# 16822 - ULLYSES LMC O5 Dwarfs - COS and STIS

Cycle: 29, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

**INVESTIGATORS**


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| Dr. Leonardo Ubeda (CoI) | Space Telescope Science Institute |
| Dr. Daniel E. Welty (CoI) | Space Telescope Science Institute |


**VISITS**

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 1C | (1) LH58-496 | COS/FUV | 2 | 07-Mar-2023 17:01:50.0 | yes |
| 1D | (1) LH58-496 | COS/FUV | 1 | 07-Mar-2023 17:01:51.0 | yes |
| 1S | (1) LH58-496<br>WAVE | STIS/CCD<br>STIS/FUV-MAMA | 3 | 07-Mar-2023 17:01:52.0 | yes |
| 2C | (2) N11-ELS-051 | COS/FUV | 3 | 07-Mar-2023 17:01:54.0 | yes |

9 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 16822, LH58-496-COS (1C), scheduling** Tue Mar 07 22:01:55 GMT 2023

**Diagnostic Status: No Diagnostics**

Scientific Instruments: COS/FUV

Special Requirements: SCHED 100%; GROUP 1C,1S WITHIN 14D

*Comments: vstatus; 1C; LH58-496; P/COS approved for submission; P/AF 27/10/22 ; intrev: internal review complete ; P/JRD 11/11/22*
*vcheck; Enter targ name & Inst. & Resp. Sci.; LH58-496 ; COS ; AF*
*vcheck; ETC numbers entered in APT?; Yes*
*vcheck; Any screening violations?; No*
*vcheck; S/N ETC calcs done & documented?; Yes; but only expect to reach S/N=14.7 at 1080 Angstroms rather than goal of 20*
*vcheck; Field images checked & saved?; Yes - LH58-496_acs_wfc_f475w_logstretch_gaiaBOT.png*
*vcheck; Selected ACQ strategy?; Dispersed G130M/1291*
*vcheck; Possible ACQ or Sci spoilers?; None*
*vcheck; Field BOT clear?; Yes; see Comments for exposure 1C.003*
*vcheck; Visual BOT check for stars not in catalog?; Done - no targets of concern in an HST/ACS image*
*vcheck; Orbit packing finalized?; Yes*
*vcheck; Buffer times optimized?; Yes*
*vcheck; Verify visit grouping correct; Group within 14 days timing requirement for Visits (1S, 1C)*
*vcheck; Is visit ready for int. review?; Yes*
*Allocated COS orbits = 2*

*Note: The allocation for this visit was increased to 2 orbits on 11/9/22.*

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | LH58-496<br>Alt Name1: L72-LH-58-496<br>Alt Name2: GMP94-496 | RA: 05 26 43.9827 (81.6832613d)<br>Dec: -68 48 42.05 (-68.81168d)<br>Equinox: J2000 | Proper Motion RA: 0 mas/yr<br>Proper Motion Dec: 0 mas/yr<br>Parallax: 0"<br>Epoch of Position: 2015.5 | V=13.73<br>SpT=O5 V((f)); E(B-V)=0.06; U=12.41; B=13.51; V=13.73 | Reference Frame: ICRS |

*Comments: LH58-496 : [L72] LH 58-496*
*Previous name : LH 58-496*
*Input file: ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv*
*SpT = O5 V((f))*
*COS/G130M/c1096 : rn(PoWR-OB-new(PoWR_42000_4.00_m7.00_Z0.50.fits, lmc-ob-i 42-40, Z=0.500 solar, Teff=42000, log_lum=5.48, log_g=4.00, log_mdot=-7.00) (extinction lmcavg=0.060), flux1160 +- 2.0A flux=8.5e-13 Flam)*
*Coordinate pedigree: Gaia DR2*
*Calculation performed 2021-10-25T01:00:24, v0.9*
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*tstatus; LH58-496; P/COS approved for submission; S/STIS approved for submission; P/AF 27/10/22; S/LS 19/10/22*
*tcheck; APT/SIMBAD target names: ; LH58-496 '[GMP94] 496' ...*
*Default SIMBAD name is [GMP94] 496 [LH72] LH58-496*
*tcheck; Target info verification status?; OK ...*
*SIMBAD gives O5 V(f) spectral type in agreement with APT SpT*
*tcheck; Coordinates & P.M. verified, epoch checked?; yes - Gaia DR2 coords*
*tcheck; Adopted SED compared to Observations?; Yes ...*
*Massey et al. (2005ApJ...627..477M) derived (Teff, log g, Mdot) = (42 kK, 4.00, 6E-7 Msun/year) from model atmosphere analysis of the UV/optical spectrum of LH58-496. The adopted SED consists of a model from the PoWR grid computed for LMC metallicity with similar parameters: (Teff, log g, Mdot) = (42 kK, 4.00, 1.E-7 Msun/year). The model flux was attenuated by an LMC average extinction law with E(B-V) = 0.10. This value is larger than reddening implied by the available UBV photometry for an O5 V spectral type, but was required to match the STIS spectroscopy. The reddened model flux was normalized by the Johnson V-band photometry. The adopted SED corresponds to the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*
*The good consistency between the available data and the adopted SED is illustrated in the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/LH58-496_adopted_SED_vs_STIS_UBV.pdf*
*Category=STAR*
*Description=[MAIN SEQUENCE O, OF]*
*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.1828818) | (1) LH58-496 | 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: For the adopted SED*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*

*COS.sa.1828818 indicates that the recommended S/N = 40 can be achieved in 0.1188 s. This estimate was rounded up to 0.2 s.*

| # | 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.1828818) | (1) LH58-496 | 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: For the adopted SED*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*

*COS.sa.1828818 indicates that the recommended S/N = 40 can be achieved in 0.1188 s. This estimate was rounded up to 0.2 s.*

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 3 | G130M/1096-1 (COS.sp.1828819) | (1) LH58-496 | COS/FUV, TIME-TAG, PSA | G130M 1096 A | BUFFER-TIME=213; FP-POS=1 | | | 970 Secs (970 Secs) *[==>]* | ***[1]*** |

*Comments: The SED used for ETC calculations is in the Box directory*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*

*ETC calculation COS.sp.1828819 indicates that S/N = 20 per resel at 1080 Angstroms is obtained in 2922.1975 s*
*- WARNING ("Segment count-rate exceeds segment/stripe limit for irregularly-variable source") does not apply to this source*

*This baseline exposure time was initially rounded to 2920 s (730 s per FP-POS)*
*Count Rate (Total, Segment A, Segment B) = (6872.384, 6743.174, 129.210)*
*Brightest Pixel: 0.116 counts/s at 1216.21 A*
*Buffer-Fill Time = 343 s*
*Buffer Time = 2/3 * 343 s = 228 s*
*Optimized = 207 s*

*However, it became clear during initial orbital packing that the allocation of 1 orbit was insufficient to support the baseline exposure time required to achieve the desired S/N. A second orbit was added, which allowed the exposure time to be increased to 970 s for FP-POS1 and FP-POS2 in Orbit 1 and 1185 s for FP-POS3 and FP-POS4 in Orbit 2. The total exposure time is 4310 s, so the expected S/N = sqrt(4310./2922) * 20 = 24.3 per resel at 1080 Angstroms. This value should not be affected by the uneven distribution of exposure time among the 4 focal plane splits. The re-optimized buffer time was determined to be 213 s and 214 s for Orbit 1 and 2, respectively.*

*Bright Object Checking of the COS Field*
*The APT BOT was unable to identify any sources due to nebulosity in the DSS image. The 124 Gaia sources within 22 arcsec of LH58-496 are identified in an image obtained with ACS/WFC in the F475W filter in the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/LH58-496_acs_wfc_f475w_logstretch_gaiaBOT.png*

*Gaia DR2 designations and photometric measurements for these sources are provided in the ancillary file*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/gaiaBOT/16822_LH_58-496_GAIA_DR2_r22arcsec_bot.csv*

*Apart from the target (which is safe), only source #106 = Gaia DR2 4658488247029978496 has an estimated V magnitude near the safety threshold for an O5 V star (which is V > 14.7 when observed with G130M according to IHB Table 10.2). However, star #106 is not a concern because it is 19.8 arcsec from the center of the PSA and much fainter than the safety threshold for observation through the BOA. The gaiaBOT data confirms that there are no sources within 22 arcseconds of the target that are bright enough to pose a threat to the health and safety of the COS detectors.*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4 | G130M/109 6-2 (COS.sp.1828819) | (1) LH58-496 | COS/FUV, TIME-TAG, PSA | G130M 1096 A | BUFFER-TIME=213; FP-POS=2 | 970 Secs (970 Secs) *[==>]* | ***[1]*** |

*Comments: The SED used for ETC calculations is in the Box directory*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*

*ETC calculation COS.sp.1828819 indicates that S/N = 20 per resel at 1080 Angstroms is obtained in 2922.1975 s*
*- WARNING ("Segment count-rate exceeds segment/stripe limit for irregularly-variable source") does not apply to this source*

*This baseline exposure time was initially rounded to 2920 s (730 s per FP-POS)*
*Count Rate (Total, Segment A, Segment B) = (6872.384, 6743.174, 129.210)*
*Brightest Pixel: 0.116 counts/s at 1216.21 A*
*Buffer-Fill Time = 343 s*
*Buffer Time = 2/3 * 343 s = 228 s*
*Optimized = 207 s*

*However, it became clear during initial orbital packing that the allocation of 1 orbit was insufficient to support the baseline exposure time required to achieve the desired S/N. A second orbit was added, which allowe d the exposure time to be increased to 970 s for FP-POS1 and FP-POS2 in Orbit 1 and 1185 s for FP-POS3 and FP-POS4 in Orbit 2. The total exposure time is 4310 s, so the expected S/N = sqrt(4310./2922) * 20 = 24.3 per resel at 1080 Angstroms. This value should not be affected by the uneven distribution of exposure time among the 4 focal plane splits. The re-optimized buffer time was determined to be 213 s and 214 s for O rbit 1 and 2, respectively.*

*Bright Object Checking of the COS Field*
*The APT BOT was unable to identify any sources due to nebulosity in the DSS image. The 124 Gaia sources within 22 arcsec of LH58-496 are identified in an image obtained with ACS/WFC in the F475W filter in the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/LH58-496_acs_wfc_f475w_logstretch_gaiaBOT.png*

*Gaia DR2 designations and photometric measurements for these sources are provided in the ancillary file*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/gaiaBOT/16822_LH_58-496_GAIA_DR2_r22arcsec_bot.csv*

*Apart from the target (which is safe), only source #106 = Gaia DR2 4658488247029978496 has an estimated V magnitude near the safety threshold for an O5 V star (which is V > 14.7 when observed with G130M according to IHB Table 10.2). However, star #106 is not a concern because it is 19.8 arcsec from the center of the PSA and much fainter than the safety threshold for observation through the BOA. The gaiaBOT data confirms that there are no sources within 22 arcseconds of the target that are bright enough to pose a threat to the health and safety of the COS detectors.*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | G130M/109 6-3 (COS.sp.1828819) | (1) LH58-496 | COS/FUV, TIME-TAG, PSA | G130M 1096 A | BUFFER-TIME=214; FP-POS=3 | 1185 Secs (1185 Secs)<br>*[==>]* | <br>***[2]*** |

*Comments: The SED used for ETC calculations is in the Box directory*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*

*ETC calculation COS.sp.1828819 indicates that S/N = 20 per resel at 1080 Angstroms is obtained in 2922.1975 s*
*- WARNING ("Segment count-rate exceeds segment/stripe limit for irregularly-variable source") does not apply to this source*

*This baseline exposure time was initially rounded to 2920 s (730 s per FP-POS)*
*Count Rate (Total, Segment A, Segment B) = (6872.384, 6743.174, 129.210)*
*Brightest Pixel: 0.116 counts/s at 1216.21 A*
*Buffer-Fill Time = 343 s*
*Buffer Time = 2/3 * 343 s = 228 s*
*Optimized = 207 s*

*However, it became clear during initial orbital packing that the allocation of 1 orbit was insufficient to support the baseline exposure time required to achieve the desired S/N. A second orbit was added, which allowe d the exposure time to be increased to 970 s for FP-POS1 and FP-POS2 in Orbit 1 and 1185 s for FP-POS3 and FP-POS4 in Orbit 2. The total exposure time is 4310 s, so the expected S/N = sqrt(4310./2922) * 20 = 24.3 per resel at 1080 Angstroms. This value should not be affected by the uneven distribution of exposure time among the 4 focal plane splits. The re-optimized buffer time was determined to be 213 s and 214 s for O rbit 1 and 2, respectively.*

*Bright Object Checking of the COS Field*
*The APT BOT was unable to identify any sources due to nebulosity in the DSS image. The 124 Gaia sources within 22 arcsec of LH58-496 are identified in an image obtained with ACS/WFC in the F475W filter in the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/LH58-496_acs_wfc_f475w_logstretch_gaiaBOT.png*

*Gaia DR2 designations and photometric measurements for these sources are provided in the ancillary file*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/gaiaBOT/16822_LH_58-496_GAIA_DR2_r22arcsec_bot.csv*

*Apart from the target (which is safe), only source #106 = Gaia DR2 4658488247029978496 has an estimated V magnitude near the safety threshold for an O5 V star (which is V > 14.7 when observed with G130M according to IHB Table 10.2). However, star #106 is not a concern because it is 19.8 arcsec from the center of the PSA and much fainter than the safety threshold for observation through the BOA. The gaiaBOT data confirms that there are no sources within 22 arcseconds of the target that are bright enough to pose a threat to the health and safety of the COS detectors.*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6 | G130M/109 6-4 (COS.sp.1828819) | (1) LH58-496 | COS/FUV, TIME-TAG, PSA | G130M 1096 A | BUFFER-TIME=214; FP-POS=4 | 1185 Secs (1185 Secs)<br>*[==>]* | <br>***[2]*** |

*Comments: The SED used for ETC calculations is in the Box directory*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*

*ETC calculation COS.sp.1828819 indicates that S/N = 20 per resel at 1080 Angstroms is obtained in 2922.1975 s*
*- WARNING ("Segment count-rate exceeds segment/stripe limit for irregularly-variable source") does not apply to this source*

*This baseline exposure time was initially rounded to 2920 s (730 s per FP-POS)*
*Count Rate (Total, Segment A, Segment B) = (6872.384, 6743.174, 129.210)*
*Brightest Pixel: 0.116 counts/s at 1216.21 A*
*Buffer-Fill Time = 343 s*
*Buffer Time = 2/3 * 343 s = 228 s*
*Optimized = 207 s*

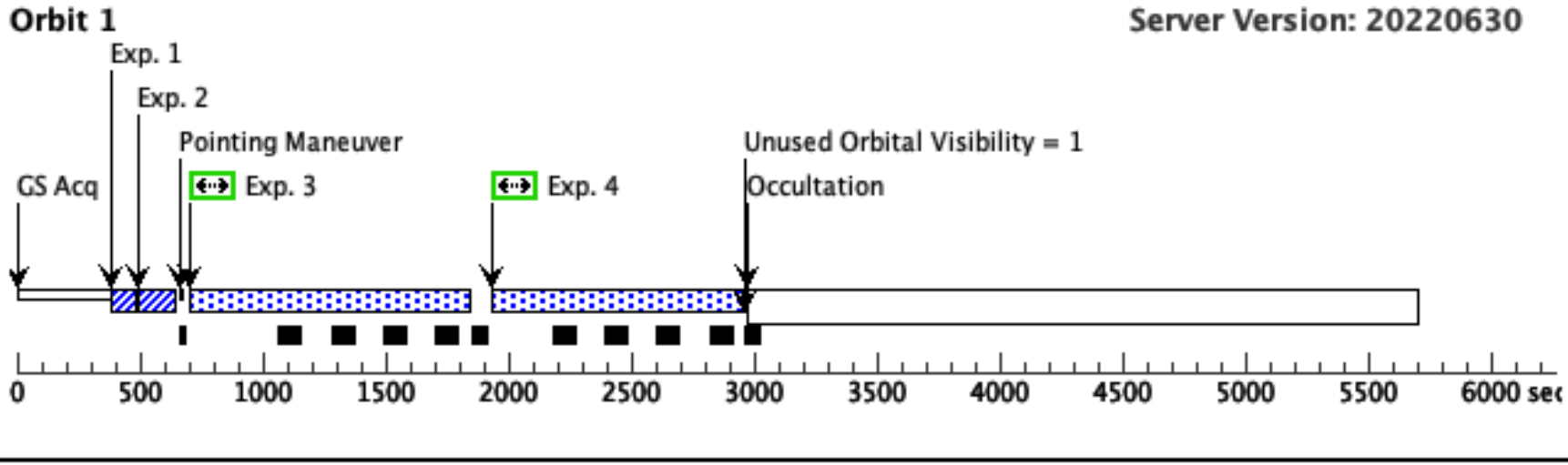
*However, it became clear during initial orbital packing that the allocation of 1 orbit was insufficient to support the baseline exposure time required to achieve the desired S/N. A second orbit was added, which allowed the exposure time to be increased to 970 s for FP-POS1 and FP-POS2 in Orbit 1 and 1185 s for FP-POS3 and FP-POS4 in Orbit 2. The total exposure time is 4310 s, so the expected S/N = sqrt(4310./2922) * 20 = 24.3 per resel at 1080 Angstroms. This value should not be affected by the uneven distribution of exposure time among the 4 focal plane splits. The re-optimized buffer time was determined to be 213 s and 214 s for Orbit 1 and 2, respectively.*

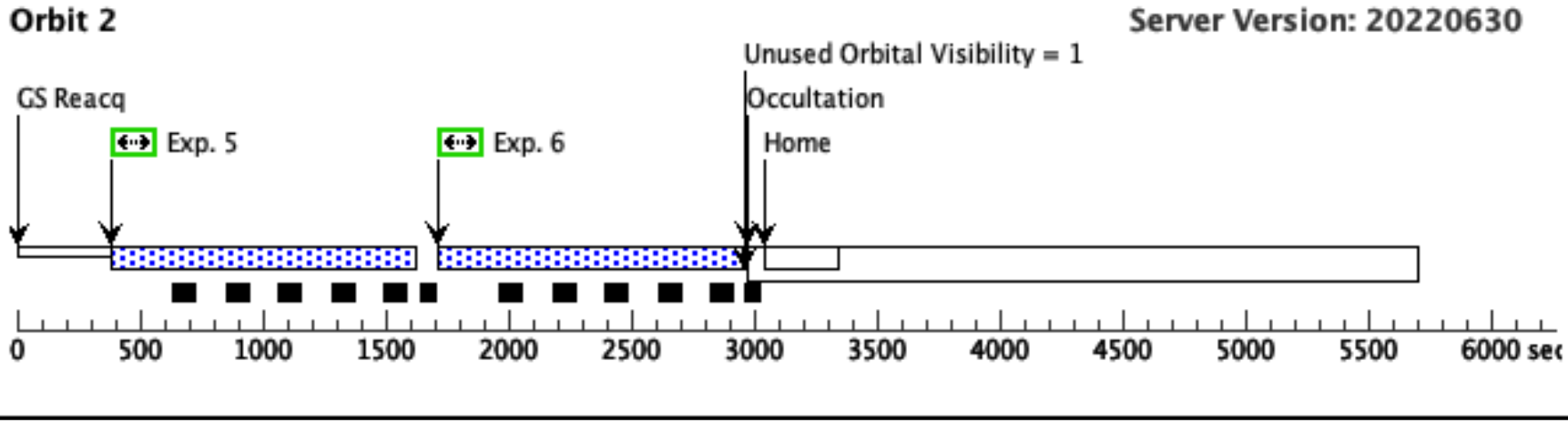
*Bright Object Checking of the COS Field*
*The APT BOT was unable to identify any sources due to nebulosity in the DSS image. The 124 Gaia sources within 22 arcsec of LH58-496 are identified in an image obtained with ACS/WFC in the F475W filter in the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/LH58-496_acs_wfc_f475w_logstretch_gaiaBOT.png*

*Gaia DR2 designations and photometric measurements for these sources are provided in the ancillary file*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/gaiaBOT/16822_LH_58-496_GAIA_DR2_r22arcsec_bot.csv*

*Apart from the target (which is safe), only source #106 = Gaia DR2 4658488247029978496 has an estimated V magnitude near the safety threshold for an O5 V star (which is V > 14.7 when observed with G130M according to IHB Table 10.2). However, star #106 is not a concern because it is 19.8 arcsec from the center of the PSA and much fainter than the safety threshold for observation through the BOA. The gaiaBOT data confirms that there are no sources within 22 arcseconds of the target that are bright enough to pose a threat to the health and safety of the COS detectors.*

Orbit Structure



## Visit

**Proposal 16822, LH58-496-COS (1D), implementation** Tue Mar 07 22:01:56 GMT 2023

**Diagnostic Status: No Diagnostics**

Scientific Instruments: COS/FUV

Special Requirements: SCHED 100%; GROUP 1D,1S WITHIN 14D

*Comments: vstatus; 1D; LH58-496; P/COS approved for submission; P/AF 27/10/22 ; intrev: internal review complete ; P/JRD 11/11/22*
*vcheck; Enter targ name & Inst. & Resp. Sci.; LH58-496 ; COS ; AF*
*vcheck; ETC numbers entered in APT?; Yes*
*vcheck; Any screening violations?; No*
*vcheck; S/N ETC calcs done & documented?; Yes; but only expect to reach S/N=14.7 at 1080 Angstroms rather than goal of 20*
*vcheck; Field images checked & saved?; Yes - LH58-496_acs_wfc_f475w_logstretch_gaiaBOT.png*
*vcheck; Selected ACQ strategy?; Dispersed G130M/1291*
*vcheck; Possible ACQ or Sci spoilers?; None*
*vcheck; Field BOT clear?; Yes; see Comments for exposure 1C.003*
*vcheck; Visual BOT check for stars not in catalog?; Done - no targets of concern in an HST/ACS image*
*vcheck; Orbit packing finalized?; Yes*
*vcheck; Buffer times optimized?; Yes*
*vcheck; Verify visit grouping correct; Group within 14 days timing requirement for Visits (1S, 1C)*
*vcheck; Is visit ready for int. review?; Yes*
*Allocated COS orbits = 2*

*Note: The allocation for Visit 1C was increased to 2 orbits on 11/9/22.*

*3/7/23 AF: Visit 1D provides 1 orbit of additional exposure time with the COS G130M/1096 configuration. To implement Visit 1D:*
*- the dispersed light target acquisition from Visit 1C was copied "as is"*
*- the exposure time for FP-POS = ALL was adjusted to fit the single-orbit allocation: 399 s per FP-POS. A re-optimized value of the buffer time was used (228 s).*

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | LH58-496<br>Alt Name1: L72-LH-58-496<br>Alt Name2: GMP94-496 | RA: 05 26 43.9827 (81.6832613d)<br>Dec: -68 48 42.05 (-68.81168d)<br>Equinox: J2000 | Proper Motion RA: 0 mas/yr<br>Proper Motion Dec: 0 mas/yr<br>Parallax: 0"<br>Epoch of Position: 2015.5 | V=13.73<br>SpT=O5 V((f)); E(B-V)=0.06; U=12.41; B=13.51; V=13.73 | Reference Frame: ICRS |

*Comments: LH58-496 : [L72] LH 58-496*
*Previous name : LH 58-496*
*Input file: ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv*
*SpT = O5 V((f))*
*COS/G130M/c1096 : rn(PoWR-OB-new(PoWR_42000_4.00_m7.00_Z0.50.fits, lmc-ob-i 42-40, Z=0.500 solar, Teff=42000, log_lum=5.48, log_g=4.00, log_mdot=-7.00) (extinction lmcavg=0.060), flux1160 +- 2.0A flux=8.5e-13 Flam)*
*Coordinate pedigree: Gaia DR2*
*Calculation performed 2021-10-25T01:00:24, v0.9*
---
*tstatus; LH58-496; P/COS approved for submission; S/STIS approved for submission; P/AF 27/10/22; S/LS 19/10/22*
*tcheck; APT/SIMBAD target names: ; LH58-496 '[GMP94] 496' ...*
*Default SIMBAD name is [GMP94] 496 [LH72] LH58-496*
*tcheck; Target info verification status?; OK ...*
*SIMBAD gives O5 V(f) spectral type in agreement with APT SpT*
*tcheck; Coordinates & P.M. verified, epoch checked?; yes - Gaia DR2 coords*
*tcheck; Adopted SED compared to Observations?; Yes ...*
*Massey et al. (2005ApJ...627..477M) derived (Teff, log g, Mdot) = (42 kK, 4.00, 6E-7 Msun/year) from model atmosphere analysis of the UV/optical spectrum of LH58-496. The adopted SED consists of a model from the PoWR grid computed for LMC metallicity with similar parameters: (Teff, log g, Mdot) = (42 kK, 4.00, 1.E-7 Msun/year). The model flux was attenuated by an LMC average extinction law with E(B-V) = 0.10. This value is larger than reddening implied by the available UBV photometry for an O5 V spectral type, but was required to match the STIS spectroscopy. The reddened model flux was normalized by the Johnson V-band photometry. The adopted SED corresponds to the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*
*The good consistency between the available data and the adopted SED is illustrated in the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/LH58-496_adopted_SED_vs_STIS_UBV.pdf*
*Category=STAR*
*Description=[MAIN SEQUENCE O, OF]*
*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 PEAK XD (COS.sa.1828818) | (1) LH58-496 | COS/FUV, ACQ/PEAKXD, PSA | G130M 1291 A | CENTER=FLUX-WT; NUM-POS=3; STEP-SIZE=1.3 | | | 0.2 Secs (0.2 Secs)<br>*[==>]* | ***[1]*** |

*Comments: For the adopted SED*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*

*COS.sa.1828818 indicates that the recommended S/N = 40 can be achieved in 0.1188 s. This estimate was rounded up to 0.2 s.*

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 2 | FUV PEAK D (COS.sa.1828818) | (1) LH58-496 | 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)<br>*[==>]* | ***[1]*** |

*Comments: For the adopted SED*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*

*COS.sa.1828818 indicates that the recommended S/N = 40 can be achieved in 0.1188 s. This estimate was rounded up to 0.2 s.*

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 3 | G130M/1096 (COS.sp.1828819) | (1) LH58-496 | COS/FUV, TIME-TAG, PSA | G130M 1096 A | BUFFER-TIME=228; FP-POS=ALL | | | 399 Secs (1596 Secs)<br>*[==>(Split 1)]*<br>*[==>(Split 2)]*<br>*[==>(Split 3)]*<br>*[==>(Split 4)]* | ***[1]*** |

*Comments: The SED used for ETC calculations is in the Box directory*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*

*ETC calculation COS.sp.1828819 indicates that S/N = 20 per resel at 1080 Angstroms is obtained in 2922.1975 s*
*- WARNING ("Segment count-rate exceeds segment/stripe limit for irregularly-variable source") does not apply to this source*

*This baseline exposure time was initially rounded to 2920 s (730 s per FP-POS)*
*Count Rate (Total, Segment A, Segment B) = (6872.384, 6743.174, 129.210)*
*Brightest Pixel: 0.116 counts/s at 1216.21 A*
*Buffer-Fill Time = 343 s*
*Buffer Time = 2/3 * 343 s = 228 s*
*Optimized = 207 s*

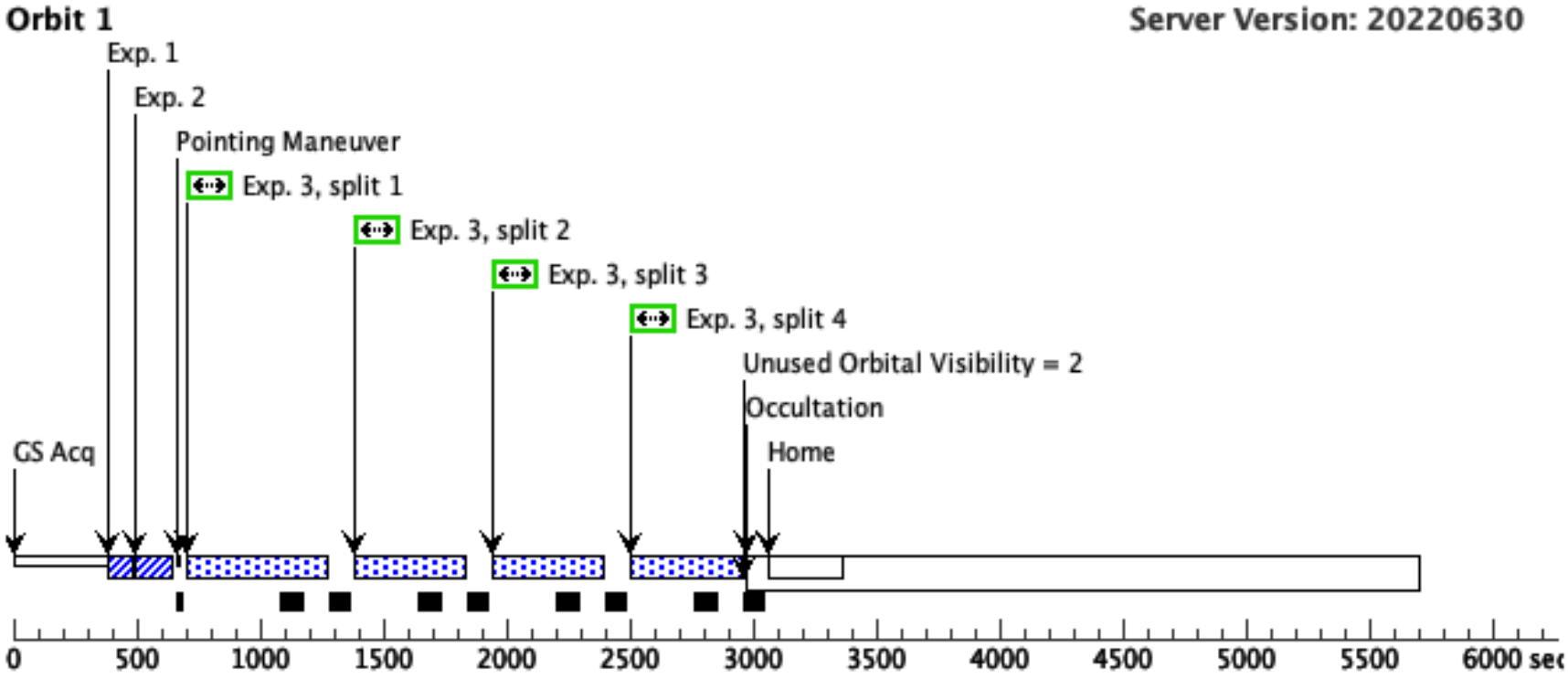
*However, it became clear during initial orbital packing that the allocation of 1 orbit was insufficient to support the baseline exposure time required to achieve the desired S/N. A second orbit was added, which allowe d the exposure time to be increased to 970 s for FP-POS1 and FP-POS2 in Orbit 1 and 1185 s for FP-POS3 and FP-POS4 in Orbit 2. The total exposure time is 4310 s, so the expected S/N = sqrt(4310./2922) * 20 = 24.3 per resel at 1080 Angstroms. This value should not be affected by the uneven distribution of exposure time among the 4 focal plane splits. The re-optimized buffer time was determined to be 213 s and 214 s for O rbit 1 and 2, respectively.*

*Bright Object Checking of the COS Field*
*The APT BOT was unable to identify any sources due to nebulosity in the DSS image. The 124 Gaia sources within 22 arcsec of LH58-496 are identified in an image obtained with ACS/WFC in the F475W filter in the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/LH58-496_acs_wfc_f475w_logstretch_gaiaBOT.png*

*Gaia DR2 designations and photometric measurements for these sources are provided in the ancillary file*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/gaiaBOT/16822_LH_58-496_GAIA_DR2_r22arcsec_bot.csv*

*Apart from the target (which is safe), only source #106 = Gaia DR2 4658488247029978496 has an estimated V magnitude near the safety threshold for an O5 V star (which is V > 14.7 when observed with G130M according to IHB Table 10.2). However, star #106 is not a concern because it is 19.8 arcsec from the center of the PSA and much fainter than the safety threshold for observation through the BOA. The gaiaBOT data confirms that there are no sources within 22 arcseconds of the target that are bright enough to pose a threat to the health and safety of the COS detectors.*

Orbit Structure



## Visit

**Proposal 16822, LH58-496-STIS (1S), scheduling** Tue Mar 07 22:01:56 GMT 2023

**Diagnostic Status: No Diagnostics**

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

Special Requirements: SCHED 100%; GROUP 1S,1C WITHIN 14D

*Comments: vstatus; 1S; LH58-496; S/STIS approved for submission; S/LS 20/10/22 ; intrev: internal review complete ; S/DW 31/10/22*
*vcheck; Enter targ name & Inst. & Resp. Sci.; LH58-496 '[GMP94] 496'; STIS ; LS*
*vcheck; ETC numbers entered in APT?; completed*
*vcheck; Any screening violations?; None*
*vcheck; S/N ETC calcs done & documented?; Yes ...*
*adopted SED requires exp time of 11,067 s for S/N=20 but only 7288 s available in 3-orbit visit. Predicted S/N is 16.2 per resel at 1200 Angstroms.*
*vcheck; Field images checked & saved?; Yes ...*
*2MASS image saved = LH58-496-2MASS.png. DSS saved but not very useful because of nebulosity.*
*vcheck; Selected ACQ strategy?; STIS F28X50LP 0.2 s*
*vcheck; Possible ACQ or Sci spoilers?; None*
*vcheck; Field BOT clear?; Yes but ...*
*BOT says GSC2 images not available and returns 0 stars. GaiaBOT tool lists 2nd brightest star after target has g=14.5 20 arcsec away so no concerns.*
*vcheck; Visual BOT check for stars not in catalog?; OK*
*vcheck; Orbit packing finalized?; 3 orbits*
*vcheck; Buffer times optimized?; Done*
*vcheck; Verify visit grouping correct; Group within 14 days timing requirement for Visits (1S, 1C)*
*vcheck; Is visit ready for int. review?; Yes*
*Allocated STIS orbits = 3*

## Fixed Targets

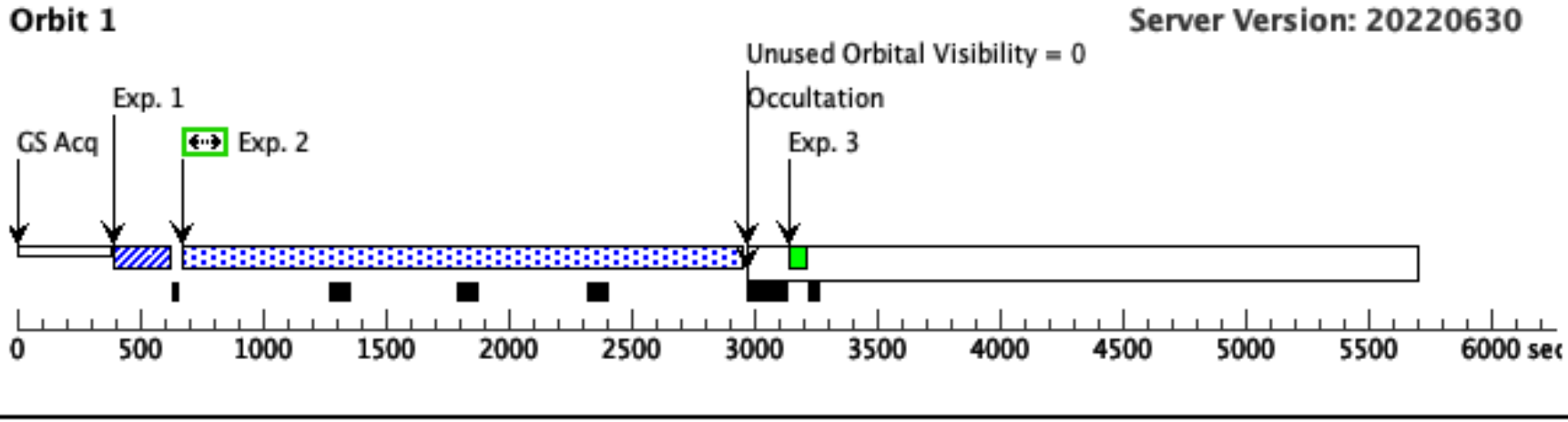
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | LH58-496<br>Alt Name1: L72-LH-58-496<br>Alt Name2: GMP94-496 | RA: 05 26 43.9827 (81.6832613d)<br>Dec: -68 48 42.05 (-68.81168d)<br>Equinox: J2000 | Proper Motion RA: 0 mas/yr<br>Proper Motion Dec: 0 mas/yr<br>Parallax: 0"<br>Epoch of Position: 2015.5 | V=13.73<br>SpT=O5 V((f)); E(B-V)=0.06; U=12.41; B=13.51; V=13.73 | Reference Frame: ICRS |

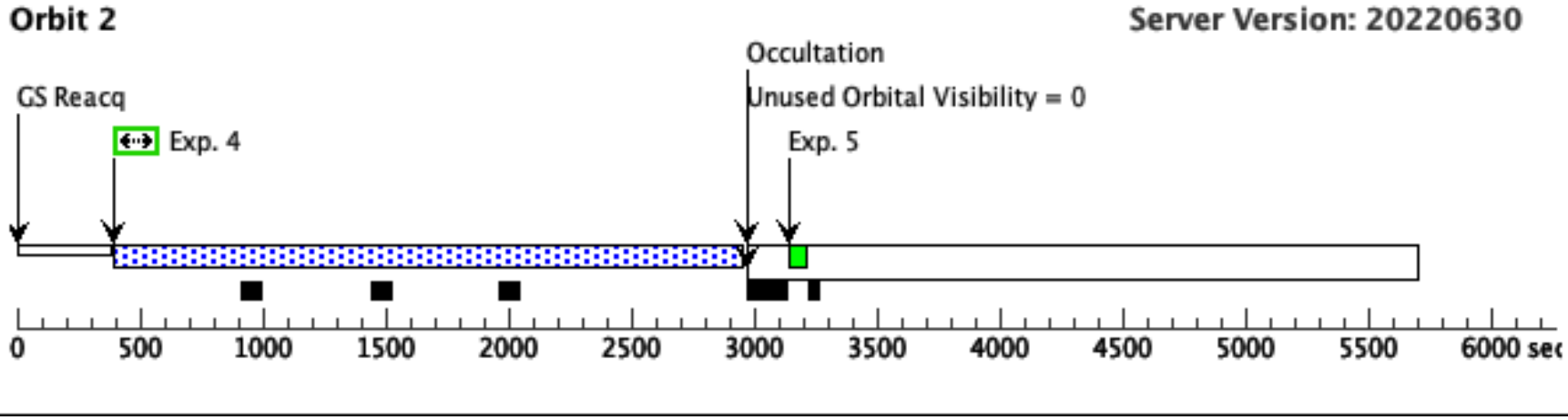
*Comments: LH58-496 : [L72] LH 58-496*
*Previous name : LH 58-496*
*Input file: ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv*
*SpT = O5 V((f))*
*COS/G130M/c1096 : rn(PoWR-OB-new(PoWR_42000_4.00_m7.00_Z0.50.fits, lmc-ob-i 42-40, Z=0.500 solar, Teff=42000, log_lum=5.48, log_g=4.00, log_mdot=-7.00) (extinction lmcavg=0.060), flux1160 +- 2.0A flux=8.5e-13 Flam)*
*Coordinate pedigree: Gaia DR2*
*Calculation performed 2021-10-25T01:00:24, v0.9*
---
*tstatus; LH58-496; P/COS approved for submission; S/STIS approved for submission; P/AF 27/10/22; S/LS 19/10/22*
*tcheck; APT/SIMBAD target names: ; LH58-496 '[GMP94] 496' ...*
*Default SIMBAD name is [GMP94] 496 [LH72] LH58-496*
*tcheck; Target info verification status?; OK ...*
*SIMBAD gives O5 V(f) spectral type in agreement with APT SpT*
*tcheck; Coordinates & P.M. verified, epoch checked?; yes - Gaia DR2 coords*
*tcheck; Adopted SED compared to Observations?; Yes ...*
*Massey et al. (2005ApJ...627..477M) derived (Teff, log g, Mdot) = (42 kK, 4.00, 6E-7 Msun/year) from model atmosphere analysis of the UV/optical spectrum of LH58-496. The adopted SED consists of a model from the PoWR grid computed for LMC metallicity with similar parameters: (Teff, log g, Mdot) = (42 kK, 4.00, 1.E-7 Msun/year). The model flux was attenuated by an LMC average extinction law with E(B-V) = 0.10. This value is larger than reddening implied by the available UBV photometry for an O5 V spectral type, but was required to match the STIS spectroscopy. The reddened model flux was normalized by the Johnson V-band photometry. The adopted SED corresponds to the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*
*The good consistency between the available data and the adopted SED is illustrated in the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/LH58-496/LH58-496_adopted_SED_vs_STIS_UBV.pdf*
*Category=STAR*
*Description=[MAIN SEQUENCE O, OF]*
*Extended=NO*

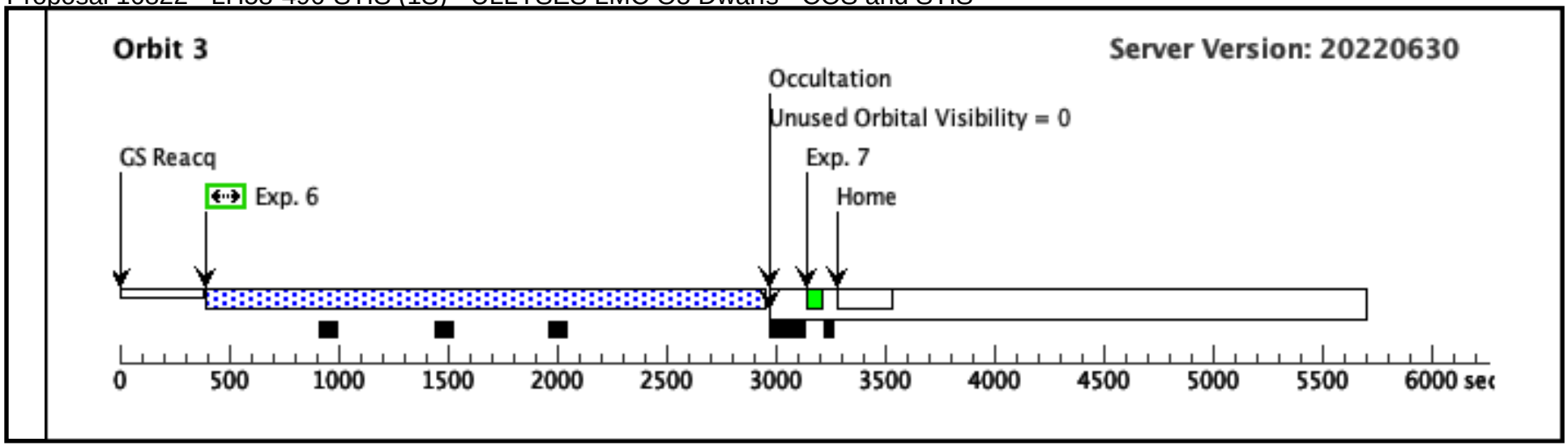
**Exposures**

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ACQ (STIS.ta.1828472) | (1) LH58-496 | STIS/CCD, ACQ, F28X50LP | MIRROR | | | | 1.0 Secs (1 Secs)<br>*[==>]* | ***[1]*** |
| | *Comments: ETC Run# STIS.ta.1828472 gives S/N = 43 in 0.2 s.*<br>*The exposure time was rounded up to 1.0 s to ensure a strong exposure.* | | | | | | | | |
| 2 | E140M/1425 (STIS.sp.1828453) | (1) LH58-496 | STIS/FUV-MAMA, TIME-TAG, 0.2X0.2 | E140M 1425 A | BUFFER-TIME=524; WAVECAL=NO | | | 2192 Secs (2192 Secs)<br>*[==>]* | ***[1]*** |
| | *Comments: Adopted SED: PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*<br><br>*ETC Calculation STIS.sp.1828453 indicates that S/N = 20 per resel at 1200 Angstroms requires a total exposure of 11,067 s.*<br>*Global Countrate: 3,051.592 counts/s*<br>*Brightest Pixel: 0.04 counts/s at 1243.5 Angstroms*<br>*Buffer Time: 0.8 * 655 s = 524 s*<br><br>*This 3 orbit visit achieves a total exposure time of 7288 s. Consequently, the predicted S/N = sqrt(7288/11067)*20 = 16.2 per resel at 1200 Angstroms.* | | | | | | | | |
| 3 | E140M/1425 WAVECAL | WAVE | STIS/FUV-MAMA, ACCUM, 0.2X0.2 | E140M 1425 A | | | | *[==>]* | ***[1]*** |
| 4 | E140M/1425 (STIS.sp.1828453) | (1) LH58-496 | STIS/FUV-MAMA, TIME-TAG, 0.2X0.2 | E140M 1425 A | BUFFER-TIME=524; WAVECAL=NO | | | 2548. Secs (2548 Secs)<br>*[==>]* | ***[2]*** |
| | *Comments: Adopted SED: PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*<br><br>*ETC Calculation STIS.sp.1828453 indicates that S/N = 20 per resel at 1200 Angstroms requires a total exposure of 11,067 s.*<br>*Global Countrate: 3,051.592 counts/s*<br>*Brightest Pixel: 0.04 counts/s at 1243.5 Angstroms*<br>*Buffer Time: 0.8 * 655 s = 524 s*<br><br>*This 3 orbit visit achieves a total exposure time of 7288 s. Consequently, the predicted S/N = sqrt(7288/11067)*20 = 16.2 per resel at 1200 Angstroms.* | | | | | | | | |
| 5 | E140M/1425 WAVECAL | WAVE | STIS/FUV-MAMA, ACCUM, 0.2X0.2 | E140M 1425 A | | | | *[==>]* | ***[2]*** |
| 6 | E140M/1425 (STIS.sp.1828453) | (1) LH58-496 | STIS/FUV-MAMA, TIME-TAG, 0.2X0.2 | E140M 1425 A | BUFFER-TIME=524; WAVECAL=NO | | | 2548. Secs (2548 Secs)<br>*[==>]* | ***[3]*** |
| | *Comments: Adopted SED: PoWR_42000_4.00_m7.00_Z0.50_lmcavg_ebmv_0.1_norm_V_sed.fits*<br><br>*ETC Calculation STIS.sp.1828453 indicates that S/N = 20 per resel at 1200 Angstroms requires a total exposure of 11,067 s.*<br>*Global Countrate: 3,051.592 counts/s*<br>*Brightest Pixel: 0.04 counts/s at 1243.5 Angstroms*<br>*Buffer Time: 0.8 * 655 s = 524 s*<br><br>*This 3 orbit visit achieves a total exposure time of 7288 s. Consequently, the predicted S/N = sqrt(7288/11067)*20 = 16.2 per resel at 1200 Angstroms.* | | | | | | | | |
| 7 | E140M/1425 WAVECAL | WAVE | STIS/FUV-MAMA, ACCUM, 0.2X0.2 | E140M 1425 A | | | | *[==>]* | ***[3]*** |

Orbit Structure




Orbit 3
Server Version: 20220630
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 16822, N11-ELS-51-COS (2C), scheduling** Tue Mar 07 22:01:56 GMT 2023

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV

Special Requirements: SCHED 100%

*Comments: vstatus; 2C; N11-ELS-051; P/COS approved for submission; P/AF 27/10/22 ; intrev: internal review complete ; P/JRD 11/11/22*
*vcheck; Enter targ name & Inst. & Resp. Sci.; N11-ELS-051 ; COS ; AF*
*vcheck; ETC numbers entered in APT?; Yes - N11-ELS-051_dss_gaiaBOT.png*
*vcheck; Any screening violations?; No*
*vcheck; S/N ETC calcs done & documented?; Yes*
*vcheck; Field images checked & saved?; Yes -*
*vcheck; Selected ACQ strategy?; Dispersed G103M/1291*
*vcheck; Possible ACQ or Sci spoilers?; None*
*vcheck; Field BOT clear?; Yes -- see Comment sections*
*vcheck; Visual BOT check for stars not in catalog?; Done - no targets of concern*
*vcheck; Orbit packing finalized?; Yes*
*vcheck; Buffer times optimized?; Yes*
*vcheck; Verify visit grouping correct; NA*
*vcheck; Is visit ready for int. review?; Yes*
*Allocated COS orbits = 3*

## Diagnostics

(N11-ELS-51-COS (2C)) Warning (Form): For the best data quality, it is generally required to use all four FP-POS positions when observing at a given COS cenwave. See the COS Instrument Handbook for exceptions that may apply to observations with G130M/1291 or G160M.

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (2) | N11-ELS-051 | RA: 04 56 29.7033 (74.1237637d) | Proper Motion RA: 0 mas/yr | V=14.03 | Reference Frame: ICRS |
| | Alt Name1: ELS2006-N11-051 | Dec: -66 21 38.86 (-66.36079d) | Proper Motion Dec: 0 mas/yr | SpT=O5 Vn((f)); E(B-V)=0.02; B=13.77; V=14.03 | |
| | | Equinox: J2000 | Parallax: 0" | | |
| | | | Epoch of Position: 2015.5 | | |

*Comments: N11-ELS-51 : [ELS2006] N11 051*
*Previous name : N11-051*
*Input file: ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv*
*SpT = O5 Vn((f))*
*COS/G130M/c1096 : rn(PoWR-OB-new(PoWR_41000_3.80_m7.00_Z0.50.fits, lmc-ob-i 41-38, Z=0.500 solar, Teff=41000, log_lum=5.73, log_g=3.80, log_mdot=-7.00) (extinction lmcavg=0.020), johnson B mag=13.770 vegamag)*
*Coordinate pedigree: Gaia DR2*
*Calculation performed 2021-10-25T01:00:13, v0.9*
---
*tstatus; N11-ELS-051; P/COS approved for submission; S/STIS approved for submission; P/COS 27/10/22; S/LS 19/10/22*
*tcheck; APT/SIMBAD target names: ; N11-ELS-051 '[ELS2006] N11 051' ...*
*Default SIMBAD name is [ELS2006] N11 051*
*tcheck; Target info verification status?; OK*
*tcheck; Coordinates & P.M. verified, epoch checked?; OK - Gaia DR2*
*tcheck; Adopted SED compared to Observations?; Yes ...*
*Rivero Gonzalez et al. (2012A&A...537A..79R) derived (Teff, log g, Mdot) = (41.4 kK, 3.7, 4.3E-7 Msun/year) from model atmosphere analysis of the optical spectrum of N11-ELS-051. The adopted SED consists of a model from the PoWR grid computed for LMC metallicity with similar parameters: (Teff, log g, Mdot) = (41 kK, 3.80, 1.E-7). The model flux was attenuated by an LMC average extinction law with E(B-V) = 0.12. This value is much larger than reddening implied by the available BV photometry for an O5 V spectral type, but was required to achieve a reasonable match with archival STIS spectra. The reddened model flux was normalized by the Johnson B-band photometry. The adopted SED corresponds to the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16822/N11-ELS-051/PoWR_41000_3.80_m7.00_Z0.50_lmcavg_ebmv_0.12_norm_B_sed.fits*
*The reasonably good match between the available data and the adopted SED is illustrated in the file:*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16822/N11-ELS-051/N11-ELS-051_adopted_SED_vs_STIS_BV.pdf*
*Category=STAR*
*Description=[MAIN SEQUENCE O, OF]*
*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 PEAK XD (COS.sa.1828889) | (2) N11-ELS-051 | 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: For the adopted SED*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/N11-ELS-051/PoWR_41000_3.80_m7.00_Z0.50_lmcavg_ebmv_0.12_norm_B_sed.fits*

*COS.sa.1828889 indicates that the recommended S/N = 40 can be achieved in 0.1730 s. This estimate was rounded up to 0.2 s.*

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 2 | FUV PEAK D (COS.sa.1828889) | (2) N11-ELS-051 | 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: For the adopted SED*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/N11-ELS-051/PoWR_41000_3.80_m7.00_Z0.50_lmcavg_ebmv_0.12_norm_B_sed.fits*

*COS.sa.1828889 indicates that the recommended S/N = 40 can be achieved in 0.1730 s. This estimate was rounded up to 0.2 s.*

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 3 | G130M/1291-3 (COS.sp.1828890) | (2) N11-ELS-051 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=105; FP-POS=3 | | | 210 Secs (210 Secs) [==>] | [1] |

*Comments: The SED used for ETC calculations is in the Box directory*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/N11-ELS-051/PoWR_41000_3.80_m7.00_Z0.50_lmcavg_ebmv_0.12_norm_B_sed.fits*

*ETC calculation COS.sp.1828890 indicates that S/N = 30 per resel at 1150 Angstroms is obtained in 430 s (215 s per FP-POS)*
*WARNING ("Segment count-rate exceeds segment/stripe limit for irregularly-variable source") does not apply to this source.*
*Count Rate (Total, Segment A, Segment B) = (11819.841, 4839.010, 6980.830)*
*Brightest Pixel: 0.171 counts/s at 1216.22 A*
*Buffer-Fill Time = 199 s*
*Buffer Time = 2/3 * 199 s = 132 s.*
*Optimized = 105 s*
*During orbit packing, the exposure time was decreased to 210 s (= twice the optimized buffer time) to enable parallel buffer dumps. The expected S/N is therefore sqrt(210/215)*30 = 29.6 per resel.*

*Bright Object Checking:*
*The gaiaBOT spreadsheet indicates that there are no stars brighter than V=17.7 within 22 arcsec of N11-ELS-051, so the field is cleared.*

*The APT/GSC-II BOT lists 3 stars as "Safe" and 1 star as "Unknown" for both the PSA and BOA regions of interest:*

| Object | RA | Dec |
|---|---|---|
| S1IW147532 | 04:56:29.8499 | -66:21:45.62 |
| gBOT #4 | 04:56:29.8862 | -66:21:45.61 |

*As indicated, the position of "unknown" S1IW147532 coincides with gBOT #4 = Gaia DR2 4662156630134021632. Under the assumption that it is an O5 V star, its Gaia photometry predicts a V magnitude of 18.6, which is 3.9 magnitudes fainter than the bright object limit for PSA spectroscopy with G130M; see Table 10.2 of the IHB. It poses no threat to the health and safety of the COS detectors.*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4 | G130M/129 1-4 (COS.sp.1828890) | (2) N11-ELS-051 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=105; FP-POS=4 | 210 Secs (210 Secs)<br>*[==>]* | | |

*Comments: The SED used for ETC calculations is in the Box directory*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/N11-ELS-051/PoWR_41000_3.80_m7.00_Z0.50_lmcavg_ebmv_0.12_norm_B_sed.fits*

*ETC calculation COS.sp.1828890 indicates that S/N = 30 per resel at 1150 Angstroms is obtained in 430 s (215 s per FP-POS)*
*WARNING ("Segment count-rate exceeds segment/stripe limit for irregularly-variable source") does not apply to this source.*
*Count Rate (Total, Segment A, Segment B) = (11819.841, 4839.010, 6980.830)*
*Brightest Pixel: 0.171 counts/s at 1216.22 A*
*Buffer-Fill Time = 199 s*
*Buffer Time = 2/3 * 199 s = 132 s.*
*Optimized = 105 s*
*During orbit packing, the exposure time was decreased to 210 s (= twice the optimized buffer time) to enable parallel buffer dumps. The expected S/N is therefore sqrt(210/215)*30 = 29.6 per resel.*

*Bright Object Checking:*
*The gaiaBOT spreadsheet indicates that there are no stars brighter than V=17.7 within 22 arcsec of N11-ELS-051, so the field is cleared.*

*The APT/GSC-II BOT lists 3 stars as "Safe" and 1 star as "Unknown" for both the PSA and BOA regions of interest:*

| *Object* | *RA* | *Dec* |
|---|---|---|
| *S1IW147532* | *04:56:29.8499* | *-66:21:45.62* |
| *gBOT #4* | *04:56:29.8862* | *-66:21:45.61* |

*As indicated, the position of "unknown" S1IW147532 coincides with gBOT #4 = Gaia DR2 4662156630134021632. Under the assumption that it is an O5 V star, its Gaia photometry predicts a V magnitude of 18.6, which is 3.9 magnitudes fainter than the bright object limit for PSA spectroscopy with G130M; see Table 10.2 of the IHB. It poses no threat to the health and safety of the COS detectors.*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5 | G160M/161 1 (COS.sp.1828893) | (2) N11-ELS-051 | COS/FUV, TIME-TAG, PSA | G160M 1611 A | BUFFER-TIME=313; FP-POS=ALL | 208.5 Secs (834 Secs)<br>*[==>(Split 1)]*<br>*[==>(Split 2)]*<br>*[==>(Split 3)]*<br>*[==>(Split 4)]* | | |

*Comments: The SED used for ETC calculations is in the Box directory*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/N11-ELS-051/PoWR_41000_3.80_m7.00_Z0.50_lmcavg_ebmv_0.12_norm_B_sed.fits*

*ETC calculation COS.sp.1828893 indicates that S/N = 30 per resel at 1590 Angstroms is obtained in 871.4421 s*

*This baseline exposure time was initially rounded to 872 s (218 s per FP-POS). However, during subsequent orbit-packing, it was was decreased to 834 s (208.5 s per FP-POS).*
*The expected S/N is therefore sqrt(843 / 872.) * 30 = 29.3 per resel.*
*Count Rate (Total, Segment A, Segment B) = (5016.510, 1080.613, 3935.897)*
*Brightest Pixel: 0.068 counts/s at 1423.51 A*
*Buffer-Fill Time = 470 s*
*Buffer Time = 2/3 * 470 s = 313 s (Optimized value)*

*Bright Object Checking:*
*The gaiaBOT spreadsheet indicates that there are no stars brighter than V=17.7 within 22 arcsec of N11-ELS-051, so the field is cleared.*

*The APT/GSC-II BOT lists 3 stars as "Safe" and 1 star as "Unknown" for both the PSA and BOA regions of interest:*

| *Object* | *RA* | *Dec* |
|---|---|---|
| *S1IW147532* | *04:56:29.8499* | *-66:21:45.62* |
| *gBOT #4* | *04:56:29.8862* | *-66:21:45.61* |

*As indicated, the position of "unknown" S1IW147532 coincides with gBOT #4 = Gaia DR2 4662156630134021632. Under the assumption that it is an O5 V star, its Gaia photometry predicts a V magnitude of 18.6, which is 4.6 magnitudes fainter than the bright object limit for PSA spectroscopy with G160M; see Table 10.2 of the IHB. It poses no threat to the health and safety of the COS detectors.*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6 | G130M/1096<br>(COS.sp.1828892) | (2) N11-ELS-051 | COS/FUV, TIME-TAG, PSA | G130M<br>1096 A | BUFFER-TIME=269;<br>FP-POS=ALL | 1189. Secs (4756 Secs)<br>*[==>(Split 1)]*<br>*[==>(Split 2)]*<br>*[==>(Split 3)]*<br>*[==>(Split 4)]* | *[2]*<br>*[3]* | |

*Comments: The SED used for ETC calculations is in the Box directory*
*{preamble for Box}/ullyses_tech/ullyses_proposals/c29_mc/16922/N11-ELS-051/PoWR_41000_3.80_m7.00_Z0.50_lmcavg_ebmv_0.12_norm_B_sed.fits*

*ETC calculation COS.sp.1828892 indicates that S/N = 20 per resel at 1080 Angstroms is obtained in 4656 (1164 s per FP-POS).*
*Count Rate (Total, Segment A, Segment B) = (4714.224, 4621.217, 93.007)*
*Brightest Pixel: 0.108 counts/s at 1216.21 A*
*Buffer-Fill Time = 500 s*
*Buffer Time = 2/3 * 500 s = 333 s*
*Optimized = 264 s*
*During orbit packing, the exposure time per FP-POS was increased to 1189 s and the Buffer Time re-optimized to be 269 s.*

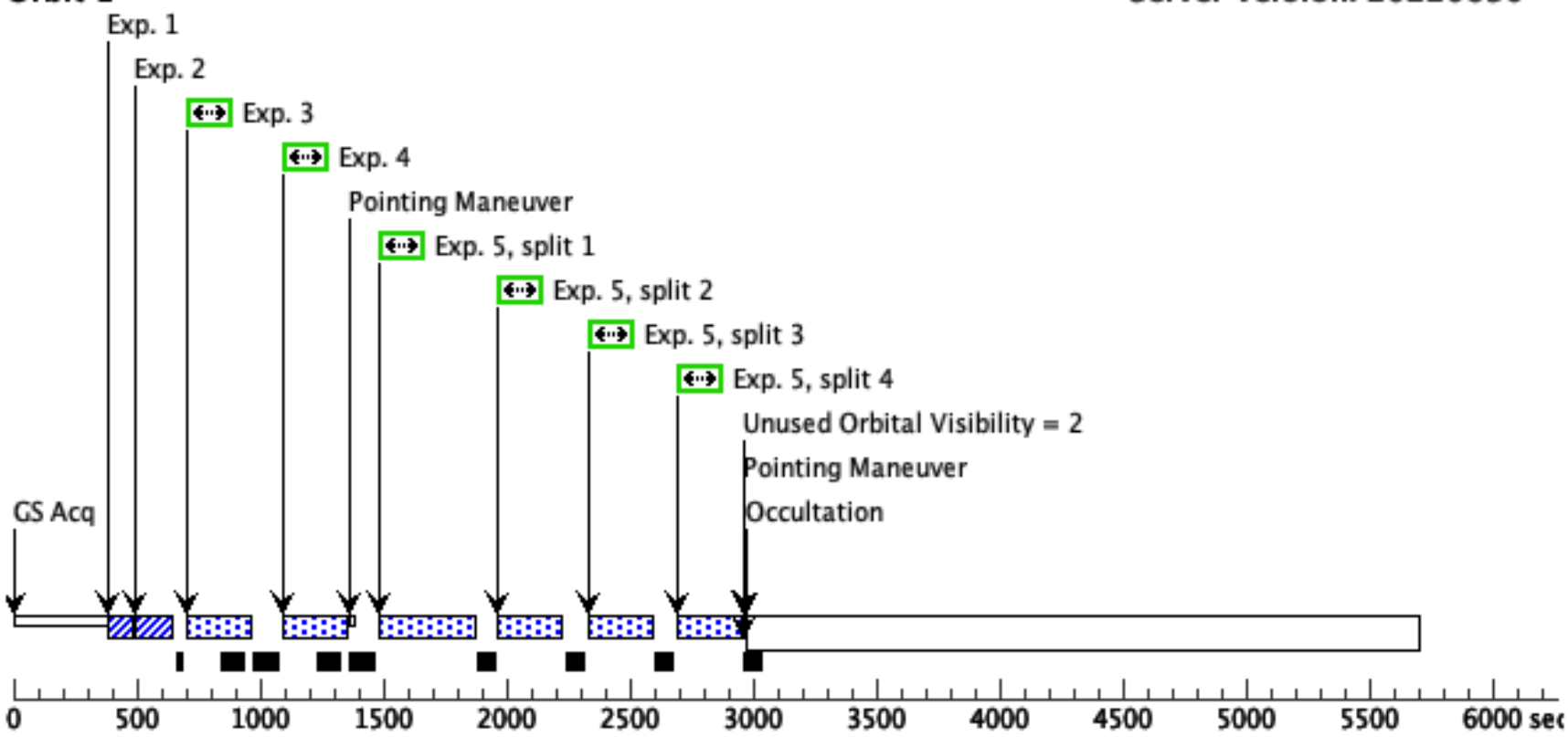
*Bright Object Checking:*
*The gaiaBOT spreadsheet indicates that there are no stars brighter than V=17.7 within 22 arcsec of N11-ELS-051, so the field is cleared.*

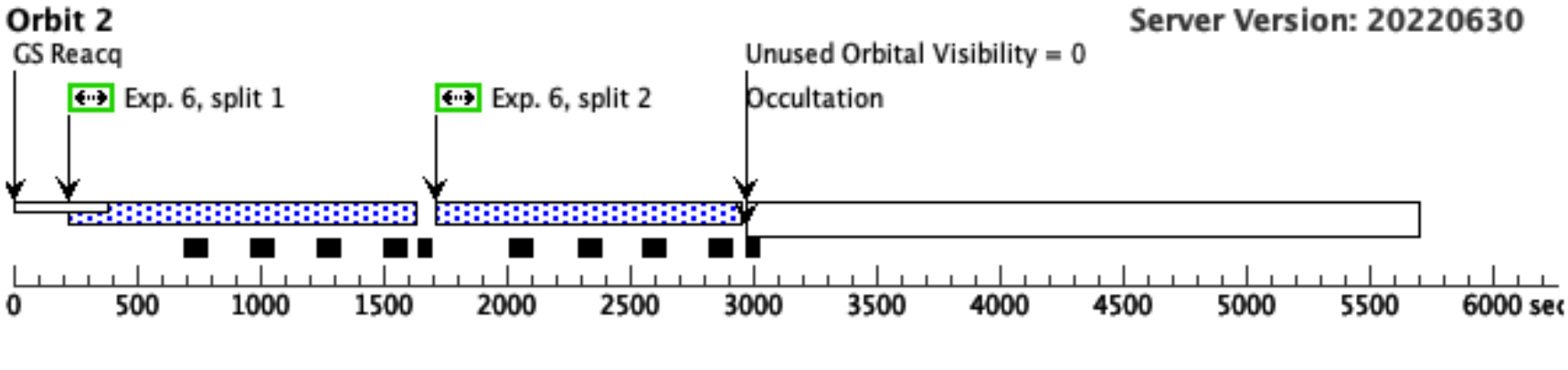
*The APT/GSC-II BOT lists 3 stars as "Safe" and 1 star as "Unknown" for both the PSA and BOA regions of interest:*

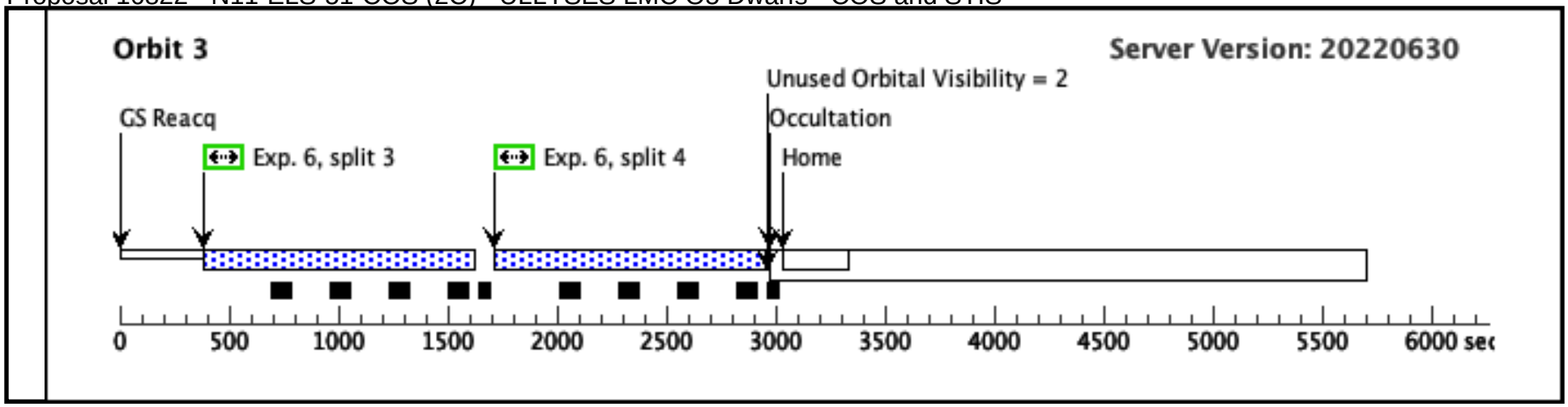
| *Object* | *RA* | *Dec* |
|---|---|---|
| *S1IW147532* | *04:56:29.8499* | *-66:21:45.62* |
| *gBOT #4* | *04:56:29.8862* | *-66:21:45.61* |

*As indicated, the position of "unknown" S1IW147532 coincides with gBOT #4 = Gaia DR2 4662156630134021632. Under the assumption that it is an O5 V star, its Gaia photometry predicts a V magnitude of 18.6, which is 3.9 magnitudes fainter than the bright object limit for PSA spectroscopy with G130M; see Table 10.2 of the IHB. It poses no threat to the health and safety of the COS detectors.*

Orbit Structure




Orbit 3
Server Version: 20220630
Unused Orbital Visibility = 2
GS Reacq
Occultation
Exp. 6, split 3
Exp. 6, split 4
Home
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500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec