16812 - ULLYSES LMC O2 Supergiants - COS

Cycle: 29, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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) VFTS-542	COS/FUV	2	09-Nov-2022 18:00:24.0	yes
2C	(2) VFTS-545	COS/FUV	2	09-Nov-2022 18:00:25.0	yes

4 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 16812, VFTS-542-COS (1C) Wed Nov 09 23:00:26 GMT 2022

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: SCHED 100%; ORIENT 1D TO 70 D; ORIENT 270D TO 360 D

Comments: vstatus; 1C; VFTS-542; P/COS approved for submission; P/DJS 07/11/22 ; intrev: complete ; P/JRD 07/11/22
vcheck; Enter targ name & Inst. & Resp. Sci.; VFTS-542 'BAT99 113'; COS; DJS
vcheck; ETC numbers entered in APT?; completed
vcheck; Any screening violations?; None
vcheck; S/N ETC calcs done & documented?; N/A
vcheck; Field images checked & saved?; yes VFTS-542_wfc3_uvis_f275w_logstretch_gBOT.png
vcheck; Selected ACQ strategy?; COS spectroscopic ACQ
vcheck; Possible ACQ or Sci spoilers?; None
vcheck; Field BOT clear?; yes
vcheck; Visual BOT check for stars not in catalog?; yes
vcheck; Orbit packing finalized?; 2 orbits
vcheck; Buffer times optimized?; yes
vcheck; Verify visit grouping correct; none needed
vcheck; Is visit ready for int. review?; yes
Allocated COS orbits = 2

Diagnostics

(VFTS-542-COS (1C)) 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

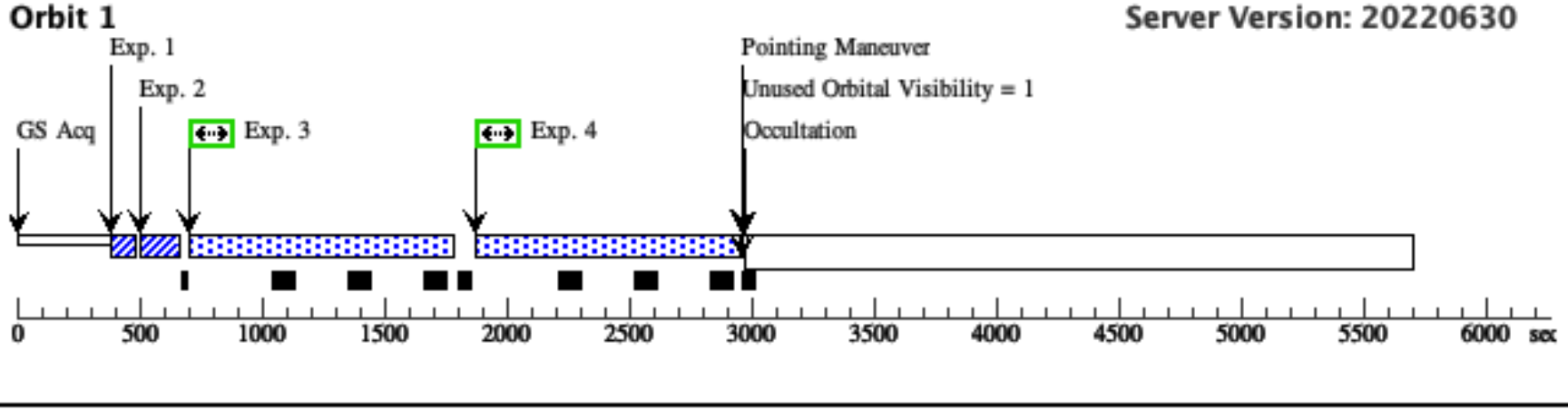
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	VFTS-542	RA: 05 38 43.0968 (84.6795700d)	Proper Motion RA: 0 mas/yr	V=13.47	Reference Frame: ICRS
	Alt Name1: BAT99-113	Dec: -69 05 46.89 (-69.09636d)	Proper Motion Dec: 0 mas/yr	SpT=O2 If*/WN5 + B0 V; E(B-V)=0.37; U=12.67; B=13.56; V=13.47; F1700=1.400e-13; F2200=6.900e-14	
	Alt Name2: MK-30	Equinox: J2000	Parallax: 0"		
			Epoch of Position: 2015.5		

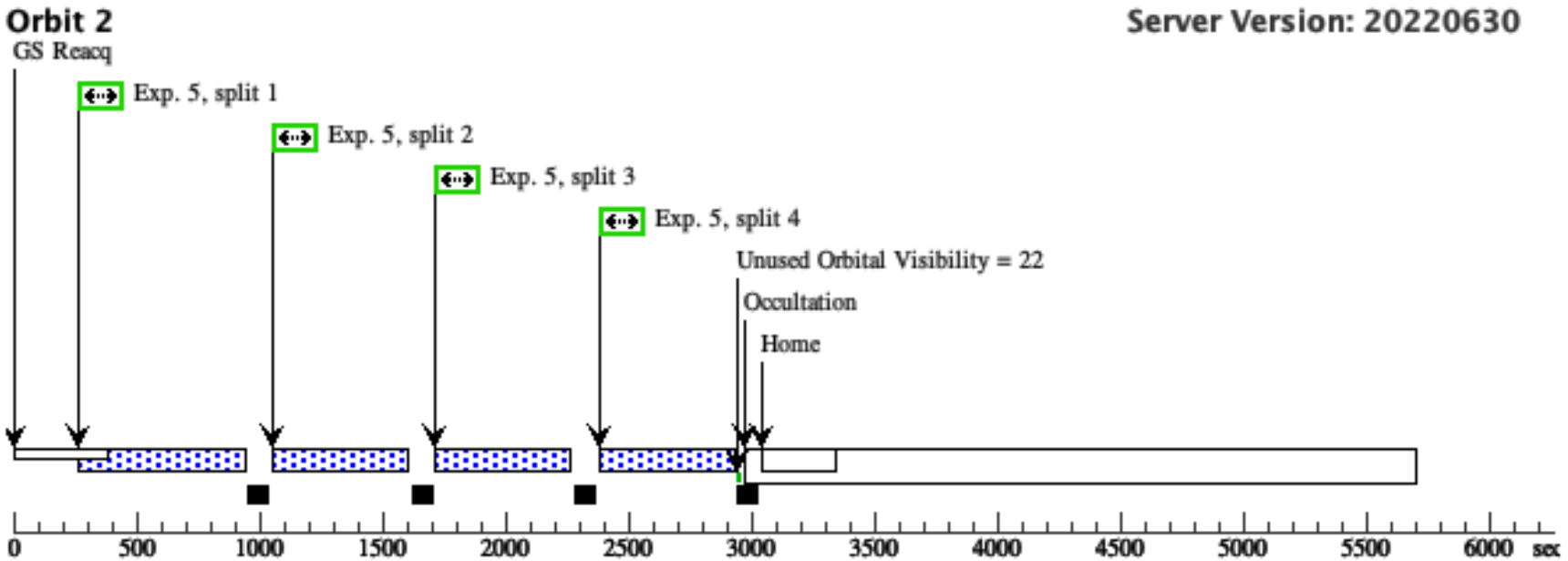
Comments: VFTS-542 : BAT99-113, MK-30, Cl NGC 2070 MEL 30*
Previous name : Mk 30
Input file: ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv
SpT = O2 If/WN5 + B0 V*
COS/G130M/c1291 : rn(PoWR-OB-new(PoWR_47000_4.20_m7.00_Z0.50.fits, lmc-ob-i 47-42, Z=0.500 solar, Teff=47000, log_lum=5.58, log_g=4.20, log_mdot=-7.00) (extinction lmc30dor=0.370), flux1700 +-2.0A flux=1.4e-13 Flam)
COS/G160M/c1611 : rn(PoWR-OB-new(PoWR_47000_4.20_m7.00_Z0.50.fits, lmc-ob-i 47-42, Z=0.500 solar, Teff=47000, log_lum=5.58, log_g=4.20, log_mdot=-7.00) (extinction lmc30dor=0.370), flux1700 +-2.0A flux=1.4e-13 Flam)
Coordinate pedigree: Gaia DR2
Calculation performed 2021-10-25T00:56:01, v0.9
---
tstatus; VFTS-542; P/COS approved for submission; S/ins not started; P/DJS 17/03/22; S/xx DD/MM/YY
tcheck; APT/SIMBAD target names: ; VFTS-542 'BAT99 113'
tcheck; Target info verification status?; OK
tcheck; Coordinates & P.M. verified, epoch checked?; ------ TBD!!!
tcheck; Adopted SED compared to Observations?; ------
Category=STAR
Description=[SUPERGIANT O, OF, WOLF RAYET - WN]
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.1830283)	(1) VFTS-542	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A	CENTER=DEF; NUM-POS=3; STEP-SIZE=1.3			1 Secs (1 Secs) *[==>]*	***[1]***
	Comments: Exposure time not yet calculated.								
2	FUV PEAK D (COS.sa.1830283)	(1) VFTS-542	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	CENTER=DEF; NUM-POS=5; STEP-SIZE=0.9			1 Secs (1 Secs) *[==>]*	***[1]***
	Comments: Exposure time not yet calculated.								
3	G130M/1291-3 (COS.sp.1830282)	(1) VFTS-542	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=3077; FP-POS=3			1031 Secs (1031 Secs) *[==>]*	***[1]***
	Comments: rn(PoWR-OB-new(PoWR_47000_4.20_m7.00_Z0.50.fits, lmc-ob-i 47-42, Z=0.500 solar, Teff=47000, log_lum=5.58, log_g=4.20, log_mdot=-7.00) (extinction lmc30dor=0.370), flux1700 +- 2.0A flux=1.4e-13 Flam); cos,fuv,g130m,c1291,psa,mjd#59670; fp-pos=None, segment=None) *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O2 If*/WN5 + B0 V* *SED = VFTS-542_COS_G130M_c1291_sed.fits* *For exptime=2023.7 s, spectral region:* *1150.0 +- 0.5 A achieves SNR=30.0/resel* *global countrate (brightest segment): 1951.8 cts/s/segment* *brightest pixel: 0.048 cts/s/pix at 1243.5 A* *Calculation performed 2021-10-25T00:56:03, v0.9*								
4	G130M/1291-4 (COS.sp.1830282)	(1) VFTS-542	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=3077; FP-POS=4			1031 Secs (1031 Secs) *[==>]*	***[1]***
	Comments: rn(PoWR-OB-new(PoWR_47000_4.20_m7.00_Z0.50.fits, lmc-ob-i 47-42, Z=0.500 solar, Teff=47000, log_lum=5.58, log_g=4.20, log_mdot=-7.00) (extinction lmc30dor=0.370), flux1700 +- 2.0A flux=1.4e-13 Flam); cos,fuv,g130m,c1291,psa,mjd#59670; fp-pos=None, segment=None) *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O2 If*/WN5 + B0 V* *SED = VFTS-542_COS_G130M_c1291_sed.fits* *For exptime=2023.7 s, spectral region:* *1150.0 +- 0.5 A achieves SNR=30.0/resel* *global countrate (brightest segment): 1951.8 cts/s/segment* *brightest pixel: 0.048 cts/s/pix at 1243.5 A* *Calculation performed 2021-10-25T00:56:03, v0.9*								
5	G160M/1611 (COS.sp.1830285)	(1) VFTS-542	COS/FUV, TIME-TAG, PSA	G160M 1611 A	BUFFER-TIME=6445; FP-POS=ALL			501 Secs (2004 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[2]***
	Comments: rn(PoWR-OB-new(PoWR_47000_4.20_m7.00_Z0.50.fits, lmc-ob-i 47-42, Z=0.500 solar, Teff=47000, log_lum=5.58, log_g=4.20, log_mdot=-7.00) (extinction lmc30dor=0.370), flux1700 +- 2.0A flux=1.4e-13 Flam); cos,fuv,g160m,c1611,psa,mjd#59670; fp-pos=None, segment=None) *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O2 If*/WN5 + B0 V* *SED = VFTS-542_COS_G160M_c1611_sed.fits* *For exptime=1641.6 s, spectral region:* *1590.0 +- 0.5 A achieves SNR=30.0/resel* *global countrate (brightest segment): 1911.1 cts/s/segment* *brightest pixel: 0.029 cts/s/pix at 1423.5 A* *Calculation performed 2021-10-25T00:56:05, v0.9*								

Orbit Structure





Visit

Proposal 16812, VFTS-545-COS (2C) Wed Nov 09 23:00:26 GMT 2022

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: SCHED 100%; ORIENT 0D TO 230 D

Comments: vstatus; 2C; VFTS-545; P/COS approved for submission; P/DJS 07/11/22 ; intrev: complete ; P/JRD 07/11/22
vcheck; Enter targ name & Inst. & Resp. Sci.; VFTS-545 'BAT99 114'; COS; DJS
vcheck; ETC numbers entered in APT?; completed
vcheck; Any screening violations?; None
vcheck; S/N ETC calcs done & documented?; N/A
vcheck; Field images checked & saved?; yes VFTS-545_wfc3_uvis_f275w_logstretch_gBOT.png
vcheck; Selected ACQ strategy?; COS spectroscopic ACQ
vcheck; Possible ACQ or Sci spoilers?; None
vcheck; Field BOT clear?; yes
vcheck; Visual BOT check for stars not in catalog?; yes
vcheck; Orbit packing finalized?; 2 orbits
vcheck; Buffer times optimized?; yes
vcheck; Verify visit grouping correct; none needed
vcheck; Is visit ready for int. review?; yes
Allocated COS orbits = 2

Diagnostics

(VFTS-545-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)	VFTS-545	RA: 05 38 43.2080 (84.6800333d)	Proper Motion RA: 0 mas/yr	V=13.4	Reference Frame: ICRS
	Alt Name1: BAT99-114	Dec: -69 06 14.51 (-69.10403d)	Proper Motion Dec: 0 mas/yr	SpT=O2 If*/WN5; E(B-V)=0.40 ; U=12.66; B=13.52; V=13.40	
	Alt Name2: MK-35	Equinox: J2000	Parallax: 0"		
			Epoch of Position: 2015.5		

Comments: VFTS-545 : BAT99-114, MK-35, Cl NGC 2070 MEL 35*
Previous name : Mk 35
Input file: ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv
SpT = O2 If/WN5*
COS/G130M/c1291 : rn(PoWR-OB-new(PoWR_47000_4.20_m7.00_Z0.50.fits, lmc-ob-i 47-42, Z=0.500 solar, Teff=47000, log_lum=5.58, log_g=4.20, log_mdot=-7.00) (extinction lmc30dor=0.400), johnson U mag=12.660 vegamag)
COS/G160M/c1611 : rn(PoWR-OB-new(PoWR_47000_4.20_m7.00_Z0.50.fits, lmc-ob-i 47-42, Z=0.500 solar, Teff=47000, log_lum=5.58, log_g=4.20, log_mdot=-7.00) (extinction lmc30dor=0.400), johnson U mag=12.660 vegamag)
Coordinate pedigree: Gaia DR2
Calculation performed 2021-10-25T00:56:10, v0.9
---
tstatus; VFTS-545; P/COS approved for submission; S/ins not started; P/DJS 17/03/22; S/xx DD/MM/YY
tcheck; APT/SIMBAD target names: ; VFTS-545 'BAT99 114'
tcheck; Target info verification status?; OK
tcheck; Coordinates & P.M. verified, epoch checked?; TBD!!!
tcheck; Adopted SED compared to Observations?; ------
Category=STAR
Description=[SUPERGIANT O, OF, WOLF RAYET - WN]
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.1830296)	(2) VFTS-545	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A	CENTER=DEF; NUM-POS=3; STEP-SIZE=1.3			1 Secs (1 Secs) *[==>]*	***[1]***
	Comments: Exposure time not yet calculated.								
2	FUV PEAK D (COS.sa.1830296)	(2) VFTS-545	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	CENTER=DEF; NUM-POS=5; STEP-SIZE=0.9			1 Secs (1 Secs) *[==>]*	***[1]***
	Comments: Exposure time not yet calculated.								
3	G130M/1291-3 (COS.sp.1830297)	(2) VFTS-545	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=448; FP-POS=3			1036 Secs (1036 Secs) *[==>]*	***[1]***
	Comments: rn(PoWR-OB-new(PoWR_47000_4.20_m7.00_Z0.50.fits, lmc-ob-i 47-42, Z=0.500 solar, Teff=47000, log_lum=5.58, log_g=4.20, log_mdot=-7.00) (extinction lmc30dor=0.400), johnson U mag=12.660 v egamag); cos,fuv,g130m,c1291,psa,mjd#59670; fp-pos=None, segment=None) *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O2 If*/WN5* *SED = VFTS-545_COS_G130M_c1291_sed.fits* *For exptime=2561.0 s, spectral region:* *1150.0 +- 0.5 A achieves SNR=30.0/resel* *global countrate (brightest segment): 1632.2 cts/s/segment* *brightest pixel: 0.040 cts/s/pix at 1243.5 A* *Calculation performed 2021-10-25T00:56:13, v0.9*								
4	G130M/1291-4 (COS.sp.1830297)	(2) VFTS-545	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=448; FP-POS=4			1036 Secs (1036 Secs) *[==>]*	***[1]***
	Comments: rn(PoWR-OB-new(PoWR_47000_4.20_m7.00_Z0.50.fits, lmc-ob-i 47-42, Z=0.500 solar, Teff=47000, log_lum=5.58, log_g=4.20, log_mdot=-7.00) (extinction lmc30dor=0.400), johnson U mag=12.660 v egamag); cos,fuv,g130m,c1291,psa,mjd#59670; fp-pos=None, segment=None) *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O2 If*/WN5* *SED = VFTS-545_COS_G130M_c1291_sed.fits* *For exptime=2561.0 s, spectral region:* *1150.0 +- 0.5 A achieves SNR=30.0/resel* *global countrate (brightest segment): 1632.2 cts/s/segment* *brightest pixel: 0.040 cts/s/pix at 1243.5 A* *Calculation performed 2021-10-25T00:56:13, v0.9*								
5	G160M/1611 (COS.sp.1830298)	(2) VFTS-545	COS/FUV, TIME-TAG, PSA	G160M 1611 A	BUFFER-TIME=730; FP-POS=ALL			506 Secs (2024 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[2]***
	Comments: rn(PoWR-OB-new(PoWR_47000_4.20_m7.00_Z0.50.fits, lmc-ob-i 47-42, Z=0.500 solar, Teff=47000, log_lum=5.58, log_g=4.20, log_mdot=-7.00) (extinction lmc30dor=0.400), johnson U mag=12.660 v egamag); cos,fuv,g160m,c1611,psa,mjd#59670; fp-pos=None, segment=None) *From file ULLYSES_Cycle29_MassiveStar_ProgramInput_v5.csv* *Spectral type: O2 If*/WN5* *SED = VFTS-545_COS_G160M_c1611_sed.fits* *For exptime=1850.0 s, spectral region:* *1590.0 +- 0.5 A achieves SNR=30.0/resel* *global countrate (brightest segment): 1676.4 cts/s/segment* *brightest pixel: 0.025 cts/s/pix at 1423.5 A* *Calculation performed 2021-10-25T00:56:15, v0.9*								

Orbit Structure