16824 - ULLYSES LMC Late-O Dwarfs - COS and STIS

Cycle: 29, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
1C	(1) N11-ELS-046	COS/FUV	1	05-Aug-2022 11:00:38.0	yes
1S	(1) N11-ELS-046 WAVE	STIS/CCD STIS/FUV-MAMA	3	05-Aug-2022 11:00:39.0	yes
2C	(2) N11-ELS-049	COS/FUV	1	05-Aug-2022 11:00:41.0	yes
2S	(2) N11-ELS-049 WAVE	STIS/CCD STIS/FUV-MAMA	3	05-Aug-2022 11:00:42.0	yes

8 Total Orbits Used

ABSTRACT

The Space Telescope Science Institute (STScI) Director has decided to devote up to 1000 orbits of Director's Discretionary time in observing Cycles 27-29 to a new Hubble Ultraviolet Legacy program focused on star formation and associated stellar physics. This new program, ULLYSES (UV Legacy Library of Young Stars as Essential Standards), will provide a UV spectroscopic reference sample of young (< 10 Myr) high- and low-mass stars. It will target over ~150 OB stars in the Magellanic Clouds and lower metallicity galaxies in the Local Group, and ~40 T Tauri stars and brown dwarfs in the Milky Way. In addition, ULLYSES will monitor 4 typical T Tauri stars over different rotational phases through at least three rotation periods, and over timescales of months to years. The resulting library will provide template spectra of massive stars at metallicities substantially

below the well studied, while the low mass sample will cover a wide range of ages, accretion rates, and masses, including objects down to well below 0.5 M_sun. The legacy of this large UV dataset on the first 10 Myr of stellar evolution will be enhanced by complementary datasets obtained by the scientific community. In addition to the core goals of the program related to stellar astrophysics of low and high mass stars, this data will also enable exciting science in the fields of ISM, CGM, jets, and exoplanets. ULLYSES will be modeled after the Frontier Fields program: all data obtained will be non-proprietary. The implementation team at STScI is developing high-level science data products and a sophisticated database and website for disseminating data from the ULLYSES program and ancillary datasets for the ULLYSES target sample from space and ground-based facilities.

OBSERVING DESCRIPTION

This proposal includes a subset of the massive ULLYSES stars being observed in the Magellanic clouds.

Depending on target brightness, the main FUV spectral range will generally use either the STIS E140M setting or the combination of the COS c1291 + c1611 settings. Sufficiently bright stars without good FUSE data in the archive will also be observed with the COS c1096 setting to provide coverage at shorter wavelengths. Where time permits, stars of type O9 or later will also be observed with STIS E230M/1978, while for supergiants of spectral type B5 or later E230M/2707 may also be included. Where possible, targets of a given spectral type were selected to span both a range in extinction and in rotation rates to support a variety of stellar and ISM studies.

Signal-to-noise requirements used to determine the desired exposures times were defined as follows:
COS/G130M/c1096: 20 / nine-pixel resel at 1080 A
COS/G130M/c1291: 30 / six-pixel resel at 1150 A
COS/G160M/c1611: 30 / six-pixel resel at 1590 A
COS/G185M/c1953: 30 / three-pixel resel at 1860 A
COS/G185M/c1986: 30 / three-pixel resel at 1980 A
STIS/E140M/c1425: 20 / two-pixel resel at 1200 A
STIS/E230M/c1978: 20 / two-pixel resel at 1800 A
STIS/E230M/c2707: 20 / two-pixel resel at 2800 A
The actual implemented exposure times may be adjusted to efficiently use HST orbits, but should always provide at least 80% of the desired time as defined by the above requirements.

Additional details about the scientific motivation and technical implementation strategy of the ULLYSES observations can be found at

http://www.stsci.edu/stsci-research/research-topics-and-programs/ullyses. The ULLYSES program is based on the recommendations of a working group led by Sally Oey; the full text of that group's report can be found at http://www.stsci.edu/files/live/sites/www/files/home/stsci-research/research-topics-and-programs/ullyses/_documents/HSTUV-report-ULLYSES.pdf.

Visit

Proposal 16824, N11-ELS-046-COS (1C) Fri Aug 05 15:00:43 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: SCHED 100%

Comments: vstatus; 1C; N11-ELS-046; P/COS approved for submission; P/AF 14/07/22 ; intrev started ; P/RS 25/07/22
vcheck; Enter targ name & Inst. & Resp. Sci.; N11-ELS-046 ; COS ; AF
vcheck; ETC numbers entered in APT?; Completed
vcheck; Any screening violations?; None
vcheck; S/N ETC calcs done & documented?; Yes
vcheck; Field images checked & saved?; Yes - N11-ELS-046_COS_DSS_BOT.png and N11-ELS-046_COS_gaiaBOT.png
vcheck; Selected ACQ strategy?; Dispersed G130M/1291
vcheck; Possible ACQ or Sci spoilers?; None
vcheck; Field BOT clear?; Yes - see Comments
vcheck; Visual BOT check for stars not in catalog?; Completed using gaiaBOT
vcheck; Orbit packing finalized?; 1 orbit, recovered 91% of desired exposure time
vcheck; Buffer times optimized?; Done
vcheck; Verify visit grouping correct; N/A
vcheck; Is visit ready for int. review?; Yes
Allocated COS orbits = 1

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	N11-ELS-046	RA: 04 56 44.6321 (74.1859671d)	Proper Motion RA: 0 mas/yr	V=13.98	Reference Frame: ICRS
	Alt Name1: ELS2006-N11-046	Dec: -66 34 20.88 (-66.57247d)	Proper Motion Dec: 0 mas/yr	SpT=O9.5 V; E(B-V)=0.02; B=13.74; V=13.98	
		Equinox: J2000	Parallax: 0"		
			Epoch of Position: 2015.5		

Comments: N11-ELS-046 : [ELS2006] N11 046
Previous name : N11-046
Input file: ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv
SpT = O9.5 V
COS/G130M/c1096 : rn(PoWR-OB-new(PoWR_34000_4.20_m7.00_Z0.50.fits, lmc-ob-i 34-42, Z=0.500 solar, Teff=34000, log_lum=4.58, log_g=4.20, log_mdot=-7.00) (extinction lmcavg=0.020), johnson B mag=13.740 vegamag)
Coordinate pedigree: Gaia DR2
Calculation performed 2021-10-25T01:00:53, v0.9
---
tstatus; N11-ELS-046; P/COS approved for submission; S/STIS approved for submission; P/AF 14/07/22; S/TM 12/05/22
tcheck; APT/SIMBAD target names: ; N11-ELS-046 '[ELS2006] N11 046'
tcheck; Target info verification status?; OK ...
Simbad mags are within ~0.1 mag to those adopted for the phase II (which come from Evans et al. 2006, A&A, 456, 623).
tcheck; Coordinates & P.M. verified, epoch checked?; Gaia coords ok, added epoch for DR2
tcheck; Adopted SED compared to Observations?; Limited data available ...
No FUV, NUV, or optical spectra available, must rely on optical broadband magnitudes
Default mags are within 2 percent of the normalized SED.
Only B and V from Evans et al. were supplied in the photo.dat file, but other mags are available through SIMBAD (though their origin is unclear: the reference given by SIMBAD incorrectly attributes the measurements to Evans et al. 2006).
Added SIMBAD magintudes to SED plots. Ratios to the SED are within 20% for the U band.
Ratios to the SED are within ~0.1 mag for Simbad B and V mags.
Although the photometry may carry residual uncertainties, Hunter et al. (2008, A&A, 479, 541) derived (Teff, log g) = (33500 K, 4.25) from model atmosphere fits to optical spectra. Consequently, the underlying PoWR model adopted for ETC calculations (Teff, log g) = (34000 K, 4.20) should be quite reliable. The adopted reddening is extremely small, so any residual photometric uncertainties can only act to increase its value (and decrease the flux of the adopted SED at far-UV wavelengths). Hunter et al. indicate that the star is a binary, but do not provide any details.
Category=STAR
Description=[MAIN SEQUENCE 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	FUV PEAKXD (COS.sa.1814849)	(1) N11-ELS-046	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A	CENTER=FLUX-WT; NUM-POS=3; STEP-SIZE=1.3			0.1 Secs (0.1 Secs) *[==>]*	***[1]***

Comments: Bright Object Check (GSCII)
PEAKXD (H&S, Science, Safe, Unknown) = (0, 0, 1,56)

The unknown stars can be identified with the following stars in the Gaia DR2 catalog, which are referenced for convenience via their gaiaBOT numbers. gaiBOT also allows their "worst-case, O5 V" V-magnitudes to be estimated (Vest) and compared with the limit of V~14.0. See
~/box/ullyses_tech/ullyses_proposals/c29_mc/16924/N11-ELS-046/N11-ELS-046_COS_DSS_BOT.png
~/box/ullyses_tech/ullyses_proposals/c29_mc/16924/N11-ELS-046/N11-ELS-046_COS_gaiaBOT.png

				gBOT#	Vest	Comment
BOA	S1IW146161	04 56 42.0099	-66 34 26.50	26	18.68	Safe
BOA	S1IW146177	04 56 41.9330	-66 34 15.27	29	18.77	Safe
BOA	S1IW146189	04 56 46.4630	-66 34 11.92	22	18.06	Safe
BOA	S1IW146208	04 56 44.8737	-66 34 30.37	14	19.52	Safe
PSA	S1IW112536	04 56 44.5551	-66 34 22.93	??	none	Spurious?

The data in the gaiaBOT spreadsheet
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/gaiaBOT/16824_N11_ELS_046_GAIA_DR2_r22arcsec_bot.csv

indicates that there is nothing brighter than Vest = 14.00 within the COS macroaperture (radius = 22 arcseconds) of the target. Thus, gaiaBOT indicates that all stars in the field are safe. There are no spoilers in this field.

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
2	FUV PEAKD (COS.sa.1814849)	(1) N11-ELS-046	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	CENTER=FLUX-WT-FLR; NUM-POS=5; STEP-SIZE=0.9			0.1 Secs (0.1 Secs) *[==>]*	***[1]***

Comments: Bright Object Check (GSCII)
PEAKD (H&S, Science, Safe, Unknown) = (0, 0, 1, 6)

The unknown stars can be identified with the following stars in the Gaia DR2 catalog, which are referenced for convenience via their gaiaBOT numbers. gaiBOT also allows their "worst-case, O5 V" V-magnitudes to be estimated (Vest) and compared with the limit of V~14.0. See
~/box/ullyses_tech/ullyses_proposals/c29_mc/16924/N11-ELS-046/N11-ELS-046_COS_DSS_BOT.png
~/box/ullyses_tech/ullyses_proposals/c29_mc/16924/N11-ELS-046/N11-ELS-046_COS_gaiaBOT.png

				gBOT#	Vest	Comment
BOA	S1IW146161	04 56 42.0099	-66 34 26.50	26	18.68	Safe
BOA	S1IW146177	04 56 41.9330	-66 34 15.27	29	18.77	Safe
BOA	S1IW146189	04 56 46.4630	-66 34 11.92	22	18.06	Safe
BOA	S1IW146208	04 56 44.8737	-66 34 30.37	14	19.52	Safe
PSA	S1IW112536	04 56 44.5551	-66 34 22.93	??	none	Spurious?

The data in the gaiaBOT spreadsheet
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/gaiaBOT/16824_N11_ELS_046_GAIA_DR2_r22arcsec_bot.csv

indicates that there is nothing brighter than Vest = 14.00 within the COS macroaperture (radius = 22 arcseconds) of the target. Thus, gaiaBOT indicates that all stars in the field are safe. There are no spoilers in this field.

3	G130M/1096 (COS.sp.1814898)	(1) N11-ELS-046	COS/FUV, TIME-TAG, PSA	G130M 1096 A	BUFFER-TIME=141; FP-POS=ALL	392 Secs (1568 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[1]***	

Comments: ETC calculations used
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/N11-ELS-046/N11-ELS-046_adopted_sed.fits
which is identical to
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/N11-ELS-046/seds/N11-ELS-46_COS_G130M_c1096_sed.fits
This is the PoWR_34000_4.20_m7.00_Z0.50 model, reddened by E(B-V) = 0.02 with the lmcavg law, and normalized to B=13.74.

ETC calculation COS.sp.1814898 indicates that SNR=20/resel is obtained at 1080 +/- 0.5 A in 1719.455 s
- Warning Issued: count-rate exceeds segment/stripe limit for irregularly-variable source, which is not relevant for current source
- There is a factor of 1.7 (0.57 magnitudes) margin before Segment A reaches the 15,000 count/s limit. This is much larger than the uncertainty in the normalization provided by the optical photometry, so photometric errors should not be a concern

Baseline exposure rounded to 1720 s (430 per FP-POS)
Count Rate (Total, Segment A, Segment B) = (9083.512, 8874.924, 208.588)
Brightest Pixel: 0.115 counts/s at 1216.22 A
Buffer-Fill Time = 259s
*Buffer Time = 2/3 * 259 s = 172 s*
Optimized = 141 s

*After orbital packing and buffer time optimization, the exposure time was adjusted to 392 s per FP-POS, which yields 91% the baseline exposure time. The predicted S/N = sqrt(392/967) * 20 = 19.1 per resel.*

Bright Object Check with GSCII
G130M/1096 (H&S, Science, Safe, Unknown) = (0, 0, 1, 5)

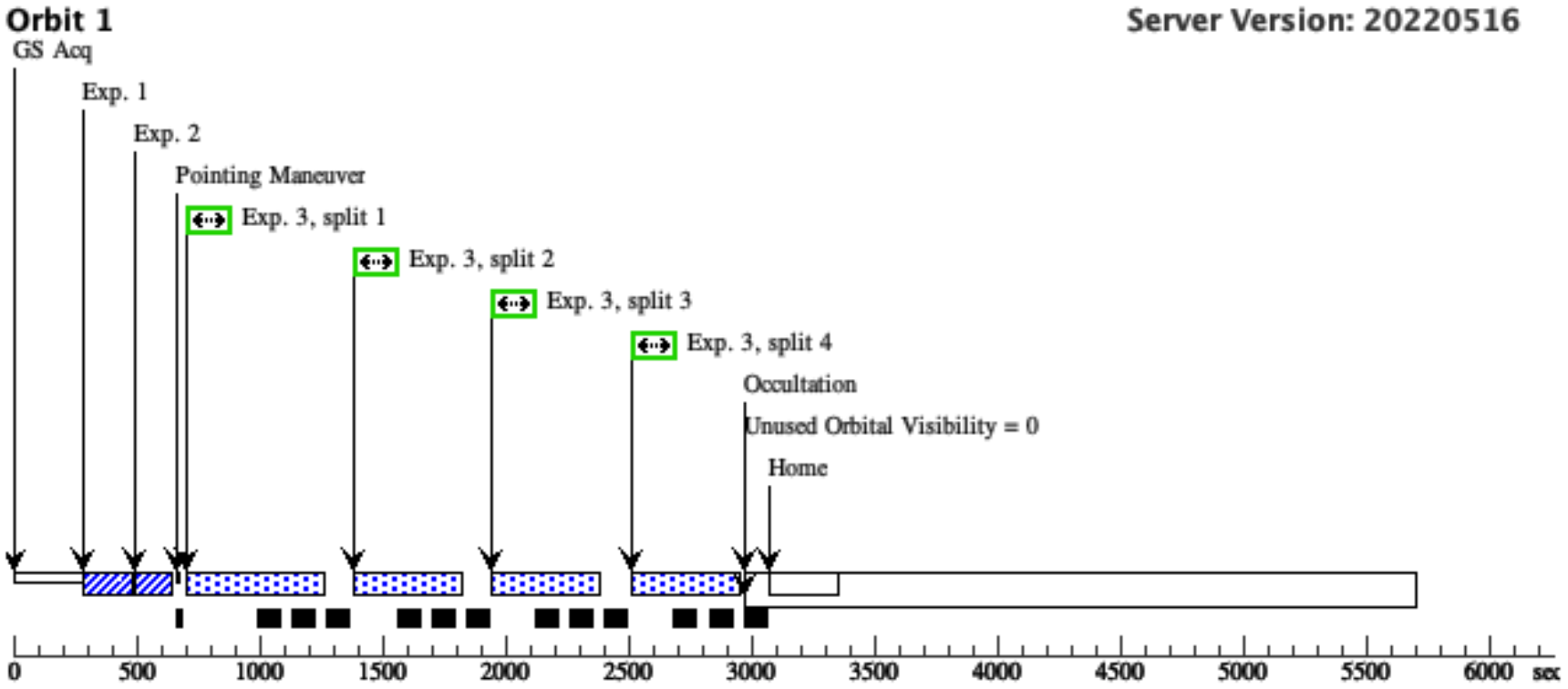
The unknown stars can be identified with the following stars in the Gaia DR2 catalog, which are referenced for convenience via their gaiaBOT numbers. gaiBOT also allows their "worst-case, O5 V" V-magnitudes to be estimated (Vest) and compared with the limit of V~14.0. See
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/N11-ELS-046/N11-ELS-046_COS_DSS_BOT.png
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/N11-ELS-046/N11-ELS-046_COS_gaiaBOT.png

				gBOT#	Vest	Comment
BOA	S1IW146161	04 56 42.0099	-66 34 26.50	26	18.68	Safe
BOA	S1IW146177	04 56 41.9330	-66 34 15.27	29	18.77	Safe
BOA	S1IW146189	04 56 46.4630	-66 34 11.92	22	18.06	Safe
BOA	S1IW146208	04 56 44.8737	-66 34 30.37	14	19.52	Safe
PSA	S1IW112536	04 56 44.5551	-66 34 22.93	??	none	Spurious?

The data in the gaiaBOT spreadsheet
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/gaiaBOT/16824_N11_ELS_046_GAIA_DR2_r22arcsec_bot.csv

indicates that there is nothing brighter than Vest = 14.00 within the COS macroaperture (radius = 22 arcseconds) of the target. Thus, gaiaBOT indicates that all stars in the field are safe. There are no spoilers in this field.

Orbit Structure



Visit

Proposal 16824, N11-ELS-046-STIS (1S) Fri Aug 05 15:00:43 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: SCHED 100%; ORIENT 260D TO 280 D; ORIENT 80D TO 100 D; GROUP 1S,1C WITHIN 30D

Comments: vstatus; 1S; N11-ELS-046; S/STIS approved for submission; S/TM 12/05/22 ; intrev: complete ; S/DW 04/08/22
vcheck; Enter targ name & Inst. & Resp. Sci.; N11-ELS-046 '[ELS2006] N11 046' ; STIS ; TM
vcheck; ETC numbers entered in APT?; completed
vcheck; Any screening violations?; none
vcheck; S/N ETC calcs done & documented?; Yes ...
STIS.sp.1748937 with 7252 sec exptime gives SNR = 16 (or 20 from ETC plots) at 1200A
Given the uncertainty in normalization due to no obs. spectra, I did an extreme BOP calculation
of 2 times the original SED: STIS.sp.1749888
A padding of 20% more flux is more realistic and was used for the buffer time calculations: STIS.sp.1749887
vcheck; Field images checked & saved?; yes
Saved images of DSS, 2MASS, and GALEX. No spoiler stars within 5".
2Mass image has some elongation near the target though.
vcheck; Selected ACQ strategy?; STIS F28X50OII 11sec ...
Using the OII filter given that the discovered companion at 0.2" may be redder in the F28x50LP filter.
STIS.ta.1817373 gives SNR = 50 in 9.75 sec
STIS.ta.1817372 Castelli-Kurucz Models O9V model with V=13.98 and E(B-V) = 0.02 gives 9.6235 sec
for SNR = 50
Given the uncertainty in normalization and reddening, rounded up to 11 sec.
vcheck; Possible ACQ or Sci spoilers?; No ...
Checked Simbad and Gaia catalogs for nearby sources. None within 5"
There is a red Gaia source at 7", but that's outside the region of interest.
Zaritsky catalog has 3 sources - 2 of the target, one offset north of the target with Vmag =19.
vcheck; Field BOT clear?; yes ...
Only the 1 source appears in GSC2, it's offset from the DSS target and Gaia coordinates.
Target is visible in Galex images, but is not returned by the BOT.
vcheck; Visual BOT check for stars not in catalog?; ok
vcheck; Orbit packing finalized?; yes, 3 orbits
vcheck; Buffer times optimized?; yes ...
Given no obs. spectra for SED normalization, I scaled the SED by 1.2 in case the source is
20 percent brighter unexpectedly. See STIS.sp.1749887
vcheck; Verify visit grouping correct; yes
vcheck; Is visit ready for int. review?; yes
Allocated STIS orbits = 3

Fixed Targets

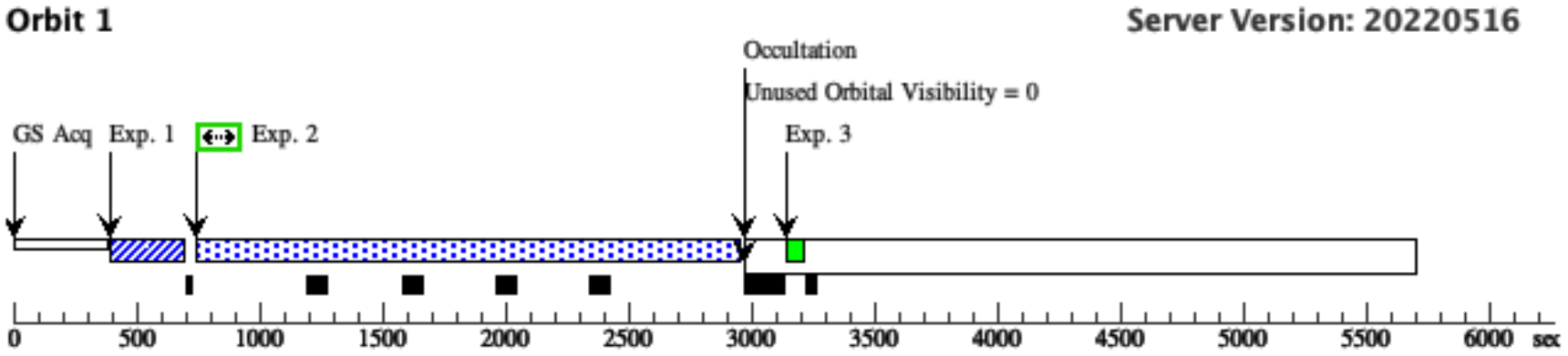
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	N11-ELS-046	RA: 04 56 44.6321 (74.1859671d)	Proper Motion RA: 0 mas/yr	V=13.98	Reference Frame: ICRS
	Alt Name1: ELS2006-N11-046	Dec: -66 34 20.88 (-66.57247d)	Proper Motion Dec: 0 mas/yr	SpT=O9.5 V; E(B-V)=0.02; B=13.74; V=13.98	
		Equinox: J2000	Parallax: 0"		
			Epoch of Position: 2015.5		

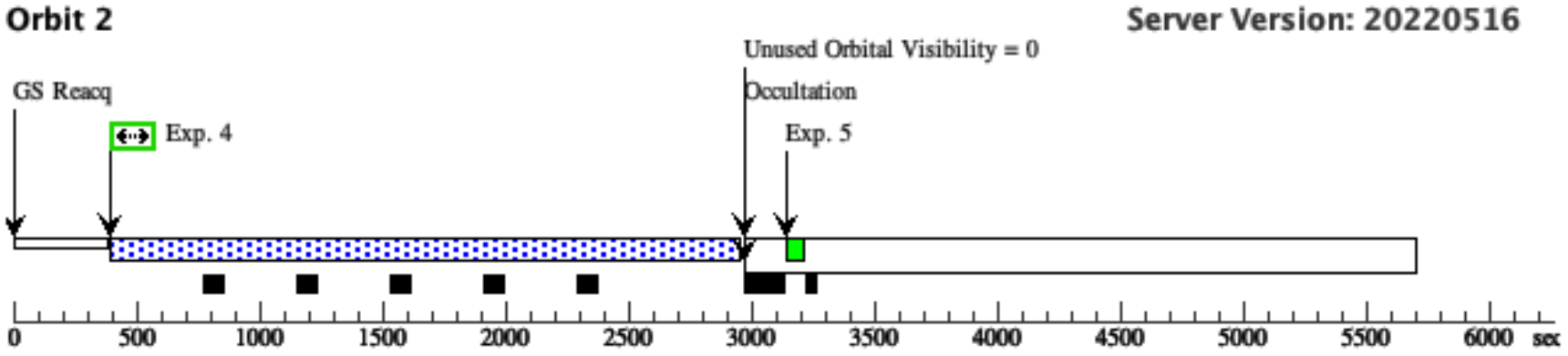
Comments: N11-ELS-046 : [ELS2006] N11 046
Previous name : N11-046
Input file: ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv
SpT = O9.5 V
COS/G130M/c1096 : rn(PoWR-OB-new(PoWR_34000_4.20_m7.00_Z0.50.fits, lmc-ob-i 34-42, Z=0.500 solar, Teff=34000, log_lum=4.58, log_g=4.20, log_mdot=-7.00) (extinction lmcavg=0.020), johnson B mag=13.740 vegamag)
Coordinate pedigree: Gaia DR2
Calculation performed 2021-10-25T01:00:53, v0.9
---
tstatus; N11-ELS-046; P/COS approved for submission; S/STIS approved for submission; P/AF 14/07/22; S/TM 12/05/22
tcheck; APT/SIMBAD target names: ; N11-ELS-046 '[ELS2006] N11 046'
tcheck; Target info verification status?; OK ...
Simbad mags are within ~0.1 mag to those adopted for the phase II (which come from Evans et al. 2006, A&A, 456, 623).
tcheck; Coordinates & P.M. verified, epoch checked?; Gaia coords ok, added epoch for DR2
tcheck; Adopted SED compared to Observations?; Limited data available ...
No FUV, NUV, or optical spectra available, must rely on optical broadband magnitudes
Default mags are within 2 percent of the normalized SED.
Only B and V from Evans et al. were supplied in the photo.dat file, but other mags are available through SIMBAD (though their origin is unclear: the reference given by SIMBAD incorrectly attributes the measurements to Evans et al. 2006).
Added SIMBAD magintudes to SED plots. Ratios to the SED are within 20% for the U band.
Ratios to the SED are within ~0.1 mag for Simbad B and V mags.
Although the photometry may carry residual uncertainties, Hunter et al. (2008, A&A, 479, 541) derived (Teff, log g) = (33500 K, 4.25) from model atmosphere fits to optical spectra. Consequently, the underlying PoWR model adopted for ETC calculations (Teff, log g) = (34000 K, 4.20) should be quite reliable. The adopted reddening is extremely small, so any residual photometric uncertainties can only act to increase its value (and decrease the flux of the adopted SED at far-UV wavelengths). Hunter et al. indicate that the star is a binary, but do not provide any details.
Category=STAR
Description=[MAIN SEQUENCE O]
Extended=NO

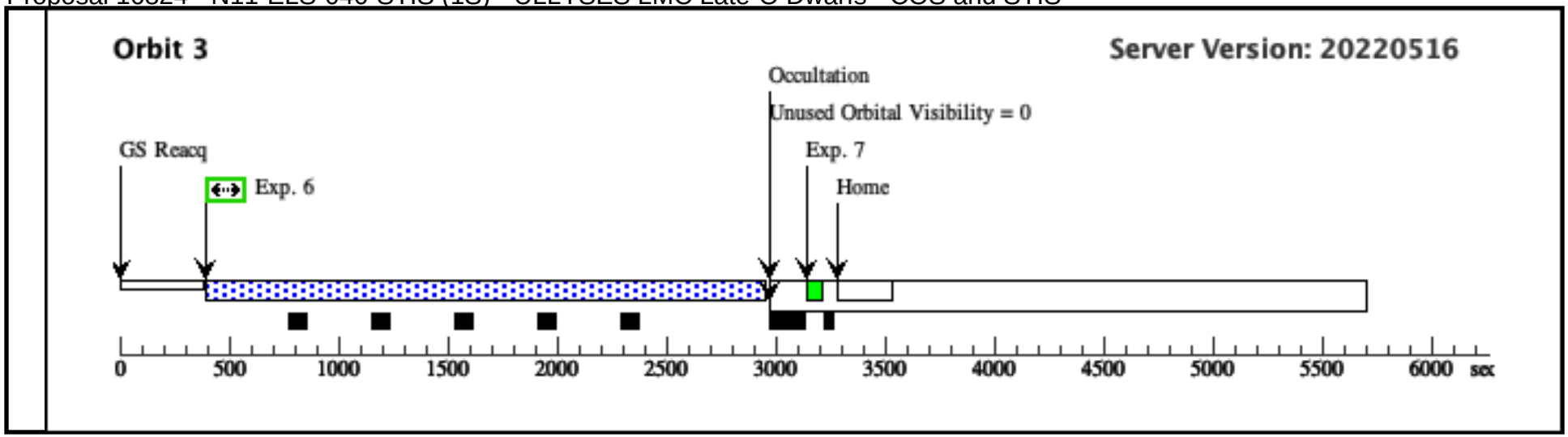
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.1817373)	(1) N11-ELS-046	STIS/CCD, ACQ, F28X50OII	MIRROR				11 Secs (11 Secs) *[==>]*	***[1]***
2	E140M/1425 (STIS.sp.1748937)	(1) N11-ELS-046	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	WAVECAL=NO; BUFFER-TIME=380			2121 Secs (2121 Secs) *[==>]*	***[1]***
	Comments: rn(PoWR-OB-new(PoWR_34000_4.20_m7.00_Z0.50.fits, lmc-ob-i 34-42, Z=0.500 solar, Teff=34000, log_lum=4.58, log_g=4.20, log_mdot=-7.00) (extinction lmcavg=0.020), johnson B mag=13.740 veg amag); stis,fuvmama,e140m,c1425,0.2x0.2,mjd#59670 *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O9.5 V* *SED = N11-ELS-46_STIS_E140M_c1425_sed.fits* *For exptime=7045.7 s, spectral region:* *1200.0 +- 0.5 A achieves SNR=20.0/resel* *global countrate (brightest segment): 3546.1 cts/s/segment* *brightest pixel: 0.043 cts/s/pix at 1298.0 A* *Calculation performed 2021-10-25T01:01:02, v0.9*								
3	E140M/1425 WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				*[==>]*	***[1]***
4	E140M/1425 (STIS.sp.1748937)	(1) N11-ELS-046	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	WAVECAL=NO; BUFFER-TIME=380			2548 Secs (2548 Secs) *[==>]*	***[2]***
	Comments: rn(PoWR-OB-new(PoWR_34000_4.20_m7.00_Z0.50.fits, lmc-ob-i 34-42, Z=0.500 solar, Teff=34000, log_lum=4.58, log_g=4.20, log_mdot=-7.00) (extinction lmcavg=0.020), johnson B mag=13.740 veg amag); stis,fuvmama,e140m,c1425,0.2x0.2,mjd#59670 *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O9.5 V* *SED = N11-ELS-46_STIS_E140M_c1425_sed.fits* *For exptime=7045.7 s, spectral region:* *1200.0 +- 0.5 A achieves SNR=20.0/resel* *global countrate (brightest segment): 3546.1 cts/s/segment* *brightest pixel: 0.043 cts/s/pix at 1298.0 A* *Calculation performed 2021-10-25T01:01:02, v0.9*								
5	E140M/1425 WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				*[==>]*	***[2]***
6	E140M/1425 (STIS.sp.1748937)	(1) N11-ELS-046	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	WAVECAL=NO; BUFFER-TIME=380			2548 Secs (2548 Secs) *[==>]*	***[3]***
	Comments: rn(PoWR-OB-new(PoWR_34000_4.20_m7.00_Z0.50.fits, lmc-ob-i 34-42, Z=0.500 solar, Teff=34000, log_lum=4.58, log_g=4.20, log_mdot=-7.00) (extinction lmcavg=0.020), johnson B mag=13.740 veg amag); stis,fuvmama,e140m,c1425,0.2x0.2,mjd#59670 *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O9.5 V* *SED = N11-ELS-46_STIS_E140M_c1425_sed.fits* *For exptime=7045.7 s, spectral region:* *1200.0 +- 0.5 A achieves SNR=20.0/resel* *global countrate (brightest segment): 3546.1 cts/s/segment* *brightest pixel: 0.043 cts/s/pix at 1298.0 A* *Calculation performed 2021-10-25T01:01:02, v0.9*								
7	E140M/1425 WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				*[==>]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20220516
Occultation
Unused Orbital Visibility = 0
GS Reacq
Exp. 6
Exp. 7
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 16824, N11-ELS-049-COS (2C) Fri Aug 05 15:00:43 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: SCHED 100%

Comments: vstatus; 2C; N11-ELS-049; P/COS approved for submission; P/AF 14/07/22 ; intrev complete ; P/RS 25/07/22
vcheck; Enter targ name & Inst. & Resp. Sci.; N11-ELS-049 ; COS ; AF
vcheck; ETC numbers entered in APT?; Completed
vcheck; Any screening violations?; None
vcheck; S/N ETC calcs done & documented?; Yes
vcheck; Field images checked & saved?; Yes - N11-ELS-049_COS_DSS_BOT.png and N11-ELS-049_COS_gaiaBOT.png
vcheck; Selected ACQ strategy?; Dispersed G130M/1291
vcheck; Possible ACQ or Sci spoilers?; None
vcheck; Field BOT clear?; Yes - see Comments
vcheck; Visual BOT check for stars not in catalog?; Completed using gaiaBOT
vcheck; Orbit packing finalized?; 1 orbit, recovered 79% of desired exposure time
vcheck; Buffer times optimized?; Done
vcheck; Verify visit grouping correct; N/A
vcheck; Is visit ready for int. review?; Yes
Allocated COS orbits = 1

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	N11-ELS-049	RA: 04 56 29.5641 (74.1231837d)	Proper Motion RA: 0 mas/yr	V=14.02	Reference Frame: ICRS
	Alt Name1: ELS2006-N11-049	Dec: -66 28 20.98 (-66.47249d)	Proper Motion Dec: 0 mas/yr	SpT=O7.5 V; E(B-V)=0.03; B=13.78; V=14.02	
		Equinox: J2000	Parallax: 0"		
			Epoch of Position: 2015.5		

Comments: N11-ELS-049 : [ELS2006] N11 049
Previous name : N11-049
Input file: ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv
SpT = O7.5 V
COS/G130M/c1096 : rn(PoWR-OB-new(PoWR_36000_4.00_m7.00_Z0.50.fits, lmc-ob-i 36-40, Z=0.500 solar, Teff=36000, log_lum=5.00, log_g=4.00, log_mdot=-7.00) (extinction lmcavg=0.030), johnson B mag=13.780 vegamag)
Coordinate pedigree: Gaia DR2
Calculation performed 2021-10-25T01:00:42, v0.9
---
tstatus; N11-ELS-049; P/COS approved for submission; S/STIS approved for submission; P/AF 14/07/22; S/TM 12/05/22
tcheck; APT/SIMBAD target names: ; N11-ELS-049 [ELS2006] N11 049 '[L72] LH 9-73'
tcheck; Target info verification status?; OK ...
Simbad mags are within ~0.05mag of the phase II values
tcheck; Coordinates & P.M. verified, epoch checked?; Gaia coords ok, added epoch for DR2
tcheck; Adopted SED compared to Observations?; Limited data available ...
No FUV, NUV, or optical spectra available, must rely on optical broadband magnitudes
Default mags are within 2 percent of the normalized SED.
Only B and V were supplied in the photo.dat file, but other mags are available through SIMBAD (though their origin is unclear).
Added SIMBAD magintudes to SED plots. Ratios to the SED are within 25% for the U band.
Ratios to the SED are within ~0.05 mag for Simbad B and V mags.
The reddening indicated by the photometry and spectral type is very small. The far-UV fluxes of the adopted SED will be near the maximum possible value that isalso consistent with the spectral type (which was used to select the model parameters) and the optical photometry (which was used to normalize the flux distribution).
Category=STAR
Description=[MAIN SEQUENCE 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	FUV PEAKXD (COS.sa.1815097)	(2) N11-ELS-049	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A	CENTER=FLUX-WT; NUM-POS=3; STEP-SIZE=1.3			0.2 Secs (0.2 Secs) *[==>]*	***[1]***

Comments: COS.sa.1815097 indicates that S/N = 30 can be achived with texp = 0.1026 s, which was rounded up to 0.2 s. The ETC issued a WARNING that the count-rate exceeds the segment/stripe limit for irregularly variable sources, which is not relevant in this case.

Bright Object Check with GSCII
PEAKXD (H&S, Science, Safe, Unknown) = (0, 0, 4, 3)

The unknown stars can be identified with the following stars in the Gaia DR2 catalog, which are referenced for convenience via their gaiaBOT numbers. gaiBOT also allows their "worst-case, O5 V" V-magnitudes to be estimated (Vest) and compared with the limit of V~14.0. See
~/box/ullyses_tech/ullyses_proposals/c29_mc/16924/N11-ELS-049/N11-ELS-049_COS_DSS_BOT.png
~/box/ullyses_tech/ullyses_proposals/c29_mc/16924/N11-ELS-049/N11-ELS-049_COS_gaiaBOT.png

				gBOT#	Vest	Comment
BOA	S1IW146778	04 56 27.4896	-66 28 35.57	73, 77	19.4, 19.6	Safe
BOA	S1IW146813	04 56 26.6290	-66 28 14.86	56	19.0	Safe
PSA	S1IW113581	04 56 29.5660	-66 28 20.88	This appears to be the target, which is Safe		

The data in the gaiaBOT spreadsheet
~/box/ullyses_tech/ullyses_proposals/c29_mc/16924/gaiaBOT/16824_N11_ELS_049_GAIA_DR2_r22arcsec_bot.csv

indicates that there is nothing brighter than Vest = 14.00 within 22 arcseconds of the target.

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
2	FUV PEAKD (COS.sa.1815097)	(2) N11-ELS-049	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	CENTER=FLUX-WT-FLR; NUM-POS=5; STEP-SIZE=0.9			0.2 Secs (0.2 Secs) *[==>]*	***[1]***

Comments: COS.sa.1815097 indicates that S/N = 30 can be achived with texp = 0.1026 s, which was rounded up to 0.2 s. The ETC issued a WARNING that the count-rate exceeds the segment/stripe limit for irregularly variable sources, which is not relevant in this case.

Bright Object Check with GSCII
PEAKD (H&S, Science, Safe, Unknown) = (0, 0, 7, 3)

The unknown stars can be identified with the following stars in the Gaia DR2 catalog, which are referenced for convenience via their gaiaBOT numbers. gaiBOT also allows their "worst-case, O5 V" V-magnitudes to be estimated (Vest) and compared with the limit of V~14.0. See
~/box/ullyses_tech/ullyses_proposals/c29_mc/16924/N11-ELS-049/N11-ELS-049_COS_DSS_BOT.png
~/box/ullyses_tech/ullyses_proposals/c29_mc/16924/N11-ELS-049/N11-ELS-049_COS_gaiaBOT.png

				gBOT#	Vest	Comment
BOA	S1IW146778	04 56 27.4896	-66 28 35.57	73, 77	19.4, 19.6	Safe
BOA	S1IW146813	04 56 26.6290	-66 28 14.86	56	19.0	Safe
PSA	S1IW113581	04 56 29.5660	-66 28 20.88	This appears to be the target, which is Safe		

The data in the gaiaBOT spreadsheet
~/box/ullyses_tech/ullyses_proposals/c29_mc/16924/gaiaBOT/16824_N11_ELS_049_GAIA_DR2_r22arcsec_bot.csv

indicates that there is nothing brighter than Vest = 14.00 within 22 arcseconds of the target.

3	G130M/1096 (COS.sp.1815098)	(2) N11-ELS-049	COS/FUV, TIME-TAG, PSA	G130M 1096 A	BUFFER-TIME=145.0; FP-POS=ALL	399 Secs (1596 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[1]***

Comments: The ETC calculations used
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/N11-ELS-049/N11-ELS-049_adopted_sed.fits
which is identical to
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/N11-ELS-049/seds/N11-ELS-49_COS_G130M_c1096_sed.fits
This is the PoWR_36000_4.00_m7.00_Z0.50 model, reddened by E(B-V) = 0.03 with the lmcavg law, and normalized to B=13.78.

ETC calculation COS.sp.1815098 indicates that SNR=20/resel is obtained at 1080 +/- 0.5 A in 2013 s
- WARNING Issued: count-rate exceeds segment/stripe limit for irregularly-variable source, which is not relevant for current source
- There is a factor of 1.8 (0.65 magnitudes) margin before Segment A reaches the 15,000 count/s limit. This is much larger than the uncertainty in the normalization provided by the optical photometry.

The baseline exposure was rounded to 2012 s (503 s per FP-POS)
Count Rate (Total, Segment A, Segment B) = (8,403.289, 8,215.660, 187.629)
Brightest Pixel: 0.118 counts/s at 1216.22 A
Buffer-Fill Time = 280 s
*Buffer Time = 2/3 * 259 s = 187 s*
Optimized = 131 s

*After orbital packing, the exposure time was reduced to 399 s per FP-POS with an optimized buffer time of 145 s. The net exposure time is 79.3% of the baseline required to achieve the S/N goal. The predicted S/N = sqrt(399/503) * 20 = 17.8 per resel, which is acceptable.*

Bright Object Check with GSCII
G130M/1096 (H&S, Science, Safe, Unknown) = (0, 0, 4, 3)

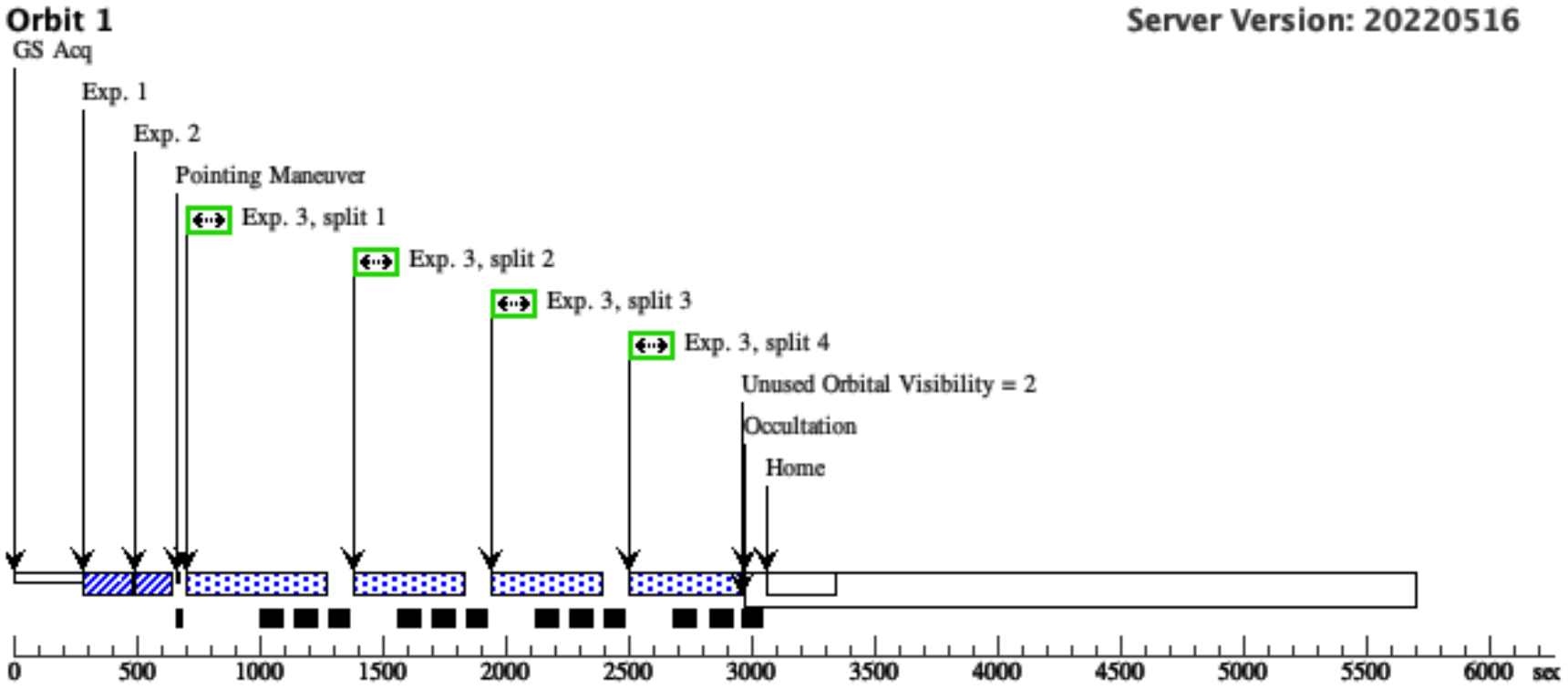
The 3 unknown stars can be identified with the following stars in the Gaia DR2 catalog, which are referenced for convenience via their gaiaBOT numbers. gaiBOT also allows their "worst-case, O5 V" V-magnitudes to be estimated (Vest) and compared with the limit of V~14.0. See
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/N11-ELS-049/N11-ELS-049_COS_DSS_BOT.png
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/N11-ELS-049/N11-ELS-049_COS_gaiaBOT.png

				gBOT#	Vest	Comment
BOA	S1IW146778	04 56 27.4896	-66 28 35.57	73, 77	19.4, 19.6	Safe
BOA	S1IW146813	04 56 26.6290	-66 28 14.86	56	19.0	Safe
PSA	S1IW113581	04 56 29.5660	-66 28 20.88	This appears to be the target, which is Safe		

The data in the gaiaBOT spreadsheet
~/box/ullyses_tech/ullyses_proposals/c29_mc/16824/gaiaBOT/16824_N11_ELS_049_GAIA_DR2_r22arcsec_bot.csv

indicates that there is nothing brighter than Vest = 14.00 within the COS macroaperture (radius = 22 arcseconds) of the target. Thus, gaiaBOT indicates that all stars in the field are safe. There are no spoilers in this field.

Orbit Structure



Visit

Proposal 16824, N11-ELS-049-STIS (2S) Fri Aug 05 15:00:43 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: SCHED 100%; GROUP 2S,2C WITHIN 30D

Comments: vstatus; 2S; N11-ELS-049; S/STIS approved for submission; S/TM 19/05/22 ; intrev: complete ; S/DW 04/08/22
vcheck; Enter targ name & Inst. & Resp. Sci.; N11-ELS-049 [ELS2006] N11 049 '[L72] LH 9-73' ; STIS ; TM
vcheck; ETC numbers entered in APT?; yes ...
STIS.sp.1749891: Default SED gives SNR = 16.1 in 7252 sec
Given uncertainty in the SED normalization, asssumed 20 percent brighter SED for buffer time calcluation
STIS.sp.1749892 for buffer time
Given the uncertainty in normalization due to no obs. spectra, I did an extreme BOP calculation
of 2 times the original SED: STIS.sp.1749893
vcheck; Any screening violations?; None
vcheck; S/N ETC calcs done & documented?; Yes ...
STIS.sp.1749891: Default SED gives SNR = 16.1 (but 20 on SNR plot) in 7252 sec
vcheck; Field images checked & saved?; Yes
vcheck; Selected ACQ strategy?; STIS F28X50LP 0.3sec ...
PoWR SEDs don't go redward enough for the F28x50LP filter but
STIS.ta.1749991 gives SNR = 40 in 0.24 sec, with only partial bandpass coverage
STIS.ta.1749995 Castelli-Kurucz Models O7V model with V=14.02 and E(B-V) = 0.03, rounding to 0.3s
vcheck; Possible ACQ or Sci spoilers?; none ...
Closest Simbad source is 5.9" to the north, with V=19mag, not a concern
No red 2MASS sources nearby.
No Gaia sources brighter than the target within 5".
No Gaia red sources that are concerns either. A red source with g=18.8 mag at 5.8" is no concern.
vcheck; Field BOT clear?; yes ...
GSC2 only returns the target. Galex returns nothing, and image is a confused mess.
Nothing bright in the Zaritsky catalog.
vcheck; Visual BOT check for stars not in catalog?; OK
vcheck; Orbit packing finalized?; yes, 3 orbits
vcheck; Buffer times optimized?; yes ...
Given no obs. spectra for SED normalization, I scaled the SED by 1.2 in case the source is
20 percent brighter unexpectedly. See STIS.sp.1749892
vcheck; Verify visit grouping correct; group 30D added
vcheck; Is visit ready for int. review?; yes
Allocated STIS orbits = 3

Fixed Targets

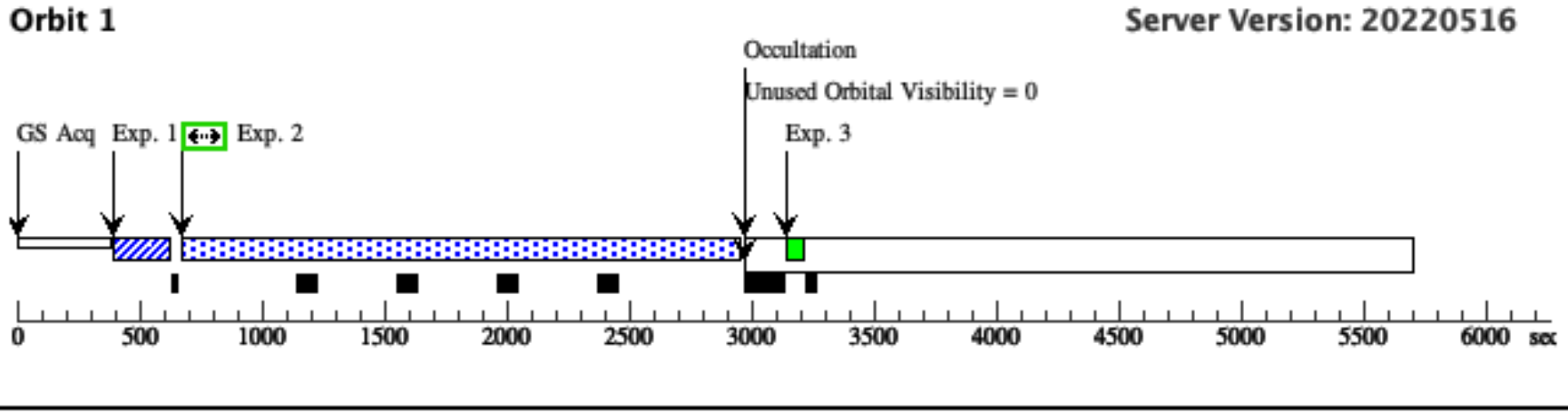
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	N11-ELS-049	RA: 04 56 29.5641 (74.1231837d)	Proper Motion RA: 0 mas/yr	V=14.02	Reference Frame: ICRS
	Alt Name1: ELS2006-N11-049	Dec: -66 28 20.98 (-66.47249d)	Proper Motion Dec: 0 mas/yr	SpT=O7.5 V; E(B-V)=0.03; B=13.78; V=14.02	
		Equinox: J2000	Parallax: 0"		
			Epoch of Position: 2015.5		

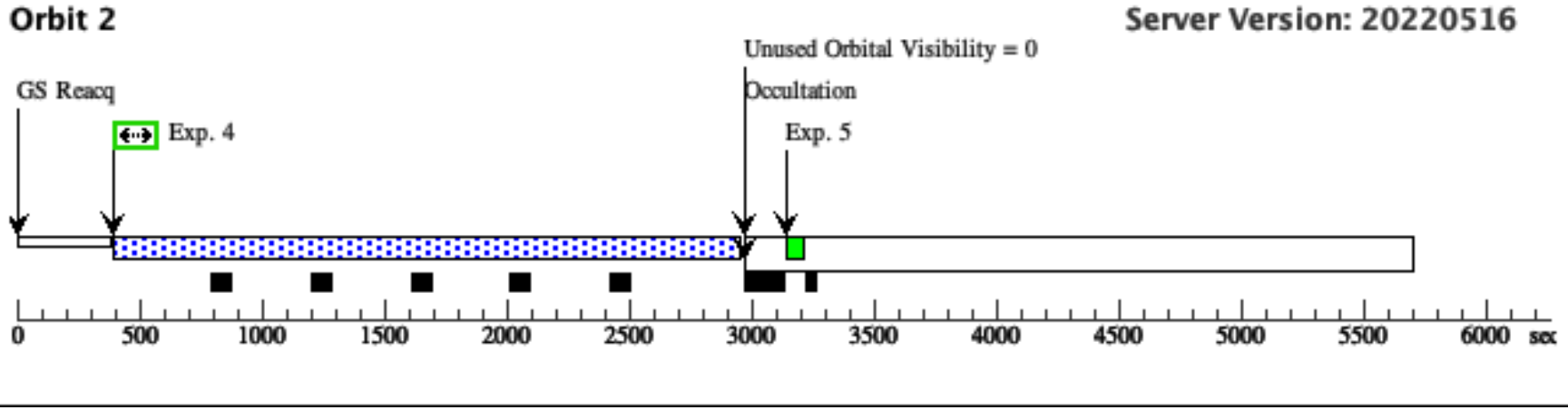
Comments: N11-ELS-049 : [ELS2006] N11 049
Previous name : N11-049
Input file: ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv
SpT = O7.5 V
COS/G130M/c1096 : rn(PoWR-OB-new(PoWR_36000_4.00_m7.00_Z0.50.fits, lmc-ob-i 36-40, Z=0.500 solar, Teff=36000, log_lum=5.00, log_g=4.00, log_mdot=-7.00) (extinction lmcavg=0.030), johnson B mag=13.780 vegamag)
Coordinate pedigree: Gaia DR2
Calculation performed 2021-10-25T01:00:42, v0.9
---
tstatus; N11-ELS-049; P/COS approved for submission; S/STIS approved for submission; P/AF 14/07/22; S/TM 12/05/22
tcheck; APT/SIMBAD target names: ; N11-ELS-049 [ELS2006] N11 049 '[L72] LH 9-73'
tcheck; Target info verification status?; OK ...
Simbad mags are within ~0.05mag of the phase II values
tcheck; Coordinates & P.M. verified, epoch checked?; Gaia coords ok, added epoch for DR2
tcheck; Adopted SED compared to Observations?; Limited data available ...
No FUV, NUV, or optical spectra available, must rely on optical broadband magnitudes
Default mags are within 2 percent of the normalized SED.
Only B and V were supplied in the photo.dat file, but other mags are available through SIMBAD (though their origin is unclear).
Added SIMBAD magintudes to SED plots. Ratios to the SED are within 25% for the U band.
Ratios to the SED are within ~0.05 mag for Simbad B and V mags.
The reddening indicated by the photometry and spectral type is very small. The far-UV fluxes of the adopted SED will be near the maximum possible value that isalso consistent with the spectral type (which was used to select the model parameters) and the optical photometry (which was used to normalize the flux distribution).
Category=STAR
Description=[MAIN SEQUENCE O]
Extended=NO

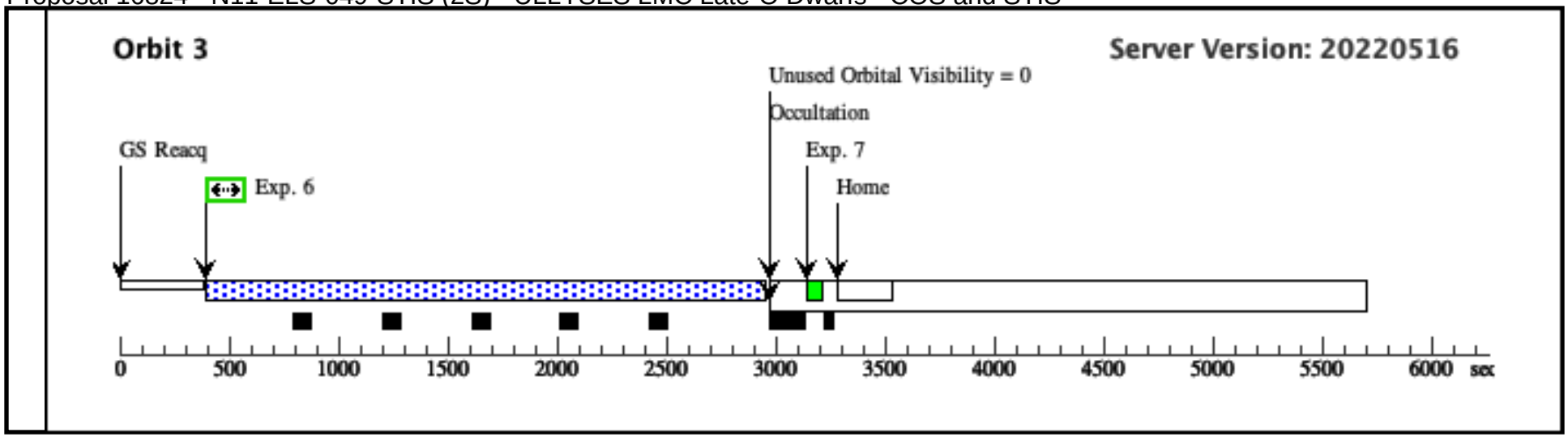
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.1749995)	(2) N11-ELS-049	STIS/CCD, ACQ, F28X50LP	MIRROR				0.3 Secs (0.3 Secs) *[==>]*	***[1]***
Comments: Exposure time not yet calculated.									
2	E140M/1425 (STIS.sp.1749891)	(2) N11-ELS-049	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	WAVECAL=NO; BUFFER-TIME=406			2196 Secs (2196 Secs) *[==>]*	***[1]***
Comments: rn(PoWR-OB-new(PoWR_36000_4.00_m7.00_Z0.50.fits, lmc-ob-i 36-40, Z=0.500 solar, Teff=36000, log_lum=5.00, log_g=4.00, log_mdot=-7.00) (extinction lmcavg=0.030), johnson B mag=13.780 veg amag); stis,fuvmama,e140m,c1425,0.2x0.2,mjd#59670 *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O7.5 V* *SED = N11-ELS-49_STIS_E140M_c1425_sed.fits* *For exptime=7344.0 s, spectral region:* *1200.0 +- 0.5 A achieves SNR=20.0/resel* *global countrate (brightest segment): 3314.9 cts/s/segment* *brightest pixel: 0.038 cts/s/pix at 1298.0 A* *Calculation performed 2021-10-25T01:00:52, v0.9*									
3	E140M/1425 WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				*[==>]*	***[1]***
4	E140M/1425 (STIS.sp.1749891)	(2) N11-ELS-049	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	WAVECAL=NO; BUFFER-TIME=406			2548 Secs (2548 Secs) *[==>]*	***[2]***
Comments: rn(PoWR-OB-new(PoWR_36000_4.00_m7.00_Z0.50.fits, lmc-ob-i 36-40, Z=0.500 solar, Teff=36000, log_lum=5.00, log_g=4.00, log_mdot=-7.00) (extinction lmcavg=0.030), johnson B mag=13.780 veg amag); stis,fuvmama,e140m,c1425,0.2x0.2,mjd#59670 *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O7.5 V* *SED = N11-ELS-49_STIS_E140M_c1425_sed.fits* *For exptime=7344.0 s, spectral region:* *1200.0 +- 0.5 A achieves SNR=20.0/resel* *global countrate (brightest segment): 3314.9 cts/s/segment* *brightest pixel: 0.038 cts/s/pix at 1298.0 A* *Calculation performed 2021-10-25T01:00:52, v0.9*									
5	E140M/1425 WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				*[==>]*	***[2]***
6	E140M/1425 (STIS.sp.1749891)	(2) N11-ELS-049	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	WAVECAL=NO; BUFFER-TIME=406			2548 Secs (2548 Secs) *[==>]*	***[3]***
Comments: rn(PoWR-OB-new(PoWR_36000_4.00_m7.00_Z0.50.fits, lmc-ob-i 36-40, Z=0.500 solar, Teff=36000, log_lum=5.00, log_g=4.00, log_mdot=-7.00) (extinction lmcavg=0.030), johnson B mag=13.780 veg amag); stis,fuvmama,e140m,c1425,0.2x0.2,mjd#59670 *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O7.5 V* *SED = N11-ELS-49_STIS_E140M_c1425_sed.fits* *For exptime=7344.0 s, spectral region:* *1200.0 +- 0.5 A achieves SNR=20.0/resel* *global countrate (brightest segment): 3314.9 cts/s/segment* *brightest pixel: 0.038 cts/s/pix at 1298.0 A* *Calculation performed 2021-10-25T01:00:52, v0.9*									
7	E140M/1425 WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				*[==>]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20220516
Unused Orbital Visibility = 0
Occultation
GS Reacq
Exp. 6
Exp. 7
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec