12173 - Feedback between Stars, ISM and IGM in IR-Luminous Galaxies

Cycle: 18, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Claus Leitherer (PI)	**Space Telescope Science Institute**	**leitherer@stsci.edu**
Dr. Rupali Chandar (CoI)	University of Toledo	Rupali.Chandar@utoledo.edu
Dr. Christy A. Tremonti (CoI)	University of Wisconsin - Madison	tremonti@astro.wisc.edu
Dr. Aida H. Wofford (CoI)	Space Telescope Science Institute	wofford@stsci.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) IRAS08339+6517	COS/FUV COS/NUV	1	11-Apr-2011 21:01:00.0	yes
02	(2) IRAS10257-4339	COS/FUV COS/NUV	4	11-Apr-2011 21:01:07.0	yes
03	(4) IRAS16104+5235	COS/FUV COS/NUV	3	11-Apr-2011 21:01:12.0	yes
04	(5) IRAS23133-4251	COS/FUV COS/NUV	2	11-Apr-2011 21:01:16.0	yes

10 Total Orbits Used

ABSTRACT

We propose COS G130M mode spectroscopy between 1150 and 1450 Angstroms of four ultraviolet-bright, infrared-luminous starburst galaxies. Our selected sightlines towards the starburst nuclei probe the physical conditions in the starburst-driven galactic superwinds. The spectral resolution of

about 20 km/s is an order of magnitude improvement over existing HST data and allows a study of the complex gas conditions. Previous observations at lower resolution found strong, blueshifted interstellar absorption lines whose strength and velocity indicate signficant mass outflow. High-resolution data are required to verify or reject suggestions of velocity dispersion and/or covering factor variations being the prime mechanism responsible for the line properties. The proposed observations will constrain the energetics of the cool and warm gas and help determine if the outflow material can escape from the galaxies. Several weak lines will be measured at sufficiently high S/N to derive the column densities and abundances in the dominant ions entrained within the outflow. In combination with the kinematic properties we will estimate the mechanical energy and mass outflow rate and perform a comparison with the star-formation rate. We will investigate whether the outflows quench star formation and ultimately regulate the starburst as has been suggested for high-redshift galaxies. The chosen sightlines will allow us to generalize our results to the overall properties of galaxy outflows, to search for implications for similar galaxies at cosmological distances, and to add to our understanding of QSO absorption lines. Outflows may be the long-sought mechanism for distributing the products of stellar nucleosynthesis over large volumes in the universe.

OBSERVING DESCRIPTION

We will use COS and the G130M grating to collect R = 20,000 spectra in the wavelength range 1150 – 1450 Å of the central starburst regions of four IR-luminous galaxies. HST archival images in the UV and/or extreme blue as well as UV spectroscopy are available. All galaxies, except IRAS 16104+5235 were observed through small (< 3 arcsec) apertures; therefore accurate flux information for estimating exposure times and evaluating target acquisition strategies are available. IRAS 16104+5235 was observed with HUT; these data and the available UV imaging provide the necessary information as well. The proposed COS spectra will be taken through the circular 2.5 arcsec aperture centered on the nucleus.

We will perform a standard target acquisition, with a NUV imaging time of about 20s. The acquisition image and all the overheads will require about 500 seconds for each visit. Accounting also for the guide star acquisition, we expect to have >2400 seconds available for science exposures. Using the HST archival information we derived the expected 1300 Å fluxes in the COS aperture. From our previous experience with HST UV spectra, we require S/N = 15 – 20 in the continuum. This S/N, together with a resolving power of R = 20,000 will allow us to measure weak, unsaturated lines with equivalent widths < 0.3 Å. Equally important, we will be able to observe weak photospheric absorption lines, which will support the determination of the galaxy restframe velocity zero point. We can reach this S/N in 1 – 4 orbits for each of the target galaxies

Visit

Proposal 12173, Visit 01, scheduling Tue Apr 12 01:01:20 GMT 2011

Diagnostic Status: Warning

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

Diagnostics

(Visit 01) Warning (Form): If the target coordinates are not known to 0.4" (or better) an ACQ/SEARCH should precede the ACQ/IMAGE.

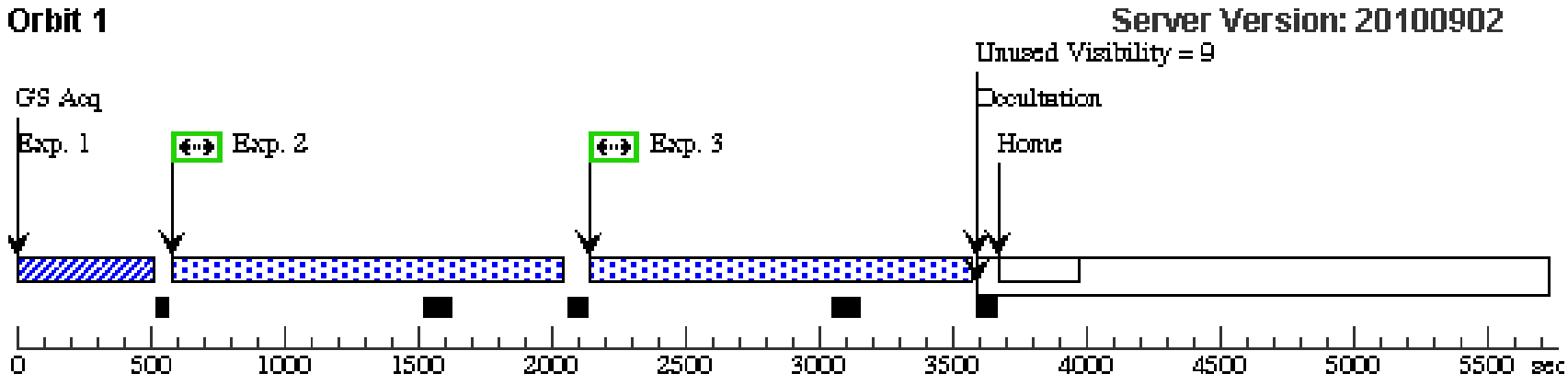
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	IRAS08339+6517	RA: 08 38 23.1500 (129.5964583d) Dec: +65 07 15.40 (65.12094d) Equinox: J2000	Radial Velocity: 5730 km/sec	V=14.0+/-1.0 F(1300)=1e-14	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) IRAS08339+6517	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				45 Secs *[==>]*	*[1]*
2		(1) IRAS08339+6517	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=800; FP-POS=3			1303 Secs *[==>]*	*[1]*
3		(1) IRAS08339+6517	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=800; FP-POS=3			1303 Secs *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 12173, Visit 02, implementation Tue Apr 12 01:01:21 GMT 2011

Diagnostic Status: Warning

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

Diagnostics

(Visit 02) Warning (Form): If the target coordinates are not known to 0.4" (or better) an ACQ/SEARCH should precede the ACQ/IMAGE.

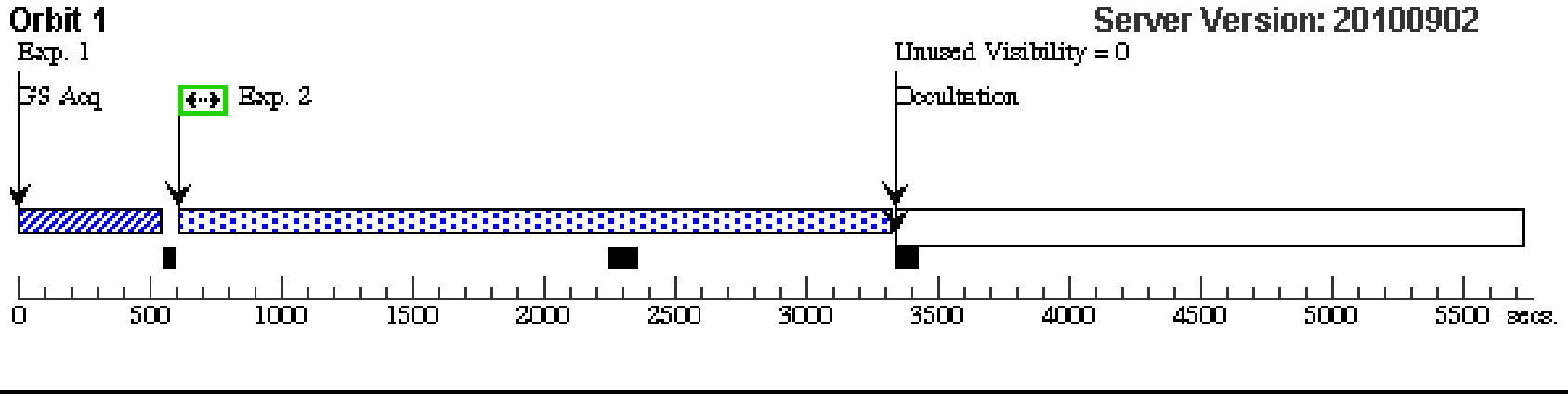
Fixed Targets

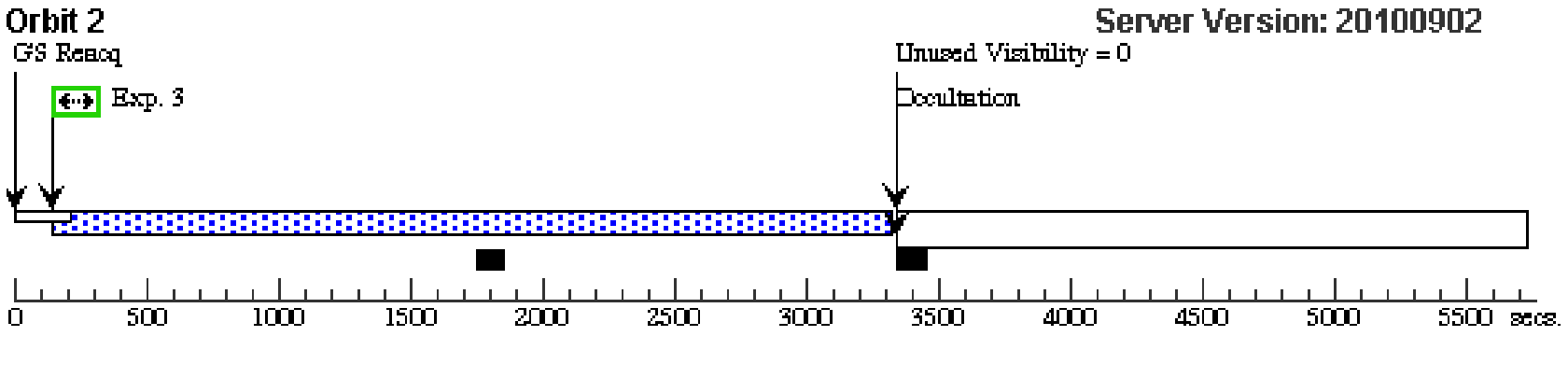
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	IRAS10257-4339 Alt Name1: NGC3256	RA: 10 27 51.3400 (156.9639167d) Dec: -43 54 12.40 (-43.90344d) Equinox: J2000	Radial Velocity: 2804 km/sec	V=14.0+/-1.0 F(1300)=2e-15	Reference Frame: ICRS

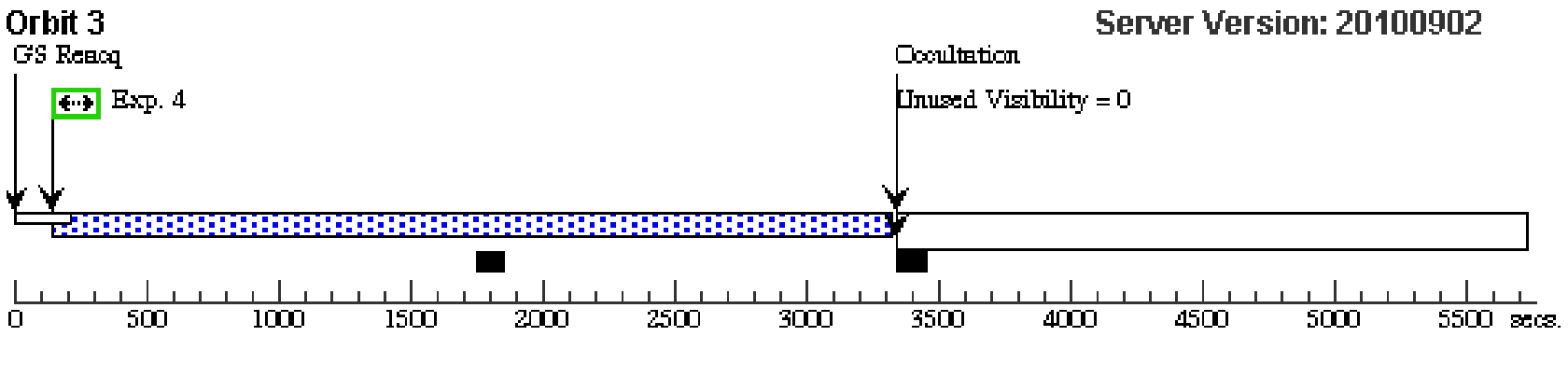
Exposures

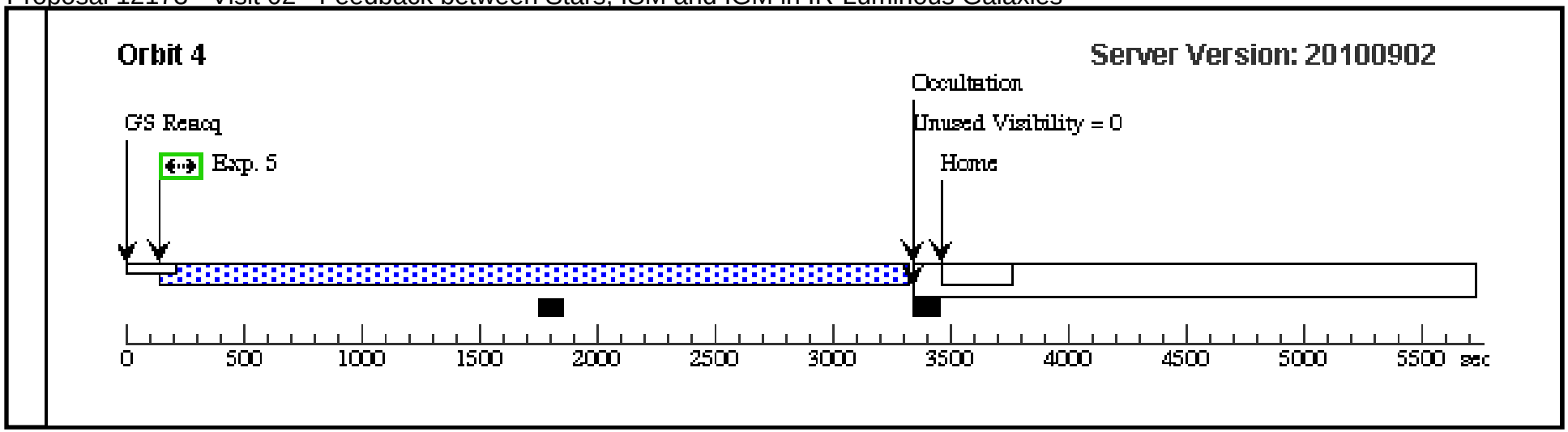
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(2) IRAS10257-4339	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				60 Secs *[==>]*	***[1]***
2		(2) IRAS10257-4339	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1500; FP-POS=3			2553 Secs *[==>]*	***[1]***
3		(2) IRAS10257-4339	COS/FUV, TIME-TAG, PSA	G130M 1300 A	BUFFER-TIME=1500; FP-POS=3			3055 Secs *[==>]*	***[2]***
4		(2) IRAS10257-4339	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=1500; FP-POS=3			3055 Secs *[==>]*	***[3]***
5		(2) IRAS10257-4339	COS/FUV, TIME-TAG, PSA	G130M 1318 A	BUFFER-TIME=1500; FP-POS=3			3055 Secs *[==>]*	***[4]***

Orbit Structure








Orbit 4
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Occultation
GS Reacq
Unused Visibility = 0
Exp. 5
Home
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500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 12173, Visit 03, scheduling Tue Apr 12 01:01:22 GMT 2011

Diagnostic Status: Warning

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

Diagnostics

(Visit 03) Warning (Form): If the target coordinates are not known to 0.4" (or better) an ACQ/SEARCH should precede the ACQ/IMAGE.

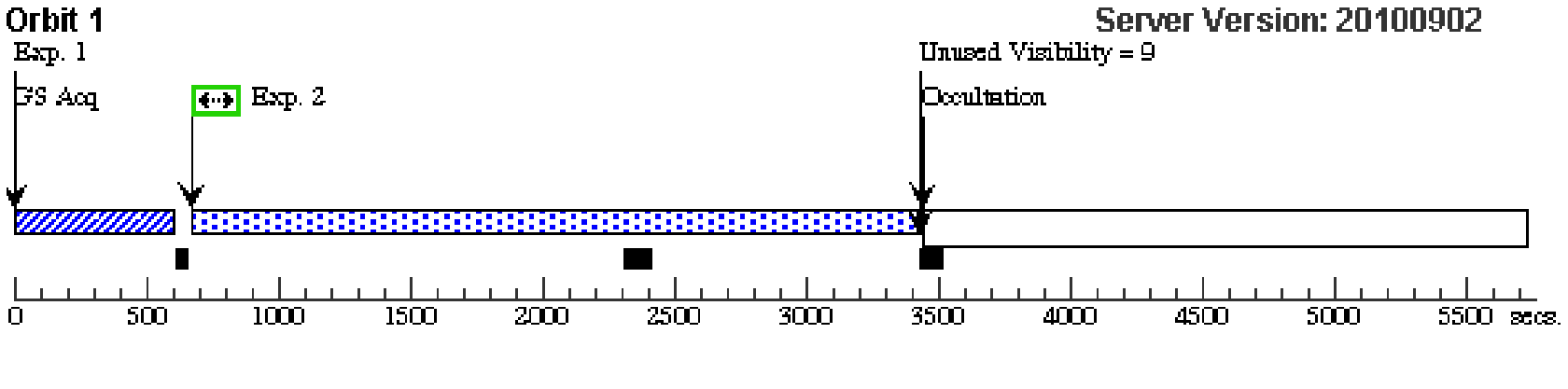
Fixed Targets

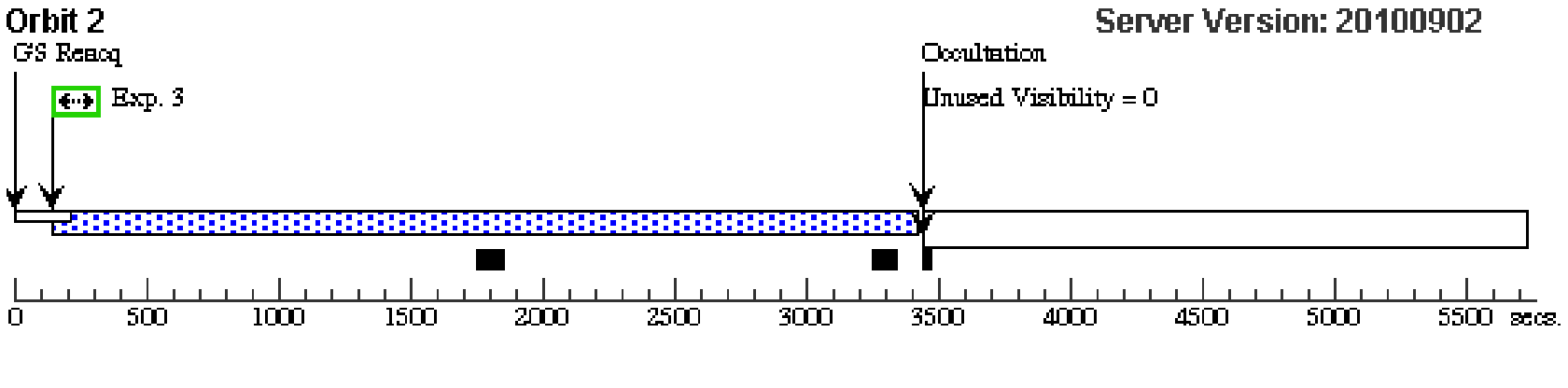
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	IRAS16104+5235 Alt Name1: NGC6090	RA: 16 11 40.2000 (242.9175000d) Dec: +52 27 23.75 (52.45660d) Equinox: J2000	Radial Velocity: 8947 km/sec	V=14.0+/-1.0 F(1300)=4e-15	Reference Frame: ICRS

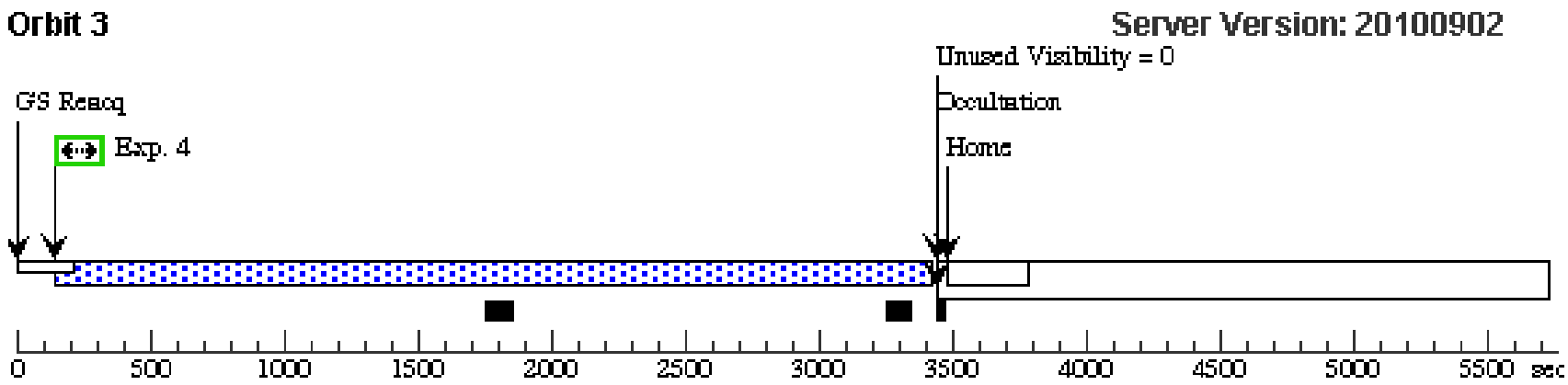
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(4) IRAS16104+5235	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				90 Secs *[==>]*	***[1]***
2		(4) IRAS16104+5235	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=1500; FP-POS=3			2588 Secs *[==>]*	***[1]***
3		(4) IRAS16104+5235	COS/FUV, TIME-TAG, PSA	G130M 1318 A	BUFFER-TIME=1500; FP-POS=3			3159 Secs *[==>]*	***[2]***
4		(4) IRAS16104+5235	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=1500; FP-POS=3			3159 Secs *[==>]*	***[3]***

Orbit Structure







Visit

Proposal 12173, Visit 04, implementation Tue Apr 12 01:01:23 GMT 2011

Diagnostic Status: Warning

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

Diagnostics

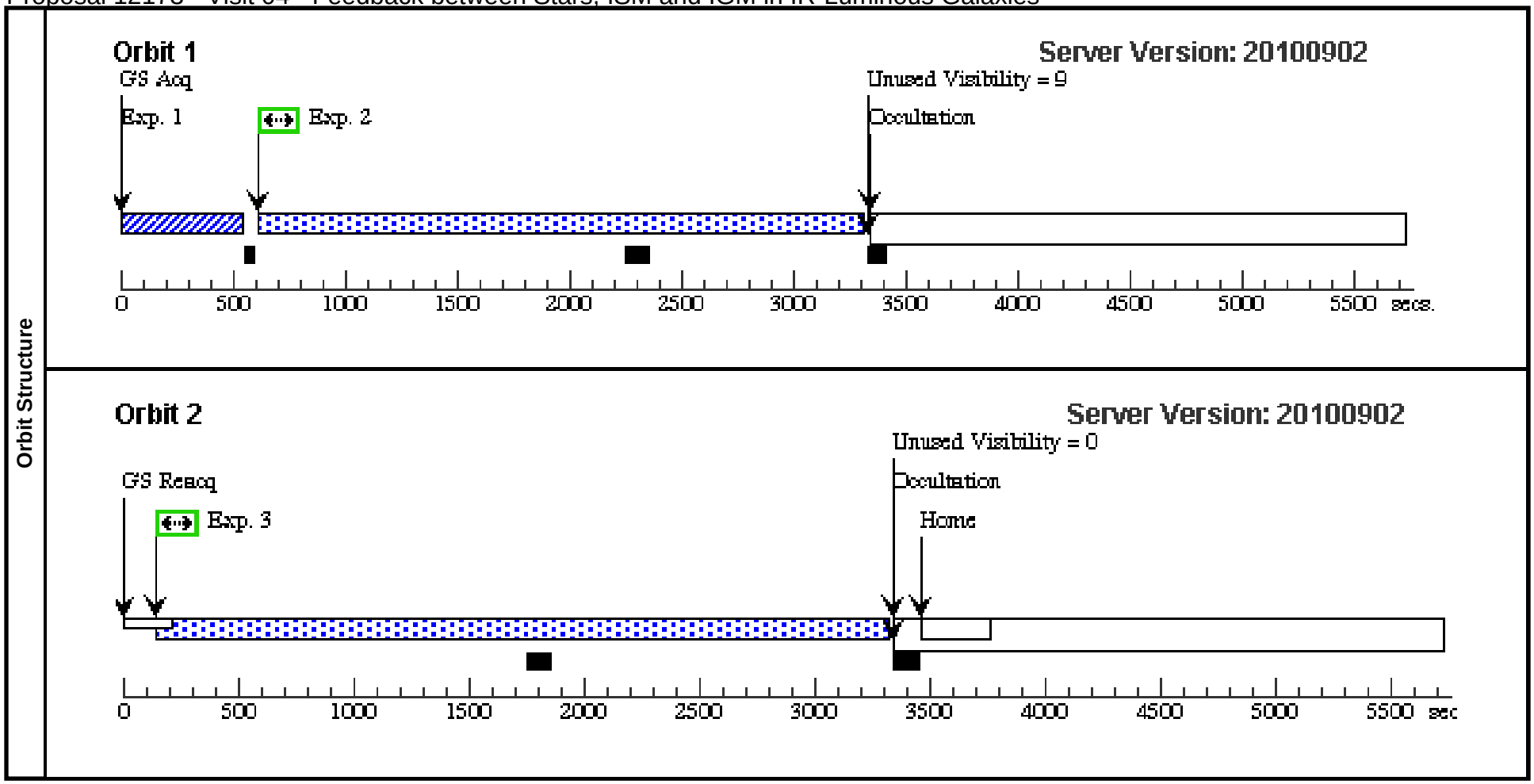
(Visit 04) Warning (Form): If the target coordinates are not known to 0.4" (or better) an ACQ/SEARCH should precede the ACQ/IMAGE.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	IRAS23133-4251 Alt Name1: NGC7552	RA: 23 16 10.7900 (349.0449583d) Dec: -42 35 5.50 (-42.58486d) Equinox: J2000	Radial Velocity: 1608 km/sec	V=14.0+/-1.0 F(1300)=5e-15	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(5) IRAS23133-4251	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				60 Secs *[==>]*	 ***[1]***
2		(5) IRAS23133-4251	COS/FUV, TIME-TAG, PSA	G130M 1300 A	BUFFER-TIME=1500; FP-POS=3			2544 Secs *[==>]*	 ***[1]***
3		(5) IRAS23133-4251	COS/FUV, TIME-TAG, PSA	G130M 1318 A	BUFFER-TIME=1500; FP-POS=3			3055 Secs *[==>]*	 ***[2]***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Exp. 1
Exp. 2
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Occultation
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500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 2
Server Version: 20100902
Unused Visibility = 0
GS Reacq
Occultation
Exp. 3
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500