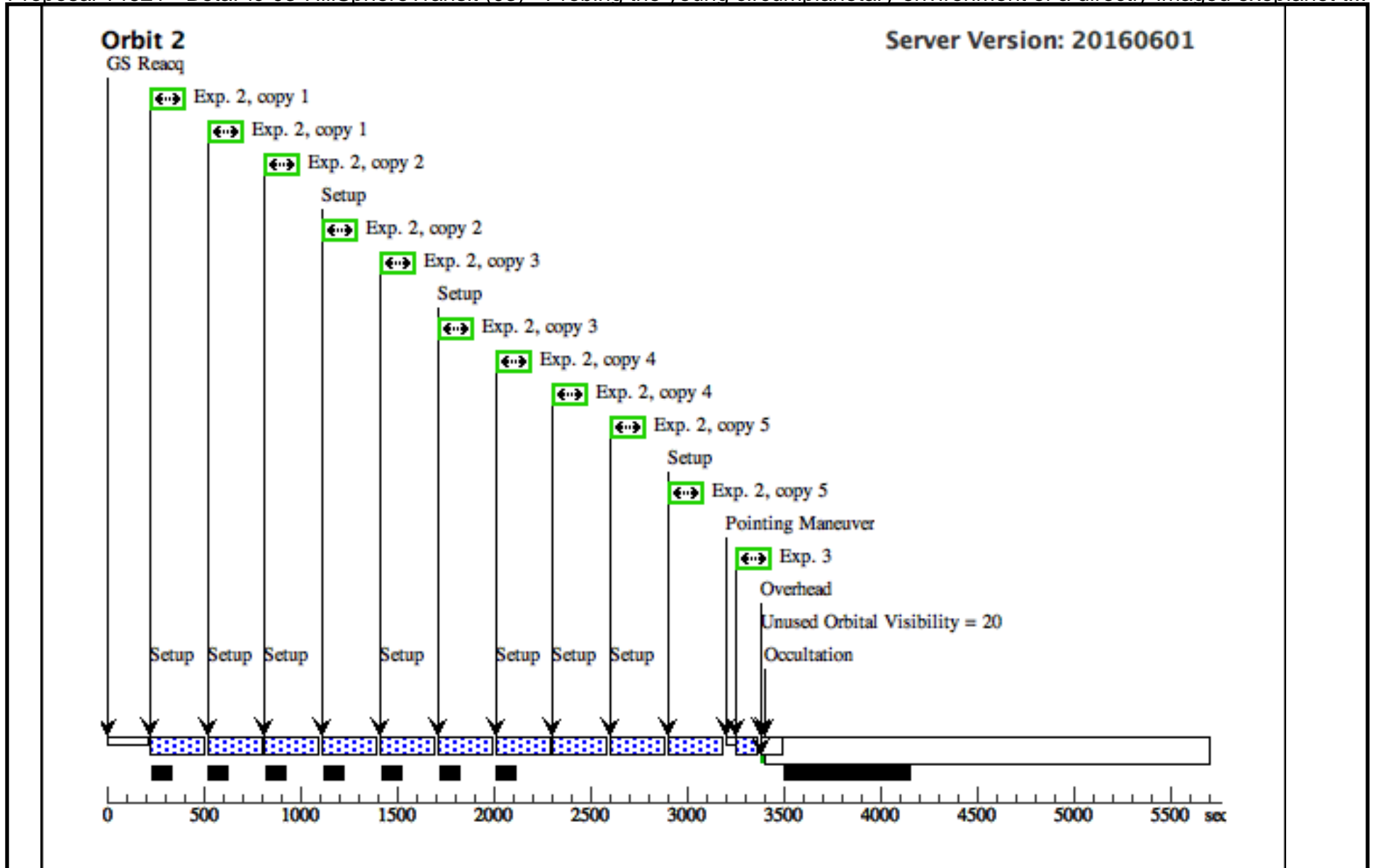
Mon Jan 23 02:00:30 GMT 2017

Visit	<p>Proposal 14621, BetaPic-03-HillSphereTransit (03), scheduling</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/UVIS</p> <p>Special Requirements: SCHED 30%; ORIENT 115D TO 220 D; ORIENT 300D TO 43 D; BETWEEN 02-AUG-2017:00:00:00 AND 16-AUG-2017:00:00:00</p> <p><i>Comments: The Phase 2 observing plan differs from Phase 1 because of concerns about visit-to-visit repeatability using WFC3 in the IR mode. WFC3/UVIS has shown to be more repeatable (at the 0.1% level). ETC ID: WFC3UVIS.si.830752</i></p> <p><i>This visit requires two consecutive orbits.</i></p> <p><i>This visit uses spatial scanning at a rate of 0.5 arcsec/sec.</i></p> <p><i>Scanning is in both the forward and reverse directions.</i></p> <p><i>This visit has broad timing and orientation requirements.</i></p>																	
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Proposal 14621 - BetaPic-03-HillSphereTransit (03) - Probing the young circumplanetary environment of a directly-imaged exoplanet t...

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	(WFC3UVI S.si.830752) (1) -BET-PIC	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F953N	BIN=NONE; CR-SPLIT=NO; FLASH=12	POS TARG -15,-15; SPATIAL SCAN 0.5 .3.7702 Degrees,Rou nd trip; GS ACQ SCENARI O BASE1B3	Same Guide Stars in BetaPic-03-HillSphe reTransit (03) Sequence 1-1 Non-In t in Same Guide Star s in BetaPic-03-HillS phereTransit (03)	110 Secs X 5 (1100 Secs) [==>(Copy 1, Forward)] [==>(Copy 1, Reverse)] [==>(Copy 2, Forward)] [==>(Copy 2, Reverse)] [==>(Copy 3, Forward)] [==>(Copy 3, Reverse)] [==>(Copy 4, Forward)] [==>(Copy 4, Reverse)] [==>(Copy 5, Forward)] [==>(Copy 5, Reverse)]	[1]
	2	(WFC3UVI S.si.830752) (1) -BET-PIC	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F953N	BIN=NONE; CR-SPLIT=NO; FLASH=12	POS TARG -15,-15; SPATIAL SCAN 0.5 .3.7702 Degrees,Rou nd trip; GS ACQ SCENARI O BASE1B3	Same Guide Stars in BetaPic-03-HillSphe reTransit (03) Sequence 2-3 Non-In t in Same Guide Star s in BetaPic-03-HillS phereTransit (03)	110 Secs X 5 (1100 Secs) [==>(Copy 1, Forward)] [==>(Copy 1, Reverse)] [==>(Copy 2, Forward)] [==>(Copy 2, Reverse)] [==>(Copy 3, Forward)] [==>(Copy 3, Reverse)] [==>(Copy 4, Forward)] [==>(Copy 4, Reverse)] [==>(Copy 5, Forward)] [==>(Copy 5, Reverse)]	[2]
	3	(1) -BET-PIC	WFC3/UVIS, ACCUM, UVIS	F953N	BIN=NONE; CR-SPLIT=NO; FLASH=12	POS TARG 0,10	Same Guide Stars in BetaPic-03-HillSphe reTransit (03) Sequence 2-3 Non-In t in Same Guide Star s in BetaPic-03-HillS phereTransit (03)	110 Secs (110 Secs) [==>]	[2]





Proposal 14621 - BetaPic-51-Baseline (51) - Probing the young circumplanetary environment of a directly-imaged exoplanet through a...

Mon Jan 23 02:00:30 GMT 2017

Visit	<p>Proposal 14621, BetaPic-51-Baseline (51)</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/UVIS</p> <p>Special Requirements: SCHED 30%; ORIENT 115D TO 220 D; ORIENT 300D TO 43 D; BETWEEN 10-FEB-2017:00:00:00 AND 22-FEB-2017:00:00:00</p> <p><i>Comments: This visit requires two consecutive orbits. This visit uses spatial scanning at a rate of 0.5 arcsec/sec. Scanning is in both the forward and reverse directions. This visit has broad timing and orientation requirements.</i></p>																
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#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	(WFC3UVI S.si.830752)	(1) -BET-PIC WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F953N	BIN=NONE; CR-SPLIT=NO; FLASH=12	POS TARG -15,-15; SPATIAL SCAN 0.5 .3.7702 Degrees,Rou nd trip; GS ACQ SCENARI O BASE1B3	Same Guide Stars in BetaPic-51-Baseline (51) Sequence 1-1 Non-In t in Same Guide Star s in BetaPic-51-Base line (51)	110 Secs X 5 (1100 Secs) [==>(Copy 1, Forward)] [==>(Copy 1, Reverse)] [==>(Copy 2, Forward)] [==>(Copy 2, Reverse)] [==>(Copy 3, Forward)] [==>(Copy 3, Reverse)] [==>(Copy 4, Forward)] [==>(Copy 4, Reverse)] [==>(Copy 5, Forward)] [==>(Copy 5, Reverse)]	[1]
	2	(WFC3UVI S.si.830752)	(1) -BET-PIC WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F953N	BIN=NONE; CR-SPLIT=NO; FLASH=12	POS TARG -15,-15; SPATIAL SCAN 0.5 .3.7702 Degrees,Rou nd trip; GS ACQ SCENARI O BASE1B3	Same Guide Stars in BetaPic-51-Baseline (51) Sequence 2-3 Non-In t in Same Guide Star s in BetaPic-51-Base line (51)	110 Secs X 5 (1100 Secs) [==>(Copy 1, Forward)] [==>(Copy 1, Reverse)] [==>(Copy 2, Forward)] [==>(Copy 2, Reverse)] [==>(Copy 3, Forward)] [==>(Copy 3, Reverse)] [==>(Copy 4, Forward)] [==>(Copy 4, Reverse)] [==>(Copy 5, Forward)] [==>(Copy 5, Reverse)]	[2]
	3		(1) -BET-PIC WFC3/UVIS, ACCUM, UVIS	F953N	BIN=NONE; CR-SPLIT=NO; FLASH=12	POS TARG 0,-20	Same Guide Stars in BetaPic-51-Baseline (51) Sequence 2-3 Non-In t in Same Guide Star s in BetaPic-51-Base line (51)	110 Secs (110 Secs) [==>]	[2]

