16907 - Mapping the COS LP6 Spectral Resolution

Cycle: 29, Proposal Category: CAL/COS

(Availability Mode: RESTRICTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Nathaniel E. B. Kerman (PI) (Contact)	**Space Telescope Science Institute**	**nkerman@stsci.edu**
Dr. Ravi Sankrit (CoI) (Contact)	Space Telescope Science Institute	rsankrit@stsci.edu
Dr. William J. Fischer (CoI) (Contact)	Space Telescope Science Institute	wfischer@stsci.edu
Dr. Marc Rafelski (CoI) (Contact)	Space Telescope Science Institute	mrafelski@stsci.edu
Dr. Bethan Lesley James (CoI) (Contact)	Space Telescope Science Institute - ESA - JWST	bjames@stsci.edu
Dr. Sergio B. Dieterich (CoI) (Contact)	Space Telescope Science Institute	sdieterich@stsci.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) AV75	COS/FUV COS/NUV	3	23-Feb-2022 14:01:23.0	yes

3 Total Orbits Used

ABSTRACT

This program will determine the line spread functions (LSFs) and spectral resolution obtained with the G160M grating at the Cosmic Origins Spectrograph's (COS) sixth lifetime position. Well-constrained LSFs allow users to evaluate the feasibility and S/N constraints of their observations, as well perform line profile fitting on their data. COS periodically shifts where its targets' light lands on the detector to avoid gain sag. The sixth of these "lifetime positions" (LPs) will become active for G160M exposures in Cycle 30. COS' LSFs and spectral resolution change with LP and with the grating and central wavelength settings used. This program will make observations to constrain the LSFs of two G160M central wavelength settings (cenwaves), G160M/1533 and G160M/1623, which encompass the range of cenwaves moving to LP6. We will acquire G160M/1533 and

G160M/1623 spectra of the SMC blue supergiant star AV75, whose spectrum contains both narrow ISM absorption lines and complex convolved lines. We expect a S/N of 60 per resolution element at 1600 Angstroms. We will then convolve existing STIS E140M spectra of AV75 with various versions of the optically-modelled COS LP6 LSFs, and determine which convolutions best agree with the COS spectra gathered here. These will be selected as the COS LP6 LSFs and used to determine the spectral resolution.

OBSERVING DESCRIPTION

This program's observability windows are determined by the orient constraints imposed by a crowded field. Ideally this program will be scheduled for the earliest window in March 2022. If the March window fails or is not schedulable, later windows in June, July, August, and September are backup options. This program observes the blue supergiant AV75 (AKA LIN-156, AzV 75) in the SMC using cenwaves G160M/1533 and G160M/1623. Because previous programs observing AV75 have sometimes encountered acquisition difficulties, we will first run an ACQ/SEARCH, followed by two sequential ACQ/IMAGE acquisitions. This is the same procedure followed by the LP5 version of this program (16467). We aim for an S/N of 60 per resolution element at 1600 Angstroms. The breakdown of this program is as follows 1. Acquisitons: ACQ/SEARCH, ACQ/IMAGE #1, ACQ/IMAGE #2 2. Four G160M/1533 exposures at each FP-POS 3. Four G160M/1623 exposures at each FP-POS

Visit

Proposal 16907, AV75_LP6_SpecRes (01), implementation Wed Feb 23 19:01:25 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 100%; ORIENT 280D TO 60 D; ORIENT 160D TO 165 D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	AV75	RA: 00 50 32.4076 (12.6350317d)	Proper Motion RA: 0.746 mas/yr	V=12.756	Reference Frame: ICRS
	Alt Name1: AV-75	Dec: -72 52 36.46 (-72.87679d)	Proper Motion Dec: -1.256 mas/yr		
	Alt Name2: AZV75	Equinox: J2000	Epoch of Position: 2015.5		

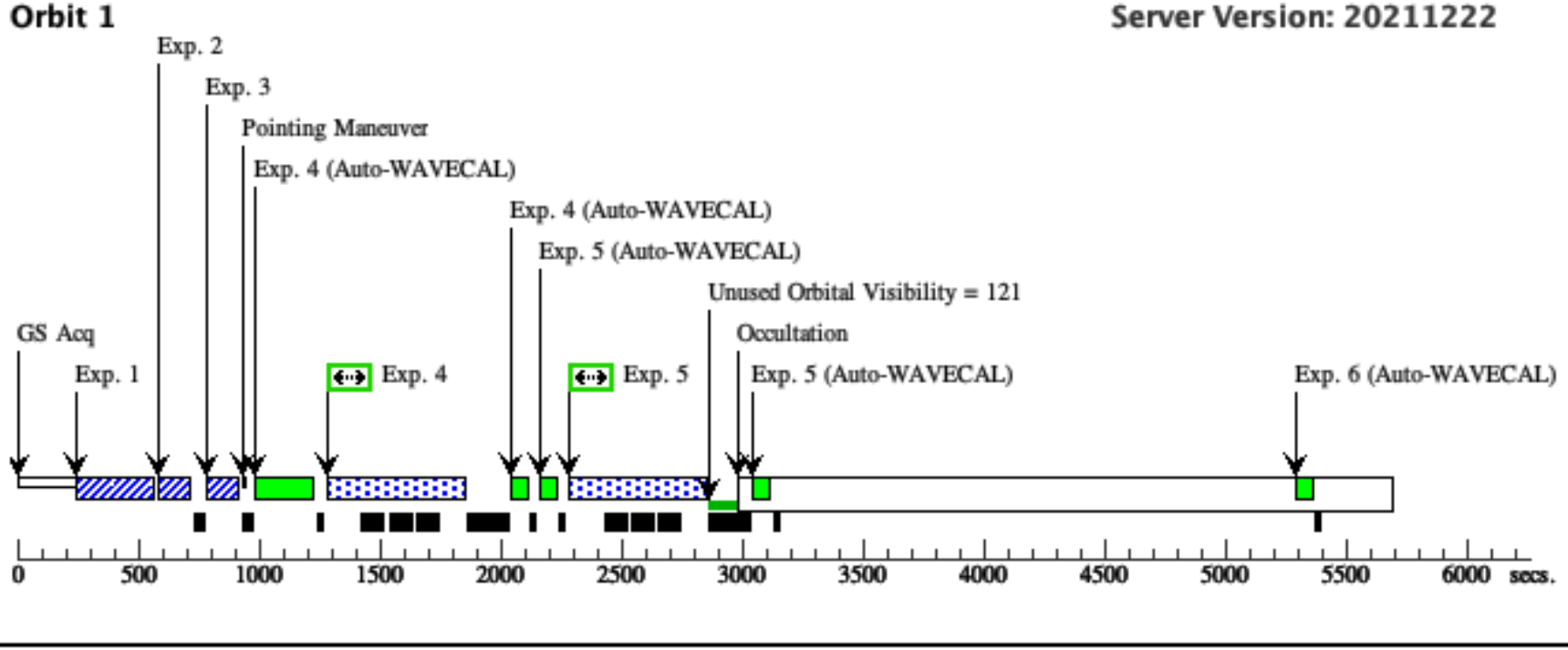
Comments: This object was generated by the target selector and retrieved from the SIMBAD database.
The coordinates and proper motions in the ICRS 2015.5 system were then gathered from the Gaia EDR3 catalog from object Gaia object 4688960073598936960.
Category=EXT-STAR
Description=[GIANT O, SUPERGIANT O]
Extended=NO

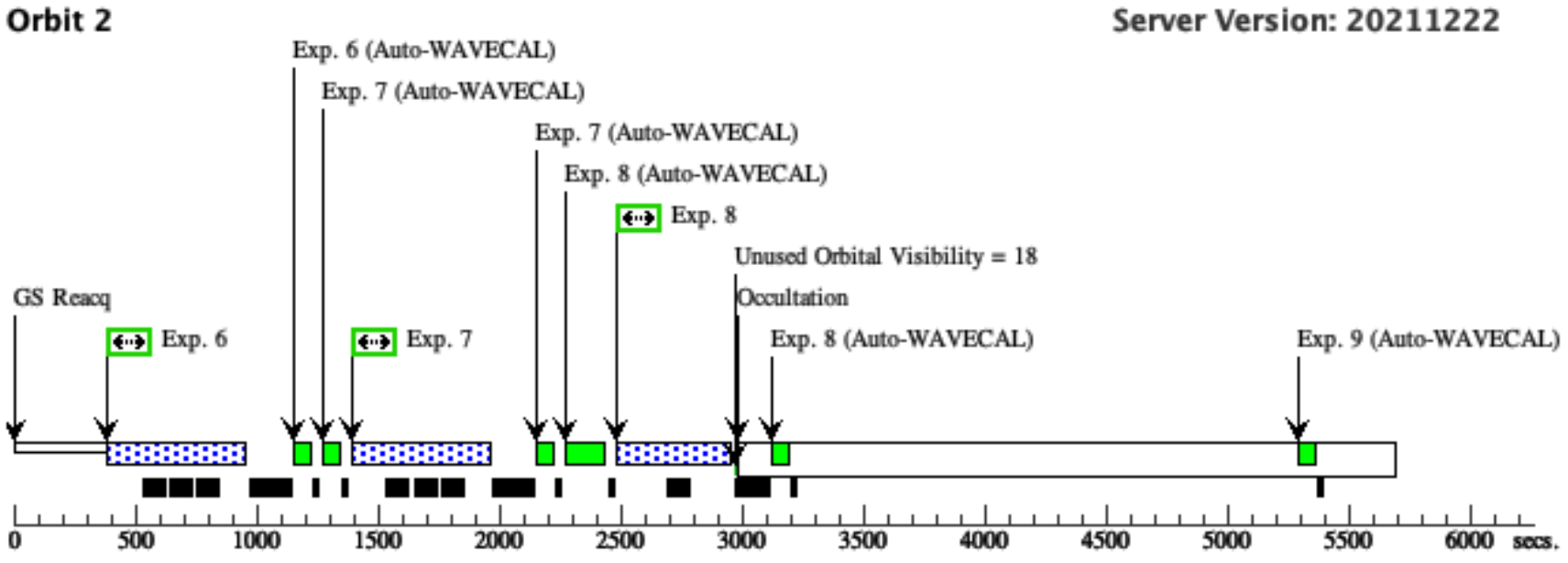
Exposures

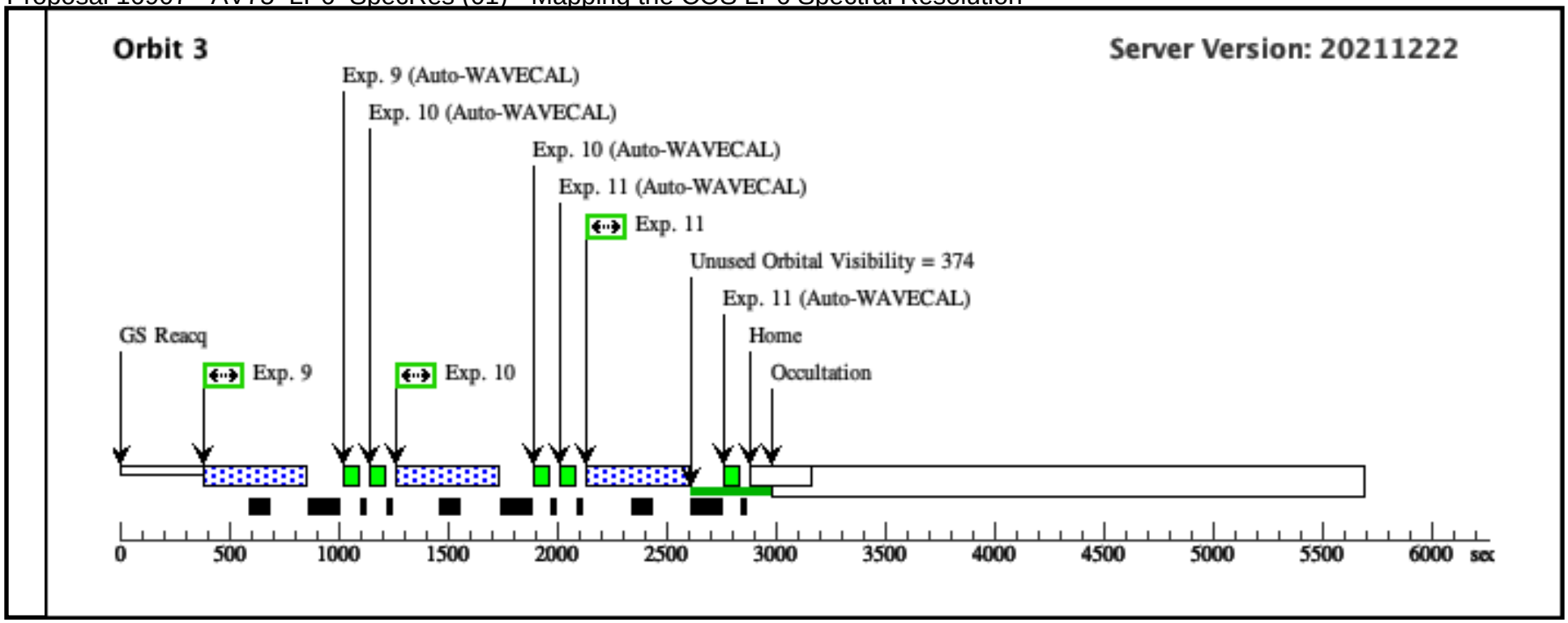
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	AV75_ACQ/SEARCH (COS.ta.1688149)	(1) AV75	COS/NUV, ACQ/SEARCH, BOA	MIRRORA	SCAN-SIZE=2; STEP-SIZE=1.767; CENTER=FLUX-WT			8.0 Secs (8 Secs) *[==>]*	***[1]***
	Comments: For S/N=40: *ETC for ACQ/SEARCH gives 7.9199 seconds for S/N=40. Round to 8 s*								
2	AV75_ACQ/IMAGE1 (COS.ta.1688163)	(1) AV75	COS/NUV, ACQ/IMAGE, BOA	MIRRORA				13.0 Secs (13 Secs) *[==>]*	***[1]***
	Comments: Previous iterations of this program for LP4 and LP5 have gotten ACQ/IMAGE S/N of 60, rather than the recommended baseline of 30. We aim for this higher S/N as well. *For S/N=60:* *ETC for ACQ/IMAGE gives 12.4927 seconds for S/N=60. Round to 13 s* *For S/N=30 (not used):* *ETC for ACQ/IMAGE gives 3.1232 seconds for S/N=30. Round to 4 s (COS.ta.1688153)*								
3	AV75_ACQ/IMAGE2 (COS.ta.1688163)	(1) AV75	COS/NUV, ACQ/IMAGE, BOA	MIRRORA				13.0 Secs (13 Secs) *[==>]*	***[1]***
	Comments: Previous iterations of this program for LP4 and LP5 have gotten ACQ/IMAGE S/N of 60, rather than the recommended baseline of 30. We aim for this higher S/N as well. *For S/N=60:* *ETC for ACQ/IMAGE gives 12.4927 seconds for S/N=60. Round to 13 s* *For S/N=30 (not used):* *ETC for ACQ/IMAGE gives 3.1232 seconds for S/N=30. Round to 4 s (COS.ta.1688153)*								
4	AV75_1533_FP1 (COS.sp.1686100)	(1) AV75	COS/FUV, TIME-TAG, PSA	G160M 1533 A	FP-POS=1; BUFFER-TIME=1111; LIFETIME-POS=LP6			519 Secs (519 Secs) *[==>]*	***[1]***
	Comments: Total exptime = 2074.5031 for S/N=60 at 1600 Angstrom. *Round up to 2075, divided by 4 FP-POS gives 518.75. Further round up to 519 seconds per FP-POS.*								
5	AV75_1533_FP2 (COS.sp.1686100)	(1) AV75	COS/FUV, TIME-TAG, PSA	G160M 1533 A	FP-POS=2; BUFFER-TIME=1111; LIFETIME-POS=LP6			519 Secs (519 Secs) *[==>]*	***[1]***
	Comments: See ETC comment on AV75_1533_FP1								
6	AV75_1533_FP3 (COS.sp.1686100)	(1) AV75	COS/FUV, TIME-TAG, PSA	G160M 1533 A	FP-POS=3; BUFFER-TIME=1111; LIFETIME-POS=LP6			519 Secs (519 Secs) *[==>]*	***[2]***
	Comments: See ETC comment on AV75_1533_FP1								
7	AV75_1533_FP4 (COS.sp.1686100)	(1) AV75	COS/FUV, TIME-TAG, PSA	G160M 1533 A	FP-POS=4; BUFFER-TIME=1111; LIFETIME-POS=LP6			519 Secs (519 Secs) *[==>]*	***[2]***
	Comments: See ETC comment on AV75_1533_FP1								

8	AV75_1623_FP1 (COS.sp.16836437)	(1) AV75	COS/FUV, TIME-TAG, PSA	G160M 1623 A	LIFETIME-POS=LP6; BUFFER-TIME=173; FP-POS=1	417 Secs (417 Secs) *[==>]*	***[2]***
	Comments: Total exptime = 1667.4918 for S/N=60 at 1600 Angstrom. Round up to 1668, divided by 4 FP-POS gives 417 seconds per FP-POS.						
9	AV75_1623_FP2 (COS.sp.16836437)	(1) AV75	COS/FUV, TIME-TAG, PSA	G160M 1623 A	LIFETIME-POS=LP6; BUFFER-TIME=173; FP-POS=2	417 Secs (417 Secs) *[==>]*	***[3]***
	Comments: See ETC comment on AV75_1623_FP1						
10	AV75_1623_FP3 (COS.sp.16836437)	(1) AV75	COS/FUV, TIME-TAG, PSA	G160M 1623 A	LIFETIME-POS=LP6; BUFFER-TIME=173; FP-POS=3	417 Secs (417 Secs) *[==>]*	***[3]***
	Comments: See ETC comment on AV75_1623_FP1						
11	AV75_1623_FP4 (COS.sp.16836437)	(1) AV75	COS/FUV, TIME-TAG, PSA	G160M 1623 A	LIFETIME-POS=LP6; BUFFER-TIME=173; FP-POS=4	417 Secs (417 Secs) *[==>]*	***[3]***
	Comments: See ETC comment on AV75_1623_FP1						

Orbit Structure






Orbit 3
Server Version: 20211222
Exp. 9 (Auto-WAVECAL)
Exp. 10 (Auto-WAVECAL)
Exp. 10 (Auto-WAVECAL)
Exp. 11 (Auto-WAVECAL)
Exp. 11
Unused Orbital Visibility = 374
Exp. 11 (Auto-WAVECAL)
Home
Occultation
GS Reacq
Exp. 9
Exp. 10
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec