15231 - Searching for fossil fragments of the Galactic bulge formation process

Cycle: 25, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
03	(1) LILLER1 ANY	ACS/WFC WFC3/IR WFC3/UVIS	5	13-Mar-2019 10:01:35.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
04	(1) LILLER1 ANY	ACS/WFC WFC3/IR WFC3/UVIS	5	13-Mar-2019 10:01:39.0	yes

10 Total Orbits Used

ABSTRACT

We have discovered that the stellar system Terzan5 (Ter5) in the Galactic bulge harbors stellar populations with very different IRON content (delta[Fe/H]~1 dex, Ferraro+09, Nature 462, 483) and AGES (12 Gyr and 4.5 Gyr for the sub-solar and super-solar metallicity populations, respectively, Ferraro+16, ApJ,828,75).

This evidence demonstrates that Ter5 is not a globular cluster, and identifies it as (1) a site in the Galactic bulge where recent star formation occurred, and (2) the remnant of a massive system able to retain the iron-enriched gas ejected by violent supernova explosions. The striking chemical similarity between Ter5 and the bulge opens the fascinating possibility that we discovered the fossil remnant of a pristine massive structure that could have contributed to the Galactic bulge assembly.

Prompted by this finding, here we propose to secure deep HST optical observations for the bulge stellar system Liller1, that shows a similar complexity as Ter5, with evidence of two stellar populations with different iron content. The immediate goal is to properly explore the main sequence turnoff region of the system for unveiling possible splits due to stellar populations of different ages. As demonstrated by our experience with Ter5, the requested HST observations, in combination with the K-band diffraction limited images that we already secured with GeMS-Gemini, are essential to achieve this goal.

The project will allow us to establish if other fossil remnants of the bulge formation epoch do exist, thus probing that the merging of pre-evolved massive structures has been an important channel for the formation of the Galactic bulge.

OBSERVING DESCRIPTION

We plan to secure optical images in two classical ACS passbands (F814W and F606W) of the stellar system Liller1 in the galactic bulge.

The observations are organized in just one visit: 3 orbits are needed to secure 6 exposures (each 1300 sec -long) in the F606W filter and 2 orbits to secure 6 exposures (each ~850 sec-long) in the F814W filter. All the exposures have been dithered by using appropriate offsets. Parallel observation with the WFC3 in the F606W,F814W,F110W and F160W filters are also planned in order to sample the bulge field population in the region

Proposal 15231 (STScI Edit Number: 1, Created: Wednesday, March 13, 2019 at 9:01:41 AM Eastern Standard Time) - Overview

surrounding the cluster.

Visit

Proposal 15231, liller1 (03), failed Wed Mar 13 14:01:41 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR, WFC3/UVIS, ACS/WFC

Special Requirements: (none)

Diagnostics

(liller1 (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN
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Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	LILLER1	RA: 17 33 24.5600 (263.3523333d) Dec: -33 23 22.40 (-33.38956d) Equinox: J2000		V=28	Reference Frame: ICRS

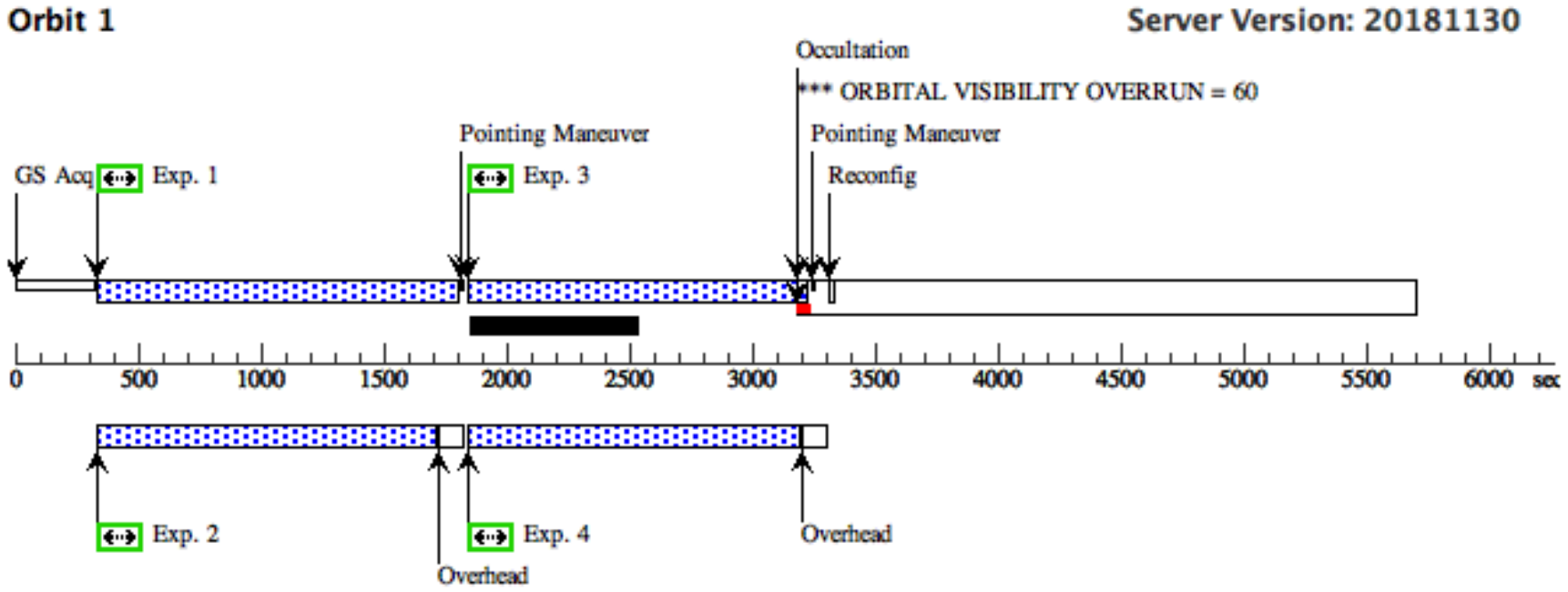
Comments:
Category=STELLAR CLUSTER
Description=[GLOBULAR CLUSTER]

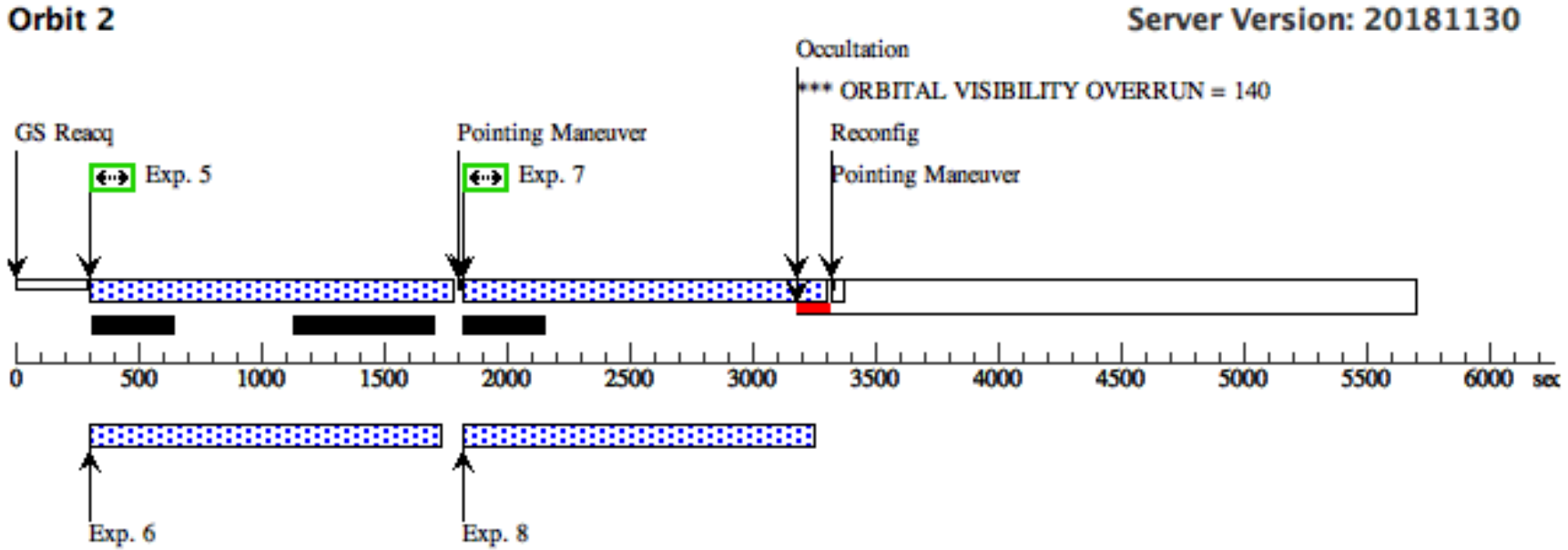
Exposures

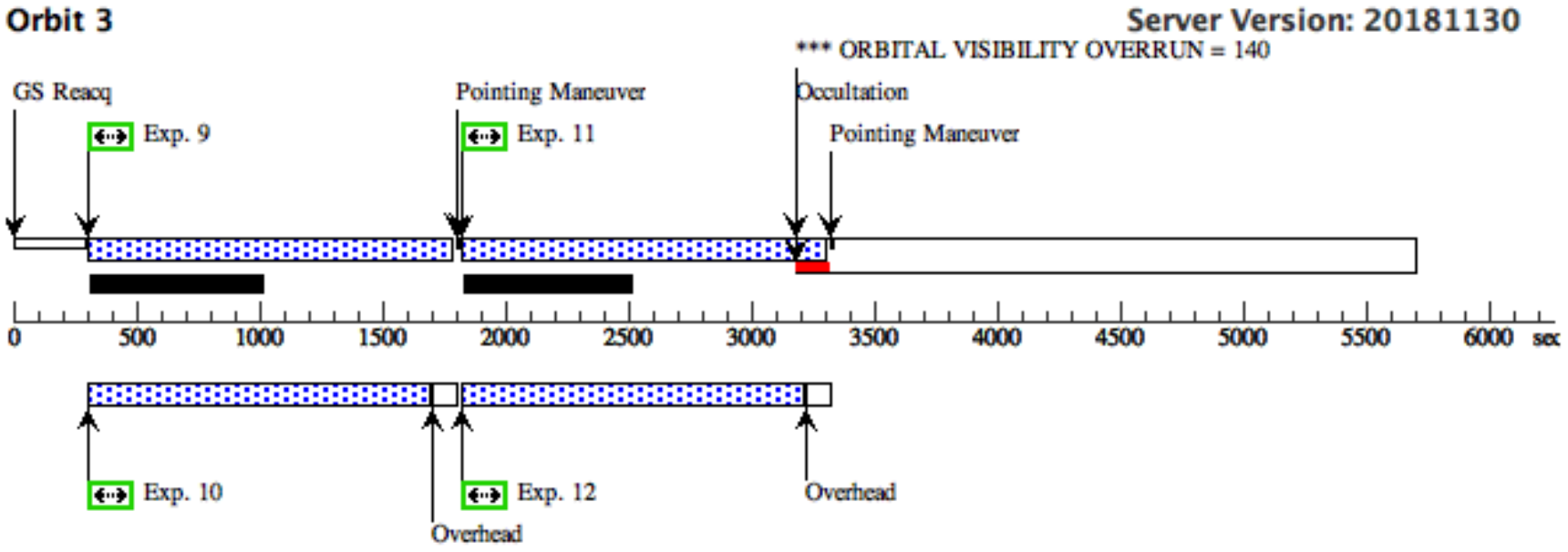
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Liller_v1	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F606W			Prime + Parallel Group 1-2 in liller1 (03)	1260 Secs (1260 Secs) *[==>]*	*[1]*
2	ParLiller_v1	ANY	WFC3/UVIS, ACCUM, UVIS1	F606W			Prime + Parallel Group 1-2 in liller1 (03)	1349 Secs (1349 Secs) *[==>]*	*[1]*
3	Liller_v2	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F606W		POS TARG -0.099,-0.165	Prime + Parallel Group 3-4 in liller1 (03)	1260 Secs (1260 Secs) *[==>]*	*[1]*
4	ParLiller_v2	ANY	WFC3/UVIS, ACCUM, UVIS1	F606W			Prime + Parallel Group 3-4 in liller1 (03)	1349 Secs (1349 Secs) *[==>]*	*[1]*
5	Liller_v3	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.059,-0.095	Prime + Parallel Group 5-6 in liller1 (03)	1361 Secs (1361 Secs) *[==>]*	*[2]*
6	ParLiller_h1	ANY	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=14; SAMP-SEQ=STEP200		Prime + Parallel Group 5-6 in liller1 (03)	1399.231402 Secs (1399.231 Secs) *[==>]*	*[2]*
7	Liller_v4	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.218,-0.024	Prime + Parallel Group 7-8 in liller1 (03)	1361 Secs (1361 Secs) *[==>]*	*[2]*
8	ParLiller_j1	ANY	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=14; SAMP-SEQ=STEP200		Prime + Parallel Group 7-8 in liller1 (03)	1399.231402 Secs (1399.231 Secs) *[==>]*	*[2]*
9	Liller_v5	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.158,0.07	Prime + Parallel Group 9-10 in liller1 (03)	1360 Secs (1360 Secs) *[==>]*	*[3]*
10	ParLiller_v3	ANY	WFC3/UVIS, ACCUM, UVIS1	F606W			Prime + Parallel Group 9-10 in liller1 (03)	1392 Secs (1392 Secs) *[==>]*	*[3]*
11	Liller_v6	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.099,0.165	Prime + Parallel Group 11-12 in liller1 (03)	1360 Secs (1360 Secs) *[==>]*	*[3]*
12	ParLiller_v4	ANY	WFC3/UVIS, ACCUM, UVIS1	F606W			Prime + Parallel Group 11-12 in liller1 (03)	1392 Secs (1392 Secs) *[==>]*	*[3]*
13	Liller_i1	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F814W		POS TARG -0.059,0.095	Prime + Parallel Group 13-14 in liller1 (03)	836 Secs (836 Secs) *[==>]*	*[4]*
14	ParLiller_i1	ANY	WFC3/UVIS, ACCUM, UVIS1	F814W			Prime + Parallel Group 13-14 in liller1 (03)	865 Secs (865 Secs) *[==>]*	*[4]*
15	Liller_i2	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F814W		POS TARG -0.218,0.024	Prime + Parallel Group 15-16 in liller1 (03)	836 Secs (836 Secs) *[==>]*	*[4]*
16	ParLiller_i2	ANY	WFC3/UVIS, ACCUM, UVIS1	F814W			Prime + Parallel Group 15-16 in liller1 (03)	865 Secs (865 Secs) *[==>]*	*[4]*
17	Liller_i3	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F814W		POS TARG -0.158,-0.07	Prime + Parallel Group 17-18 in liller1 (03)	837 Secs (837 Secs) *[==>]*	*[4]*
18	ParLiller_i3	ANY	WFC3/UVIS, ACCUM, UVIS1	F814W			Prime + Parallel Group 17-18 in liller1 (03)	865 Secs (865 Secs) *[==>]*	*[4]*
19	Liller_i4	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F814W		POS TARG -0.158,-0.11	Prime + Parallel Group 19-20 in liller1 (03)	855 Secs (855 Secs) *[==>]*	*[5]*

	20	ParLiller_i4	ANY	WFC3/UVIS, ACCUM, UVIS1	F814W		Prime + Parallel Group 19-20 in liller1 (03)	864 Secs (864 Secs) *[==>]*	 ***[5]***
	21	Liller_i5	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F814W	POS TARG -0.099,0.052	Prime + Parallel Group 21-22 in liller1 (03)	855 Secs (855 Secs) *[==>]*	 ***[5]***
	22	ParLiller_i5	ANY	WFC3/UVIS, ACCUM, UVIS1	F814W		Prime + Parallel Group 21-22 in liller1 (03)	864 Secs (864 Secs) *[==>]*	 ***[5]***
	23	Liller_i6	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F814W	POS TARG -0.040,0.214	Prime + Parallel Group 23-24 in liller1 (03)	854 Secs (854 Secs) *[==>]*	 ***[5]***
	24	ParLiller_i6	ANY	WFC3/UVIS, ACCUM, UVIS1	F814W		Prime + Parallel Group 23-24 in liller1 (03)	864 Secs (864 Secs) *[==>]*	 ***[5]***

Orbit Structure



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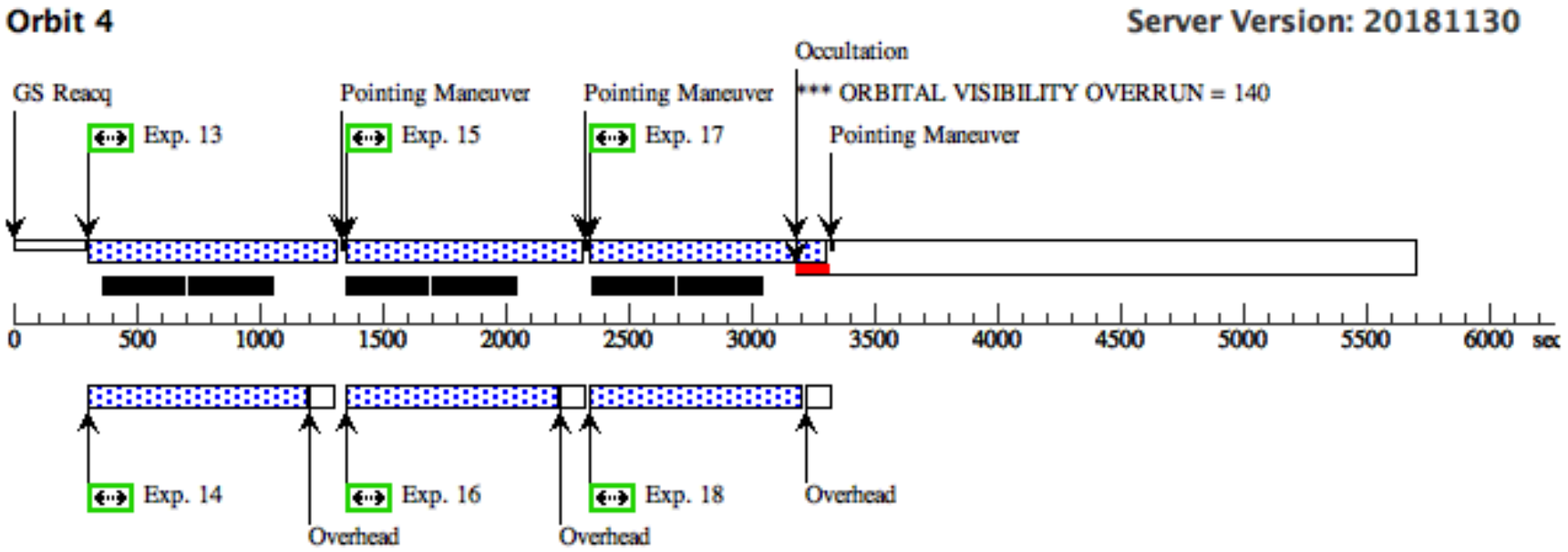
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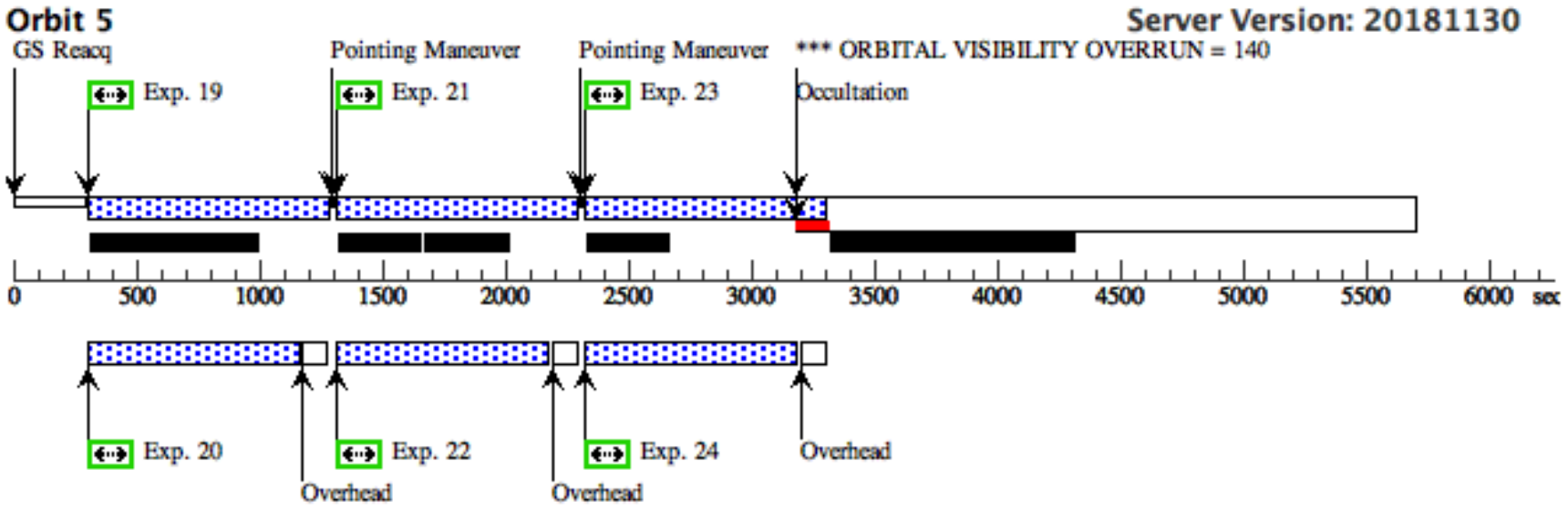
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Visit

Proposal 15231, liller1 (04) Wed Mar 13 14:01:41 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR, WFC3/UVIS, ACS/WFC

Special Requirements: (none)

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14	ParLiller_i1	ANY	WFC3/UVIS, ACCUM, UVIS1	F814W			Prime + Parallel Group 13-14 in liller1 (04)	865 Secs (865 Secs) *[==>]*	*[4]*
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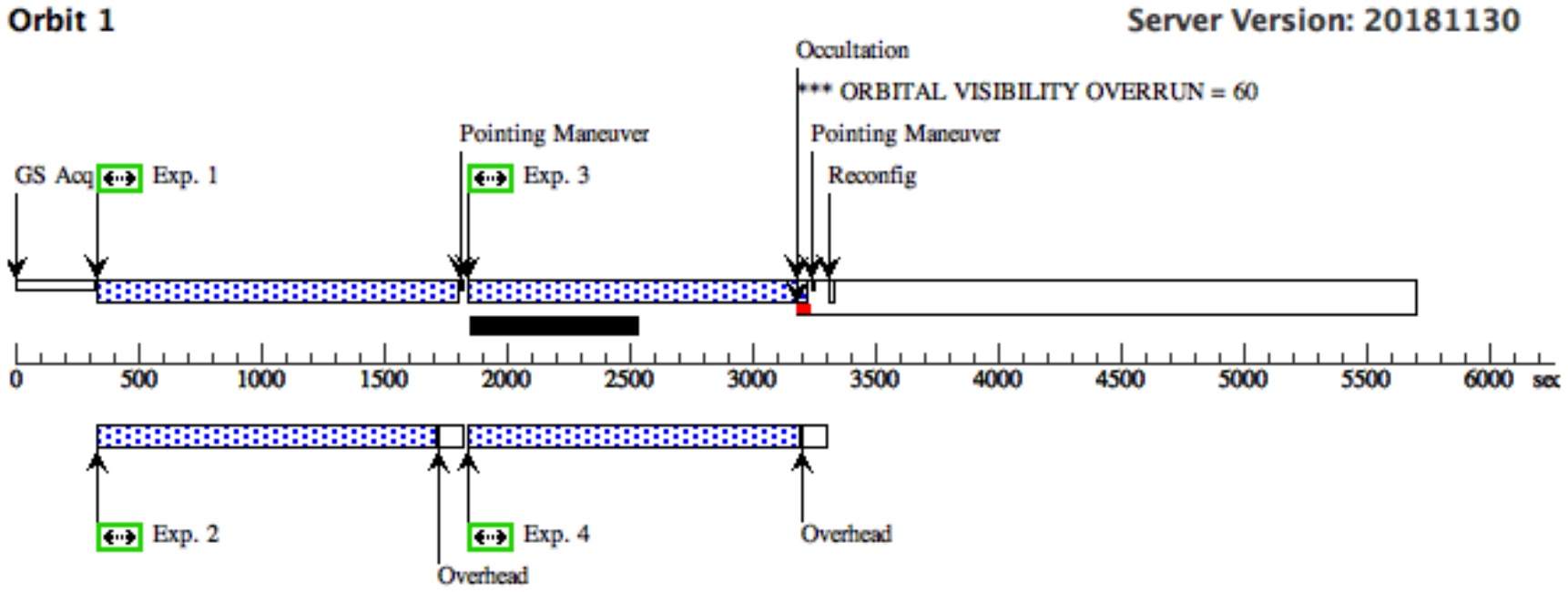
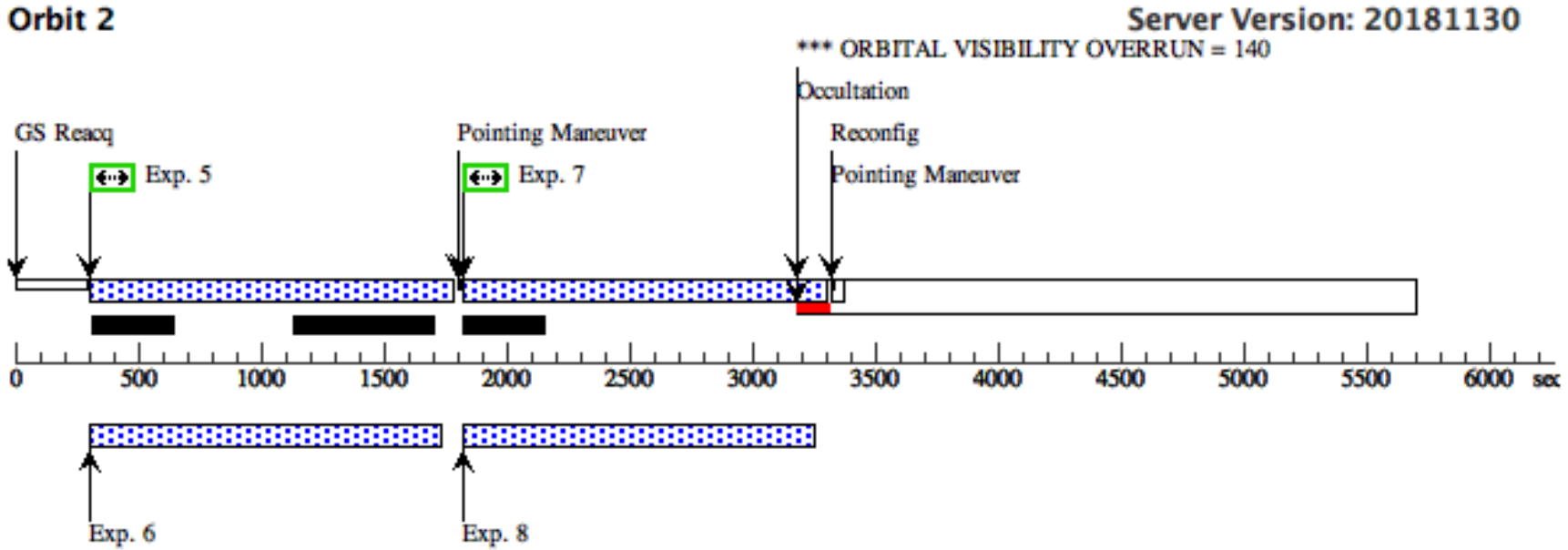
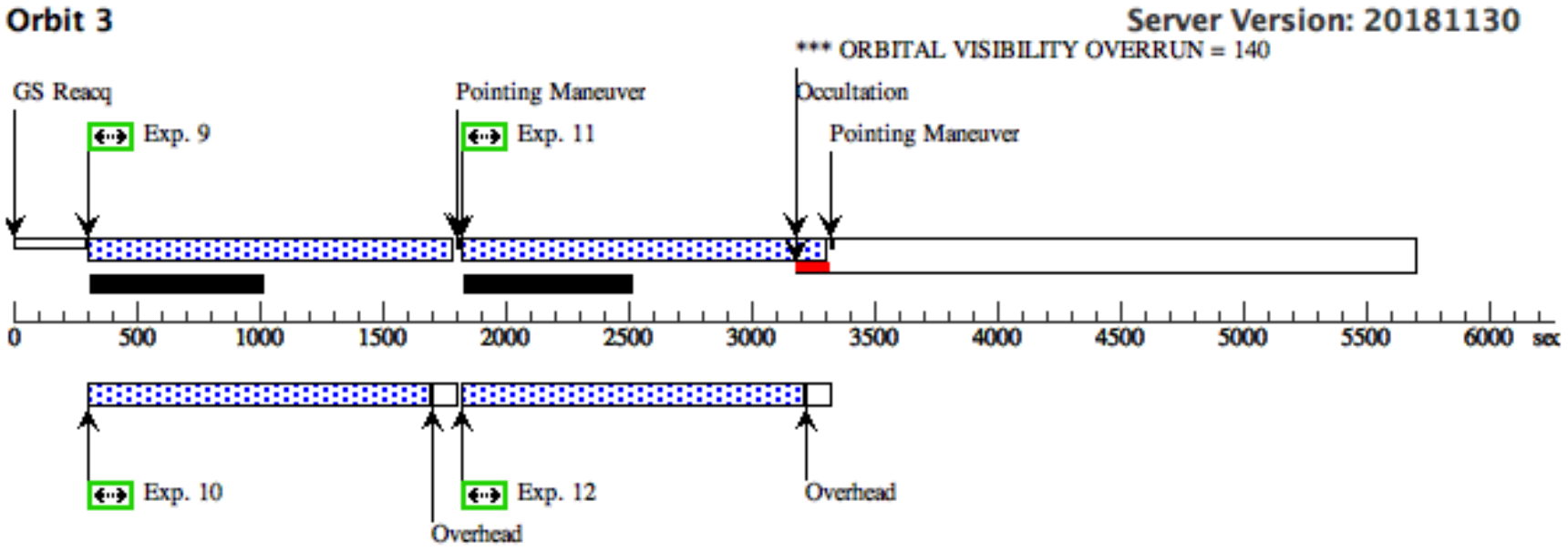
19	Liller_i4	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F814W		POS TARG -0.158,-0.11	Prime + Parallel Group 19-20 in liller1 (04)	855 Secs (855 Secs) *[==>]*	*[5]*

	20	ParLiller_i4	ANY	WFC3/UVIS, ACCUM, UVIS1	F814W		Prime + Parallel Group 19-20 in liller1 (04)	864 Secs (864 Secs) *[==>]*	 ***[5]***
	21	Liller_i5	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F814W	POS TARG -0.099,0.052	Prime + Parallel Group 21-22 in liller1 (04)	855 Secs (855 Secs) *[==>]*	 ***[5]***
	22	ParLiller_i5	ANY	WFC3/UVIS, ACCUM, UVIS1	F814W		Prime + Parallel Group 21-22 in liller1 (04)	864 Secs (864 Secs) *[==>]*	 ***[5]***
	23	Liller_i6	(1) LILLER1	ACS/WFC, ACCUM, WFC1	F814W	POS TARG -0.040,0.214	Prime + Parallel Group 23-24 in liller1 (04)	854 Secs (854 Secs) *[==>]*	 ***[5]***
	24	ParLiller_i6	ANY	WFC3/UVIS, ACCUM, UVIS1	F814W		Prime + Parallel Group 23-24 in liller1 (04)	864 Secs (864 Secs) *[==>]*	 ***[5]***

Orbit Structure



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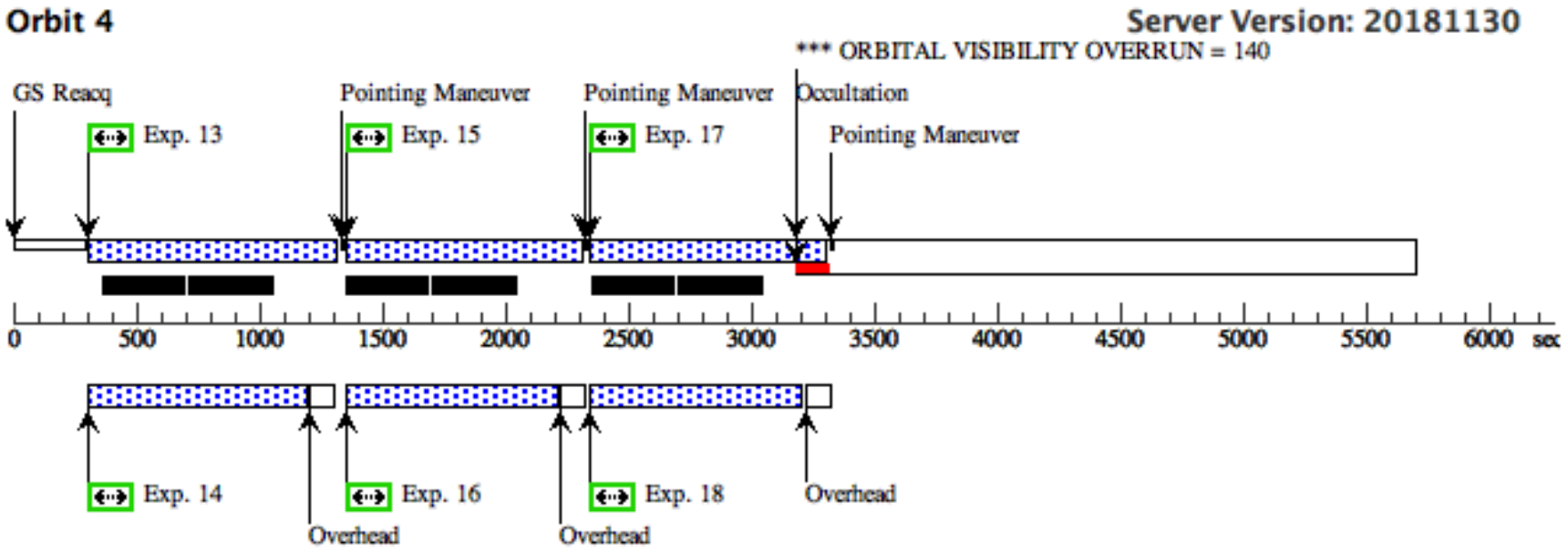
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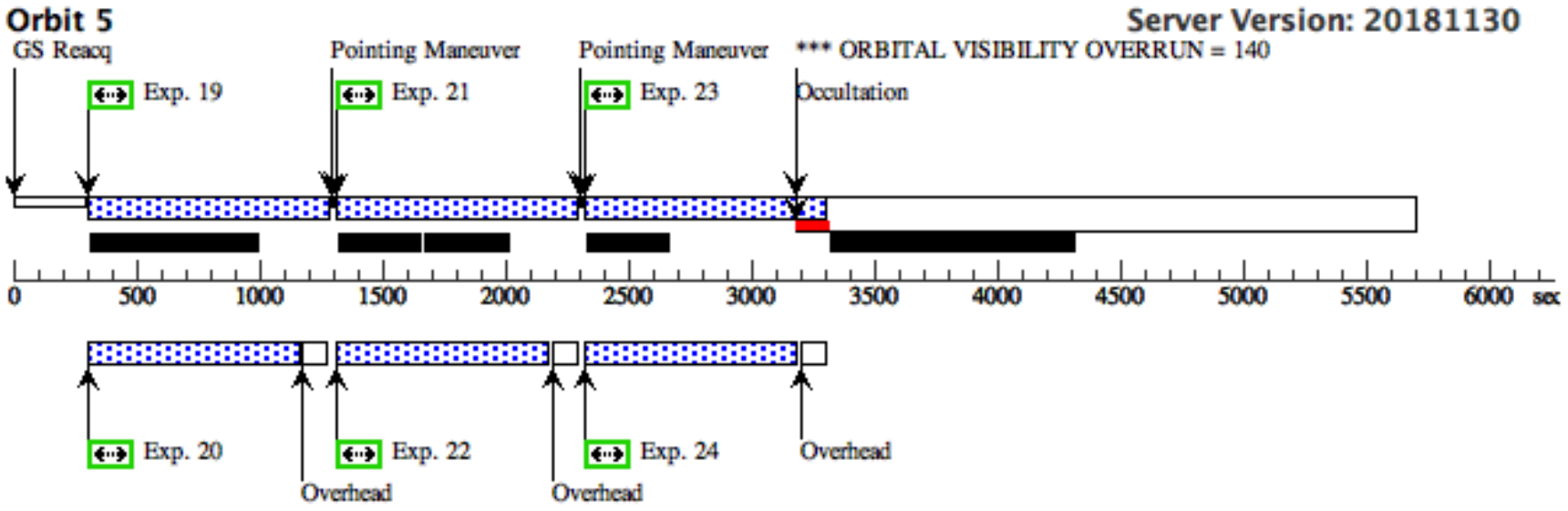
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