16837 - Mapping the Activity of the LINER I NGC 5005 from ~30 pc out to kpc scales

Cycle: 29, 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?*
01	(1) NGC-5005	WFC3/UVIS	4	24-Sep-2021 13:00:34.0	yes
02	(1) NGC-5005	WFC3/UVIS	4	24-Sep-2021 13:00:35.0	yes
03	(1) NGC-5005	WFC3/UVIS	2	24-Sep-2021 13:00:36.0	yes
04	(1) NGC-5005	WFC3/UVIS	1	24-Sep-2021 13:00:36.0	yes

11 Total Orbits Used

ABSTRACT

High resolution multi-wavelength maps of the nuclear regions of active galaxies reveal an increasingly complex view, with AGN, LINER and star-formation co-existing in the same, often highly obscured, nucleus. The ongoing deep high resolution spectral-spatial mapping of Compton-thick (CT) AGNs with Chandra explores one aspect of this multi-faceted activity. However, there are no comparable X-ray studies of LINERs. We propose deep Chandra ACIS-S observations of the nearby (~17 Mpc) LINER NGC 5005 (250 ks), for which the archival snapshot suggests an extended ionized region, akin to an AGN ionization cone. To get a fuller detailed picture of the AGN-host interaction, we propose 11 orbits with HSTWFC3 for diagnostic optical emission line imaging.

OBSERVING DESCRIPTION

We aim to measure [O III], H-alpha, H-beta, the [S II] 6717,6731 and red & blue continua of NGC 5005. Ratios between continuum-subtracted line maps will be used to make "BPT maps" to diagnose the local ionization state.

The overall goals are similar to Programs #15350 (PI: Maksym) and #15609 (PI: Fabbiano), as are the basic strategies. This program requires some changes with respect to specific filters, and it is a WFC3-only program. Our goal is to reach >3-sigma detection for all lines within <3 arcsec of the nucleus.

This will require 4 orbits of [O III] (F502N), 4 orbits of H-beta (F487N), 2 orbits of [S II] (F673N) and <1 orbit of H-alpha (F658N). Even the faintest H-alpha regions will be detected at ~16-sigma in one orbit, so we pack the continuua into the H-alpha orbit.

Given the number of exposures, it is possible to use a box dither to improve PSF sampling for [O III], H-beta and [S II]. H-alpha and continuum observations are short and use a CR-split.

All exposures use pre-flash amounts that vary with exposure.

Visit

Proposal 16837, NGC 5005 [O III] (01) Fri Sep 24 17:00:37 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: 4 orbits of exposure for NGC 5005 using F502N. The box dither pattern should improve resolution (should it become relevant), and 8 exposures should be okay for cosmic ray rejection even if the individual exposures are a little long.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1-2)

Fixed Targets

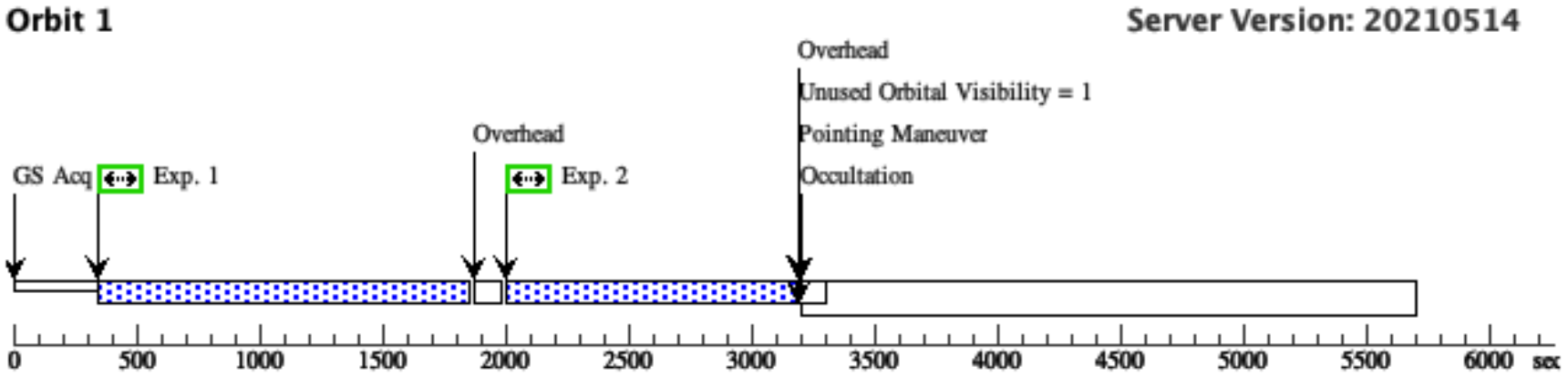
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-5005	RA: 13 10 56.3120 (197.7346333d) Dec: +37 03 32.19 (37.05894d) Equinox: J2000	Epoch of Position: 2015.5	V=13.67	Reference Frame: SIMBAD

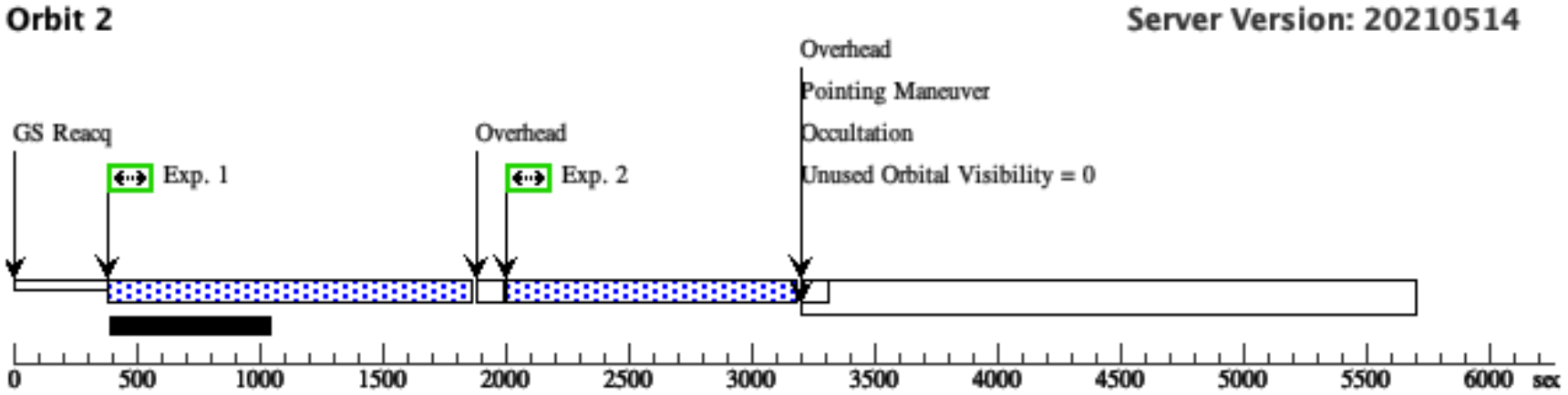
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[EMISSION LINE NEBULA, LINER, NLR, NUCLEUS]

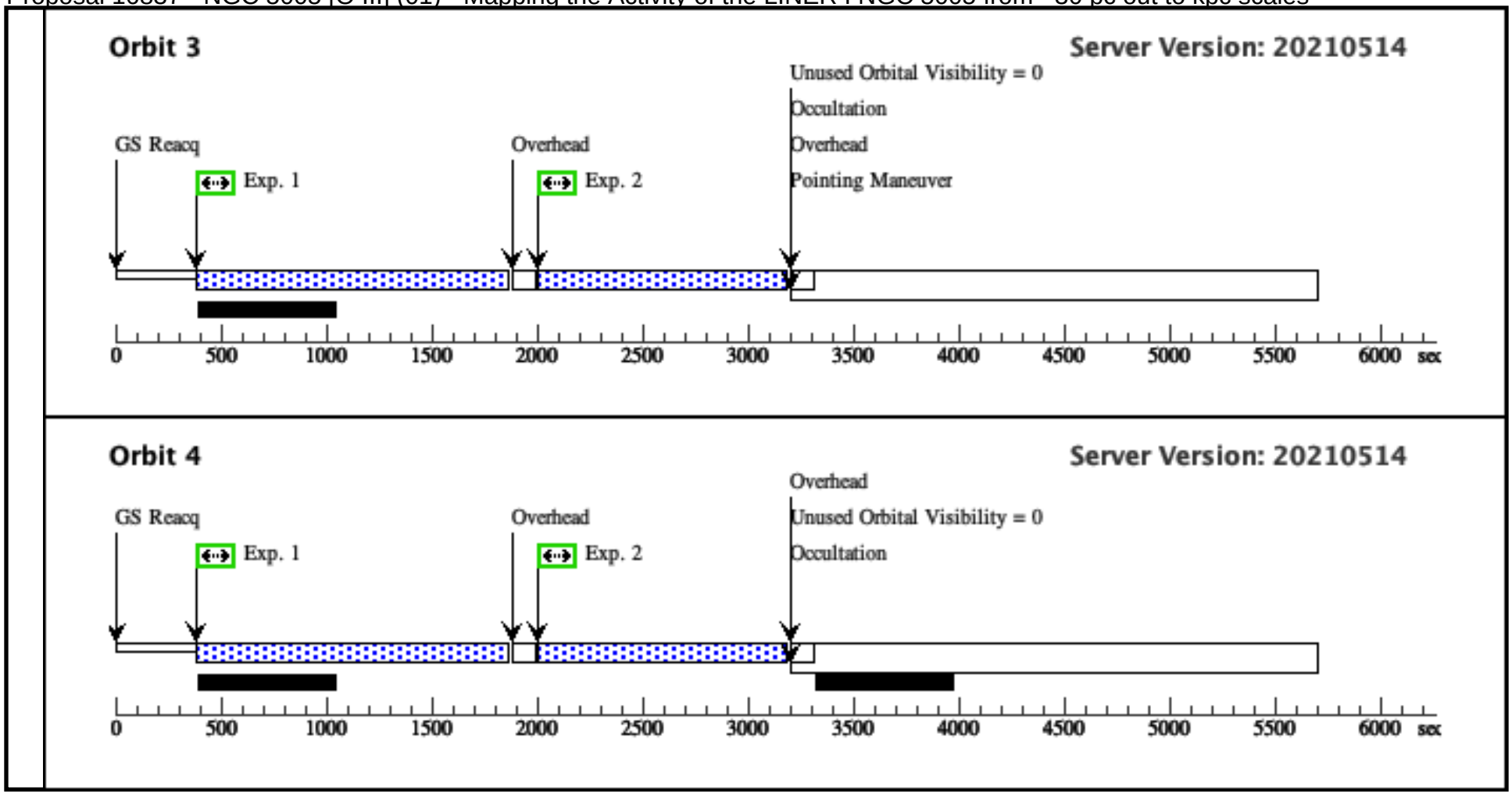
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NGC 5005 [O III] orbits 1-2	(1) NGC-5005	WFC3/UVIS, ACCUM, UVIS	F502N	FLASH=17		Pattern 1, Exps 1-2 in NGC 5005 [O III] (01) (1)	1300 Secs (5928 Secs)	
								[==>1485.0 Secs (Pattern 1)]	***[1]***
								[==>1481.0 Secs (Pattern 2)]	***[2]***
								[==>1481.0 Secs (Pattern 3)]	***[3]***
								[==>1481.0 Secs (Pattern 4)]	***[4]***
2	NGC 5005 [O III] orbits 3-4	(1) NGC-5005	WFC3/UVIS, ACCUM, UVIS	F502N	FLASH=17		Pattern 1, Exps 1-2 in NGC 5005 [O III] (01) (1)	1000 Secs (4728 Secs)	
								[==>1185.0 Secs (Pattern 1)]	***[1]***
								[==>1181.0 Secs (Pattern 2)]	***[2]***
								[==>1181.0 Secs (Pattern 3)]	***[3]***
								[==>1181.0 Secs (Pattern 4)]	***[4]***

Orbit Structure



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Occultation
Overhead
Pointing Maneuver
GS Reacq
Overhead
Exp. 1
Exp. 2
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec
Orbit 4
Server Version: 20210514
Overhead
Unused Orbital Visibility = 0
Occultation
GS Reacq
Overhead
Exp. 1
Exp. 2
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 16837, NGC 5005 H-beta (02) Fri Sep 24 17:00:37 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: 4 orbits of exposure for NGC 5005 using F487N. The box dither pattern should improve resolution (should it become relevant), and 8 exposures should be okay for cosmic ray rejection even if the individual exposures are a little long.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1-2)

Fixed Targets

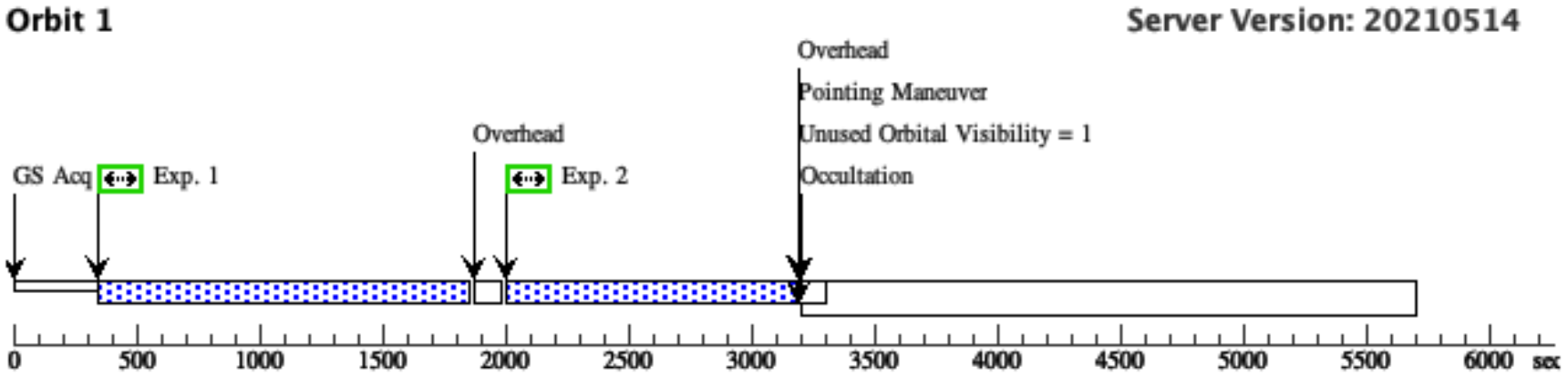
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-5005	RA: 13 10 56.3120 (197.7346333d) Dec: +37 03 32.19 (37.05894d) Equinox: J2000	Epoch of Position: 2015.5	V=13.67	Reference Frame: SIMBAD

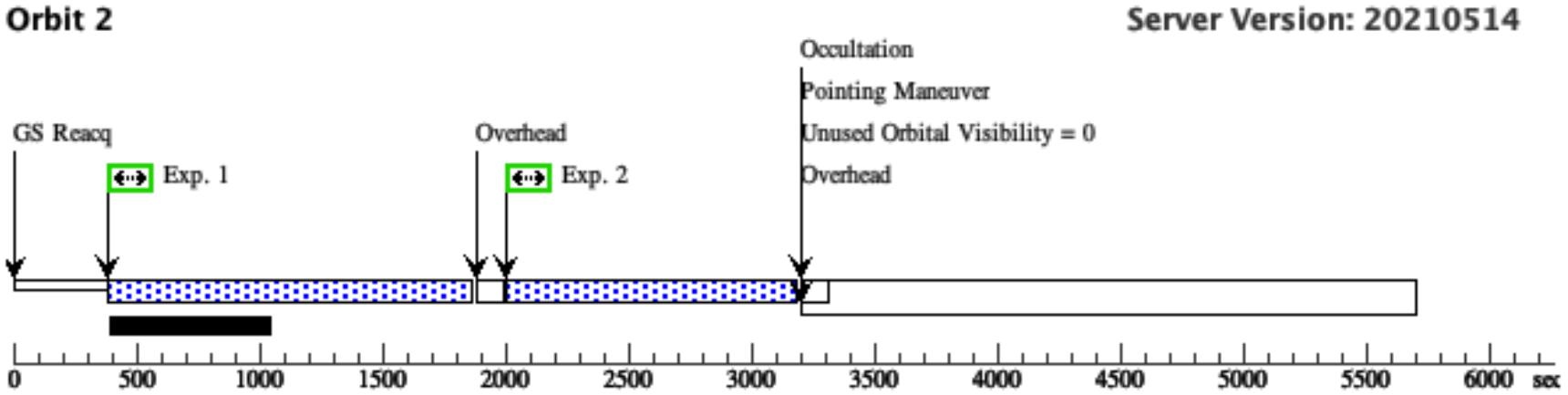
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[EMISSION LINE NEBULA, LINER, NLR, NUCLEUS]

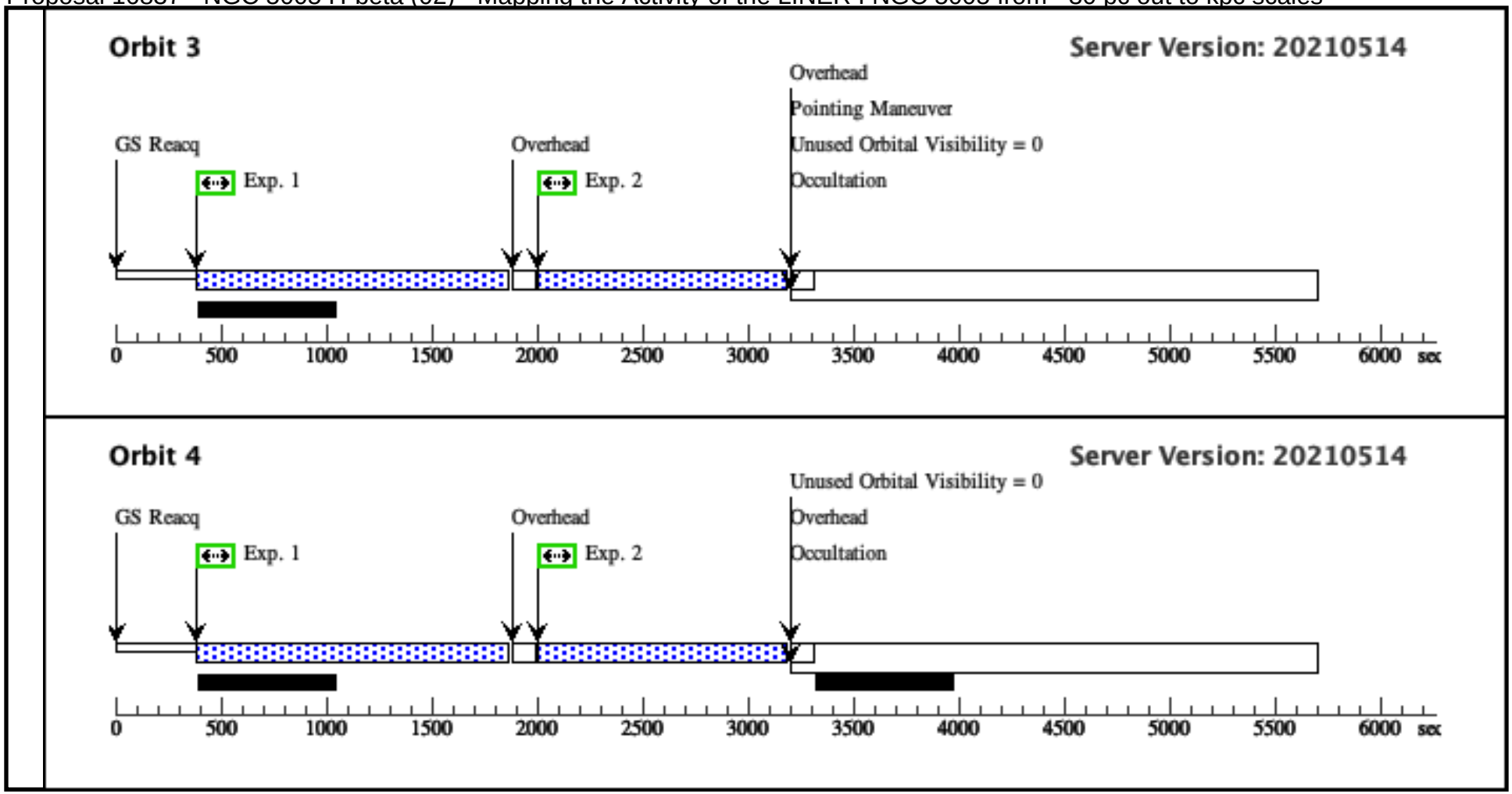
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NGC 5005 H-beta orbits 1-2	(1) NGC-5005	WFC3/UVIS, ACCUM, UVIS	F487N	FLASH=17		Pattern 1, Exps 1-2 in NGC 5005 H-beta (02) (1)	1300 Secs (5928 Secs)	
								[==>1485.0 Secs (Pattern 1)]	***[1]***
								[==>1481.0 Secs (Pattern 2)]	***[2]***
								[==>1481.0 Secs (Pattern 3)]	***[3]***
								[==>1481.0 Secs (Pattern 4)]	***[4]***
2	NGC 5005 H-beta orbits 3-4	(1) NGC-5005	WFC3/UVIS, ACCUM, UVIS	F487N	FLASH=17		Pattern 1, Exps 1-2 in NGC 5005 H-beta (02) (1)	1000 Secs (4728 Secs)	
								[==>1185.0 Secs (Pattern 1)]	***[1]***
								[==>1181.0 Secs (Pattern 2)]	***[2]***
								[==>1181.0 Secs (Pattern 3)]	***[3]***
								[==>1181.0 Secs (Pattern 4)]	***[4]***

Orbit Structure






Orbit 3
Server Version: 20210514
Overhead
Pointing Maneuver
Unused Orbital Visibility = 0
Occultation
GS Reacq
Exp. 1
Overhead
Exp. 2
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec
Orbit 4
Server Version: 20210514
Unused Orbital Visibility = 0
Overhead
Occultation
GS Reacq
Exp. 1
Overhead
Exp. 2
0
500
1000
1500
2000
2500
3000
3500
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5000
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6000
sec

Visit

Proposal 16837, NGC 5005 [S II] (03) Fri Sep 24 17:00:37 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: 2 orbits of exposure for NGC 5005 using F673N. The box dither pattern should improve resolution (should it become relevant), and 4 exposures should be okay for cosmic ray rejection even if the individual exposures are a little long.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1)

Fixed Targets

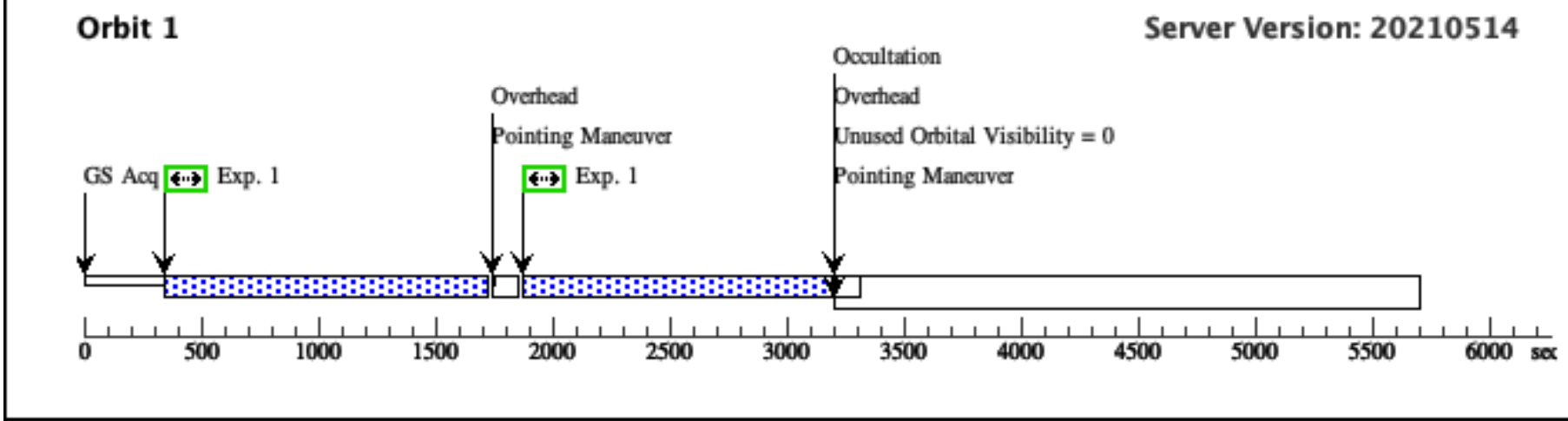
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-5005	RA: 13 10 56.3120 (197.7346333d) Dec: +37 03 32.19 (37.05894d) Equinox: J2000	Epoch of Position: 2015.5	V=13.67	Reference Frame: SIMBAD

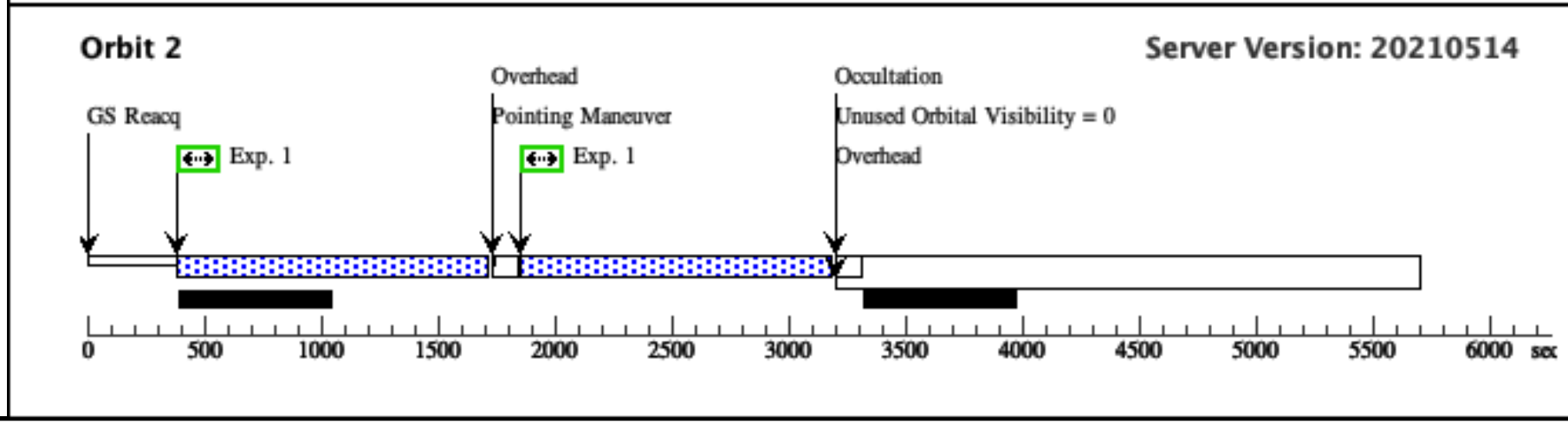
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[EMISSION LINE NEBULA, LINER, NLR, NUCLEUS]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NGC 5005 [S II] orbits 1-2	(1) NGC-5005	WFC3/UVIS, ACCUM, UVIS	F673N	FLASH=17		Pattern 1, Exps 1-1 in NGC 5005 [S II] (03) (1)	1300 Secs (5333 Secs) *[==>1353.0 Secs (Pattern 1)]* *[==>1318.0 Secs (Pattern 2)]* *[==>1331.0 Secs (Pattern 3)]* *[==>1331.0 Secs (Pattern 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 16837, NGC 5005 H-alpha (04) Fri Sep 24 17:00:37 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: 1 orbit of exposure for NGC 5005 using F673N, plus brief continuum observations with F547M and F814W.

This was tricky to pack because of readout constraints for 6 exposures. One subexposure needed to be fixed. This setup should be checked for a different orbit length.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-5005	RA: 13 10 56.3120 (197.7346333d) Dec: +37 03 32.19 (37.05894d) Equinox: J2000	Epoch of Position: 2015.5	V=13.67	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[EMISSION LINE NEBULA, LINER, NLR, NUCLEUS]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NGC 5005 H-alpha	(1) NGC-5005	WFC3/UVIS, ACCUM, UVIS	F658N	FLASH=17; CR-SPLIT=2			695 Secs (695 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	*[1]*
2	NGC 5005 blue continuum	(1) NGC-5005	WFC3/UVIS, ACCUM, UVIS	F547M	FLASH=17; CR-SPLIT=2			695 Secs (695 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	*[1]*
3	NGC 5005 red continuum	(1) NGC-5005	WFC3/UVIS, ACCUM, UVIS	F814W	FLASH=12; CR-SPLIT=2			695 Secs (680.5 Secs) *[==>(Split 1)]* *[==>333.0 Secs (Split 2)]*	*[1]*

Orbit Structure