



15881 - Ultra-Deep HST/COS Spectroscopy of Extremely Metal-Poor Galaxies

Cycle: 27, Proposal Category: GO

(UV Initiative)

(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) SDSSJ082555.52+353231.9	COS/FUV COS/NUV	2	21-Feb-2020 10:00:14.0	yes
02	(1) SDSSJ082555.52+353231.9	COS/FUV COS/NUV	2	21-Feb-2020 10:00:15.0	yes
03	(1) SDSSJ082555.52+353231.9	COS/FUV COS/NUV	1	21-Feb-2020 10:00:16.0	yes
53	(1) SDSSJ082555.52+353231.9	COS/FUV COS/NUV	1	21-Feb-2020 10:00:17.0	yes
04	(2) SDSSJ120202.49+541551.0	COS/FUV COS/NUV	2	21-Feb-2020 10:00:17.0	yes

<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>
05	(2) SDSSJ120202.49+541551.0	COS/FUV COS/NUV	2	21-Feb-2020 10:00:18.0	yes
06	(2) SDSSJ120202.49+541551.0	COS/FUV COS/NUV	1	21-Feb-2020 10:00:18.0	yes

11 Total Orbits Used

ABSTRACT

The first glimpse of the spectra of $z \sim 7-10$ galaxies has revealed intense nebular emission that has proven challenging to interpret owing to shortcomings in our understanding of low metallicity stellar populations. Recent work with HST/COS in the local universe has provided a way forward, characterizing the UV spectra that are common in metal poor galaxies. Attention to date has focused on the strongest CIV emitting galaxies found locally, as these appear most similar to the few detections known at $z > 6$. But it has recently become clear that the majority of metal poor galaxies exhibit much weaker CIV. Nothing is known about the nature of the massive stars in these systems, resulting in an extremely biased view of the range of radiation fields powered by low metallicity stars in metal poor galaxies. Here we propose to combat this problem by providing the first study of the massive stars in the dominant population of metal poor galaxies in the local universe. Via deep (5 orbit) COS/G160M spectra of two of the $z < 0.02$ metal poor galaxies with weak CIV emission, we will deliver quantitative constraints on the metallicity of massive stars through measurement of photospheric absorption lines and test stellar wind prescriptions in the poorly calibrated low metallicity regime. Using new spectral tools, we will test whether existing population synthesis models can simultaneously reproduce the metallicity and radiation field, providing a powerful stress test for models. If this UV database is not completed soon, the interpretation of reionization era galaxy spectra will be jeopardized throughout the JWST era.

OBSERVING DESCRIPTION

Our program will obtain ultra-deep medium-resolution FUV COS spectroscopy for two highly star-forming extremely metal-poor galaxies identified as producing anomalously weak nebular C IV emission. The target galaxies are compact, have high-precision coordinates confirmed in SDSS, and have been previously observed with lower-resolution COS spectroscopy. In order to make the program as flexible as possible in scheduling, we have broken the 5 orbits devoted to each galaxy into 3 separate visits. As in previous COS programs targeting similar galaxies, we will perform ACQ/IMAGE exposures to center the galaxies in the COS aperture. Then, each orbit will be devoted to integration at a single FP-POS setting, with buffer readout and grating shift occurring during occultation. Since readout occurs during occultation, we set the BUFFER-TIME to the exposure time

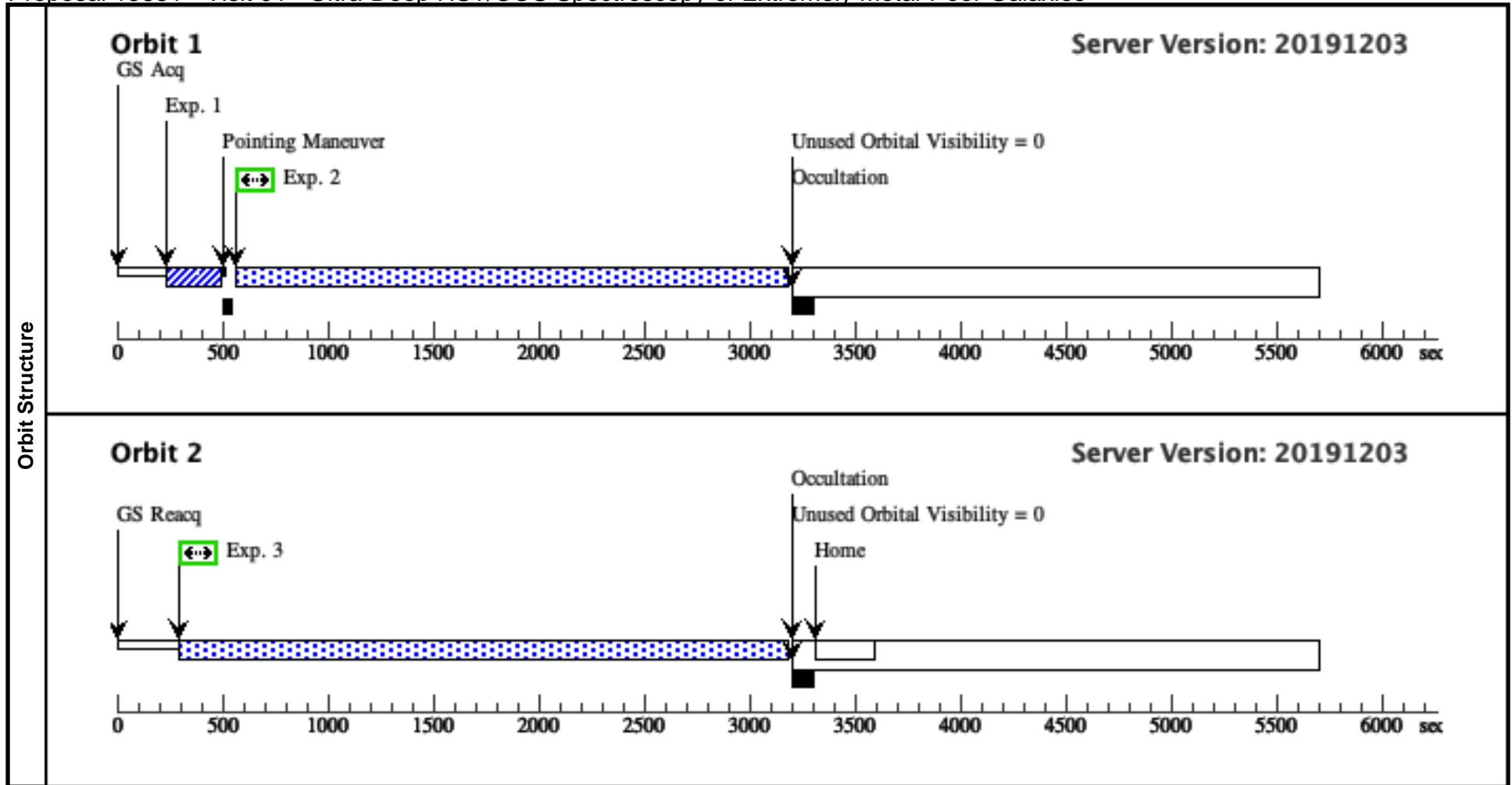
Proposal 15881 (STScI Edit Number: 1, Created: Friday, February 21, 2020 at 10:00:19 AM Eastern Standard Time) - Overview

to ensure the entire buffer is read. All observations will be conducted with G160M/1533, which gives simultaneous coverage of key stellar wind lines and photospheric features in the range 1350-1700 Angstroms yielding constraints on stellar wind strengths and stellar Fe abundance. In five orbits per object, we will achieve S/N per resolution element >4 , providing confident measurement of these features and a comprehensive picture of the massive stellar populations in the target systems.

Proposal 15881 - Visit 01 - Ultra-Deep HST/COS Spectroscopy of Extremely Metal-Poor Galaxies

Fri Feb 21 15:00:19 GMT 2020

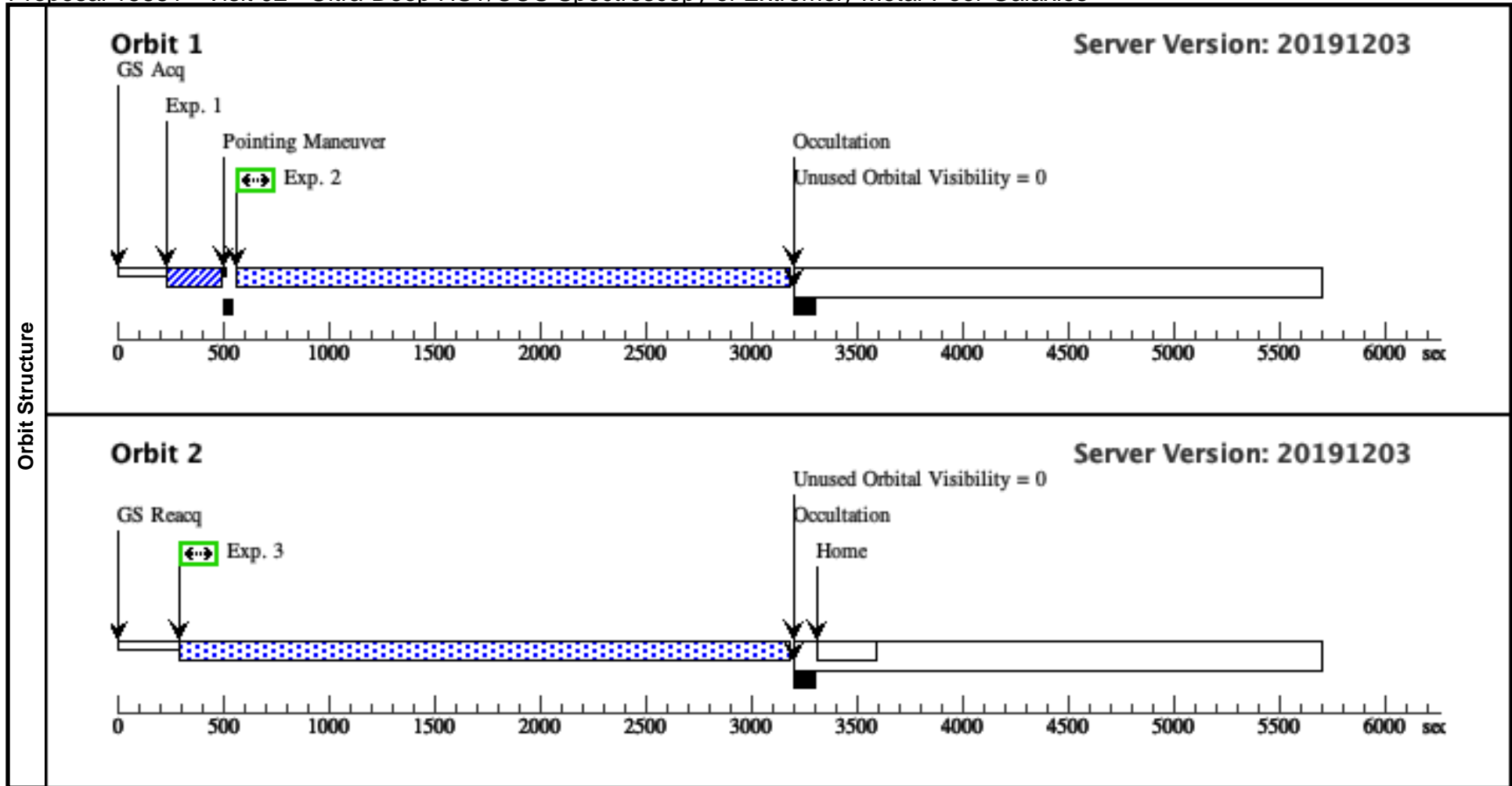
Visit	Proposal 15881, Visit 01, scheduled Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
		(1)	SDSSJ082555.52+353231.9	RA: 08 25 55.5207 (126.4813362d) Dec: +35 32 31.96 (35.54221d) Equinox: J2000		V=18.5	Reference Frame: ICRS			
	<i>Comments:</i> Category=GALAXY Description=[STAR FORMING REGION] Extended=NO									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(COS.ta.137 1879)	(1) SDSSJ082555.52 +353231.9	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				21 Secs (21 Secs) [==>]	[1]
	2	(COS.sp.137 1885)	(1) SDSSJ082555.52 +353231.9	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2400; FLASH=YES; FP-POS=1			2400 Secs (2400 Secs) [==>]	[1]
	3	(COS.sp.137 1885)	(1) SDSSJ082555.52 +353231.9	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2834; FLASH=YES; FP-POS=2			2800 Secs (2834 Secs) [==>2834.0 Secs]	[2]



Proposal 15881 - Visit 02 - Ultra-Deep HST/COS Spectroscopy of Extremely Metal-Poor Galaxies

Fri Feb 21 15:00:19 GMT 2020

Visit	Proposal 15881, Visit 02, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	SDSSJ082555.52+353231.9	RA: 08 25 55.5207 (126.4813362d) Dec: +35 32 31.96 (35.54221d) Equinox: J2000		V=18.5	Reference Frame: ICRS				
	<i>Comments:</i> Category=GALAXY Description=[STAR FORMING REGION] Extended=NO									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(COS.ta.137 1879)	(1) SDSSJ082555.52 +353231.9	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				21 Secs (21 Secs) [==>]	[1]
	2	(COS.sp.137 1885)	(1) SDSSJ082555.52 +353231.9	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2400; FLASH=YES; FP-POS=3			2400 Secs (2400 Secs) [==>]	[1]
	3	(COS.sp.137 1885)	(1) SDSSJ082555.52 +353231.9	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2834; FLASH=YES; FP-POS=4			2800 Secs (2834 Secs) [==>2834.0 Secs]	[2]



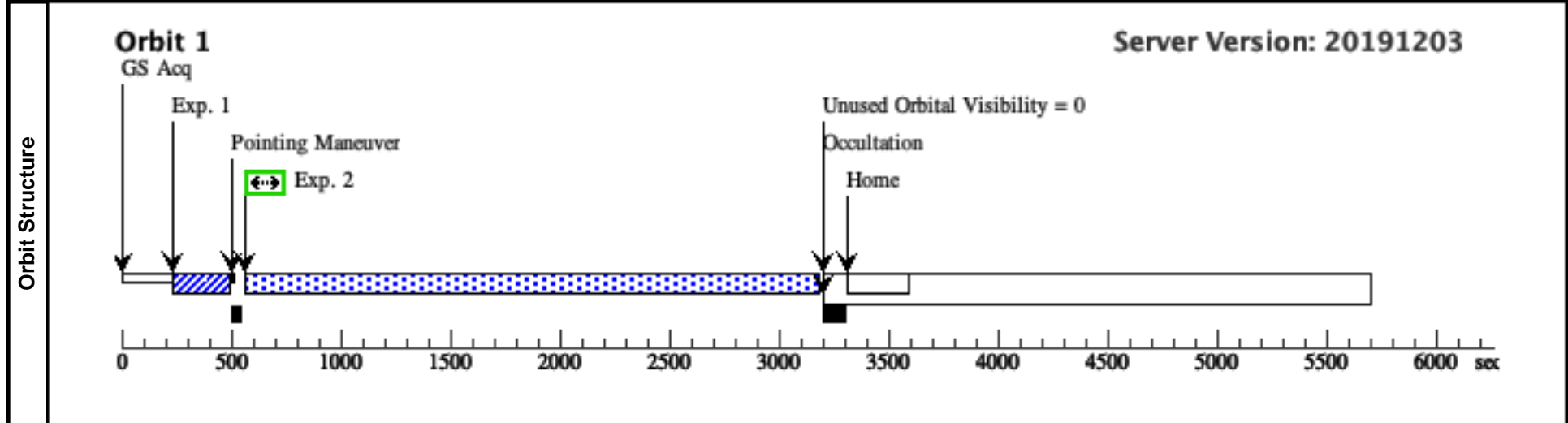
Proposal 15881 - Visit 03 - Ultra-Deep HST/COS Spectroscopy of Extremely Metal-Poor Galaxies

Fri Feb 21 15:00:19 GMT 2020

Visit	Proposal 15881, Visit 03, failed				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: COS/FUV, COS/NUV				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SDSSJ082555.52+353231.9	RA: 08 25 55.5207 (126.4813362d) Dec: +35 32 31.96 (35.54221d) Equinox: J2000		V=18.5	Reference Frame: ICRS
	<i>Comments:</i> Category=GALAXY Description=[STAR FORMING REGION] Extended=NO					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(COS.ta.137 1879)	(1) SDSSJ082555.52 +353231.9	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				21 Secs (21 Secs) [==>]	[1]
	2	(COS.sp.137 1885)	(1) SDSSJ082555.52 +353231.9	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2400; FLASH=YES; FP-POS=1			2400 Secs (2400 Secs) [==>]	[1]



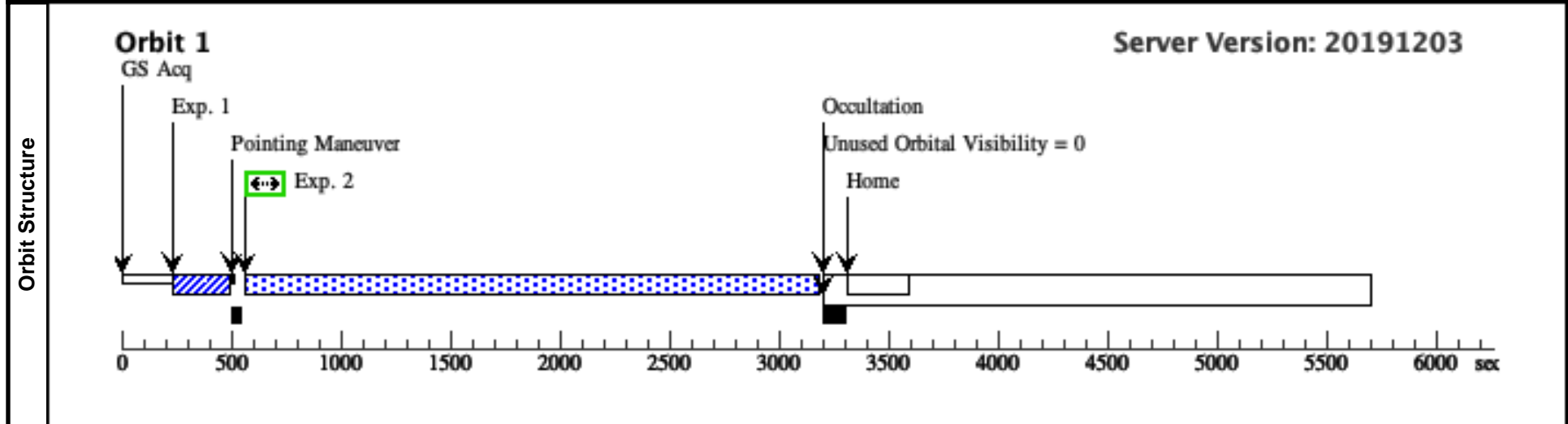
Proposal 15881 - Visit 53 - Ultra-Deep HST/COS Spectroscopy of Extremely Metal-Poor Galaxies

Fri Feb 21 15:00:19 GMT 2020

Visit	Proposal 15881, Visit 53 Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none) <i>Comments: Repeat of failed Visit 03</i>				
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SDSSJ082555.52+353231.9	RA: 08 25 55.5207 (126.4813362d) Dec: +35 32 31.96 (35.54221d) Equinox: J2000		V=18.5	Reference Frame: ICRS
<i>Comments:</i> Category=GALAXY Description=[STAR FORMING REGION] Extended=NO						

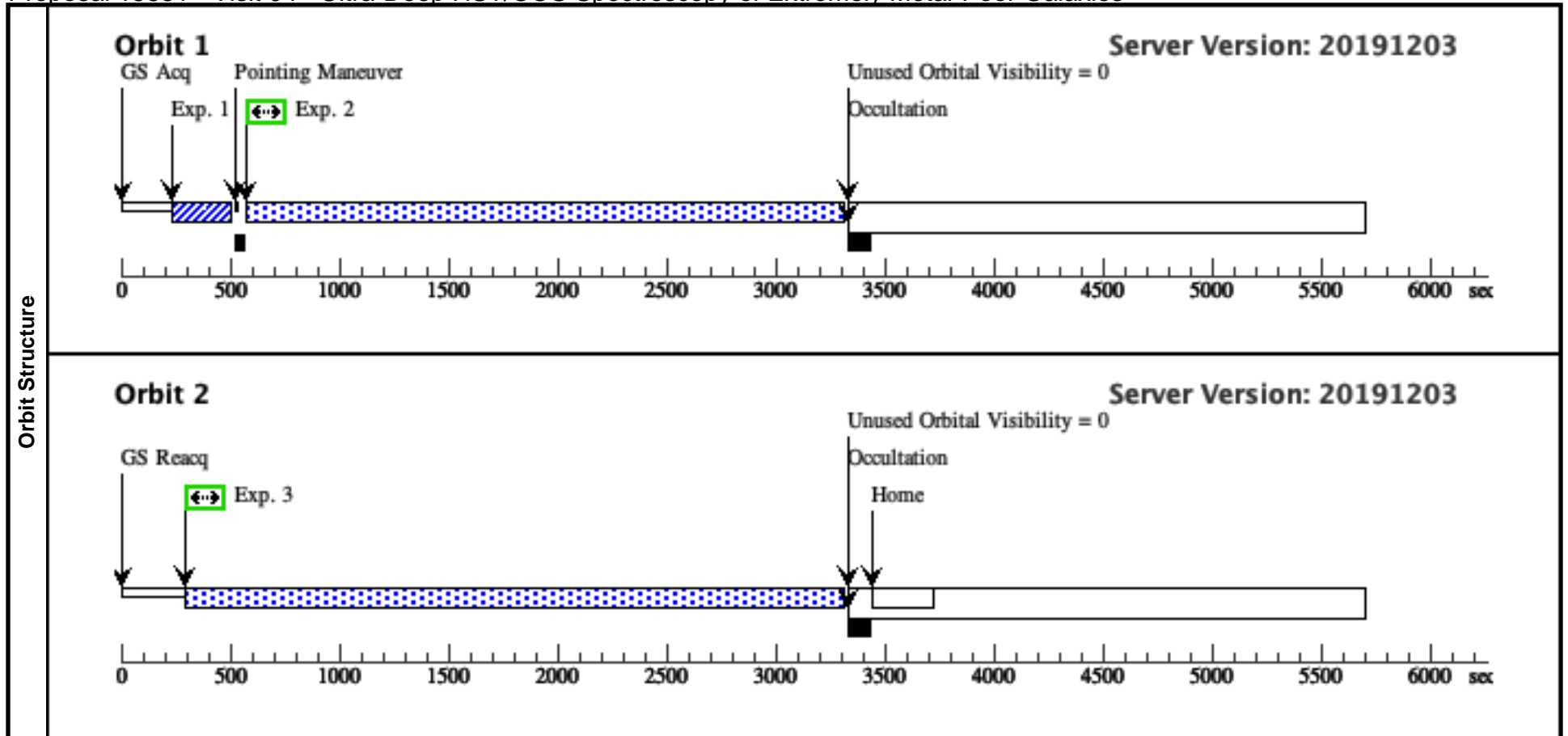
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	(COS.ta.137 1879)	(1) SDSSJ082555.52 +353231.9	COS/NUV, ACQ/IMAGE, PSA	MIRRORA					21 Secs (21 Secs) [==>]	[1]
	2	(COS.sp.137 1885)	(1) SDSSJ082555.52 +353231.9	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2400; FLASH=YES; FP-POS=1				2400 Secs (2400 Secs) [==>]	[1]



Proposal 15881 - Visit 04 - Ultra-Deep HST/COS Spectroscopy of Extremely Metal-Poor Galaxies

Fri Feb 21 15:00:19 GMT 2020

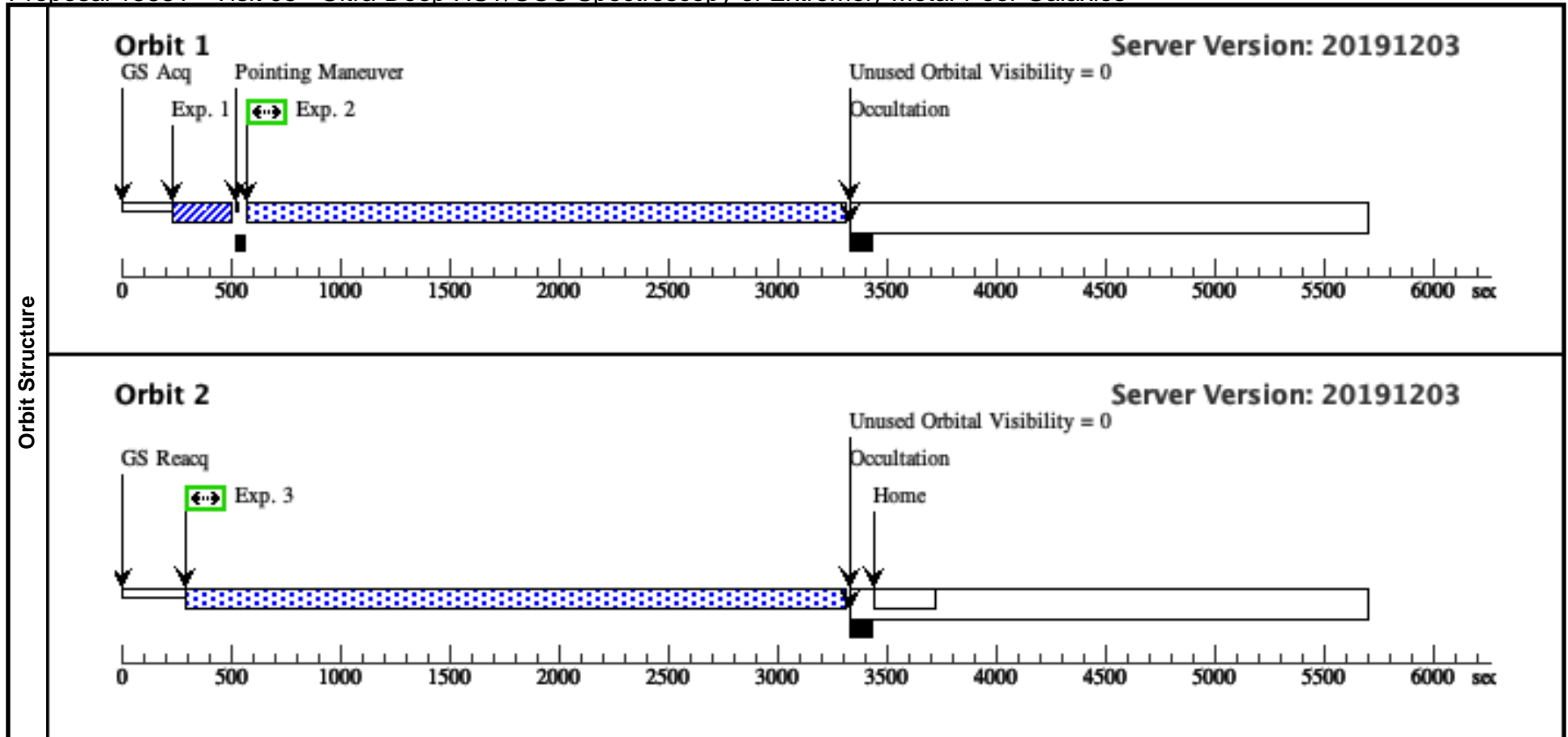
Visit	Proposal 15881, Visit 04, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
		(2)	SDSSJ120202.49+541551.0	RA: 12 02 2.4925 (180.5103854d) Dec: +54 15 51.05 (54.26418d) Equinox: J2000		V=19.5	Reference Frame: ICRS			
	<i>Comments:</i> Category=GALAXY Description=[STAR FORMING REGION] Extended=NO									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(COS.ta.137 1886)	(2) SDSSJ120202.49 +541551.0	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				27 Secs (27 Secs) [==>]	[1]
	2	(COS.sp.137 1888)	(2) SDSSJ120202.49 +541551.0	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=25 21; FLASH=YES; FP-POS=1			2400 Secs (2521 Secs) [==>2521.0 Secs]	[1]
	3	(COS.sp.137 1888)	(2) SDSSJ120202.49 +541551.0	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=29 67; FLASH=YES; FP-POS=2			2800 Secs (2967 Secs) [==>2967.0 Secs]	[2]



Proposal 15881 - Visit 05 - Ultra-Deep HST/COS Spectroscopy of Extremely Metal-Poor Galaxies

Fri Feb 21 15:00:19 GMT 2020

Visit	Proposal 15881, Visit 05, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
		(2)	SDSSJ120202.49+541551.0	RA: 12 02 2.4925 (180.5103854d) Dec: +54 15 51.05 (54.26418d) Equinox: J2000		V=19.5	Reference Frame: ICRS			
	<i>Comments:</i> Category=GALAXY Description=[STAR FORMING REGION] Extended=NO									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(COS.ta.137 1886)	(2) SDSSJ120202.49 +541551.0	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				27 Secs (27 Secs) [==>]	[1]
	2	(COS.sp.137 1888)	(2) SDSSJ120202.49 +541551.0	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=25 21;	FLASH=YES; FP-POS=3		2400 Secs (2521 Secs) [==>2521.0 Secs]	[1]
	3	(COS.sp.137 1888)	(2) SDSSJ120202.49 +541551.0	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=29 67;	FLASH=YES; FP-POS=4		2800 Secs (2967 Secs) [==>2967.0 Secs]	[2]



Proposal 15881 - Visit 06 - Ultra-Deep HST/COS Spectroscopy of Extremely Metal-Poor Galaxies

Fri Feb 21 15:00:19 GMT 2020

Visit	Proposal 15881, Visit 06, scheduling				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: COS/FUV, COS/NUV				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	SDSSJ120202.49+541551.0	RA: 12 02 2.4925 (180.5103854d) Dec: +54 15 51.05 (54.26418d) Equinox: J2000		V=19.5	Reference Frame: ICRS
	<i>Comments:</i> Category=GALAXY Description=[STAR FORMING REGION] Extended=NO					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(COS.ta.137 1886)	(2) SDSSJ120202.49 +541551.0	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				27 Secs (27 Secs) [==>]	[1]
	2	(COS.sp.137 1888)	(2) SDSSJ120202.49 +541551.0	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=25 21; FLASH=YES; FP-POS=1			2400 Secs (2521 Secs) [==>2521.0 Secs]	[1]

