17180 - What's hidding in the neutral gas? Dissecting the different metallicity components in NGC 1313

Cycle: 30, Proposal Category: GO

(UV Initiative)

(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?*
01	(1) NGC-1313-P1	COS/FUV COS/NUV	2	29-Jun-2022 16:00:35.0	yes
02	(2) NGC-1313-P2	COS/FUV COS/NUV	1	29-Jun-2022 16:00:35.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
03	(3) NGC-1313-P3	COS/FUV COS/NUV	2	29-Jun-2022 16:00:36.0	yes
04	(4) NGC-1313-P4	COS/FUV COS/NUV	2	29-Jun-2022 16:00:37.0	yes
05	(5) NGC-1313-P5	COS/FUV COS/NUV	1	29-Jun-2022 16:00:37.0	yes

8 Total Orbits Used

ABSTRACT

Metallicity is a critical parameter shaping the evolution of galaxies on cosmic timescales. In spite of the importance of this single parameter and the variety of tools available to investigate its distribution in star-forming galaxies, detailed comparisons of the abundances obtained from the ionized-gas, neutral-gas, and stellar components are still lacking to fully understand the chemical state and evolution of galaxies. We propose to remedy the situation by exploiting the unique capabilities of HST/COS in the FUV regime, acquiring and analyzing G130M/1291 spectroscopic observations of 7 pointings (2 archival + 5 new) in the low-metallicity environment of NGC 1313. The data will provide a rich assortment of neutral-gas metallicity tracers allowing us to assess the abundances of the neutral ISM and estimate the stellar metallicities of the targeted stellar clusters. Our study will combine the metallicities of the neutral gas and stellar populations with existing abundances of the ionized gas, performing the first co-spatial comparison of these three components in a low metallicity system, investigating the degree of homogeneity between the stars and multi-phase ISM across the galaxy on spatial scales of ~55 pc. This complete and inexpensive study in the barred spiral NGC 1313 will uncover the links between the different internal components (stars, neutral and ionized gas), and their precise roles in moderating the mixing timescales and star formation in galaxies.

OBSERVING DESCRIPTION

This HST/COS program observes 5 young massive clusters (YMCs) in the nearby barred spiral galaxy NGC 1313 with the G130M/1291 COS configuration in 5 different visits. Each individual visit acquires the target using the ACQ/IMAGE mode with MIRRORA. The spectroscopic observations are collected using FP-POS = 3 and 4.

Target Selection: At a distance of ~4.4 Mpc, NGC 1313 is an ideal target for a spatially-resolved study with the 2.5" COS aperture, as it allows us to

sample the abundances of stellar clusters and the warm ISM on spatial scales of ~55 pc. This COS sample of YMCs covers a broad parameter space both in stellar ages (1-20 Myr) and spatial scales (R~ 0.1-4.4 kpc). The broad range in stellar ages is essential to test mixing timescale scenarios in a lower metallicity regime, particularly those where newly-synthesized metals take more than ~10 Myr to fully mix on spatial scales of <~100 pc.

The exposure times were calculated assuming the spectrum of a simple stellar population of age 5 or 25 Myr (based on photometric ages) renormalized to the WFC3/F275W magnitudes to reach S/N~10 at 1250 A.

Visit

Proposal 17180, NGC1313-P1 (01) Wed Jun 29 20:00:38 GMT 2022

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(NGC1313-P1 (01)) 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

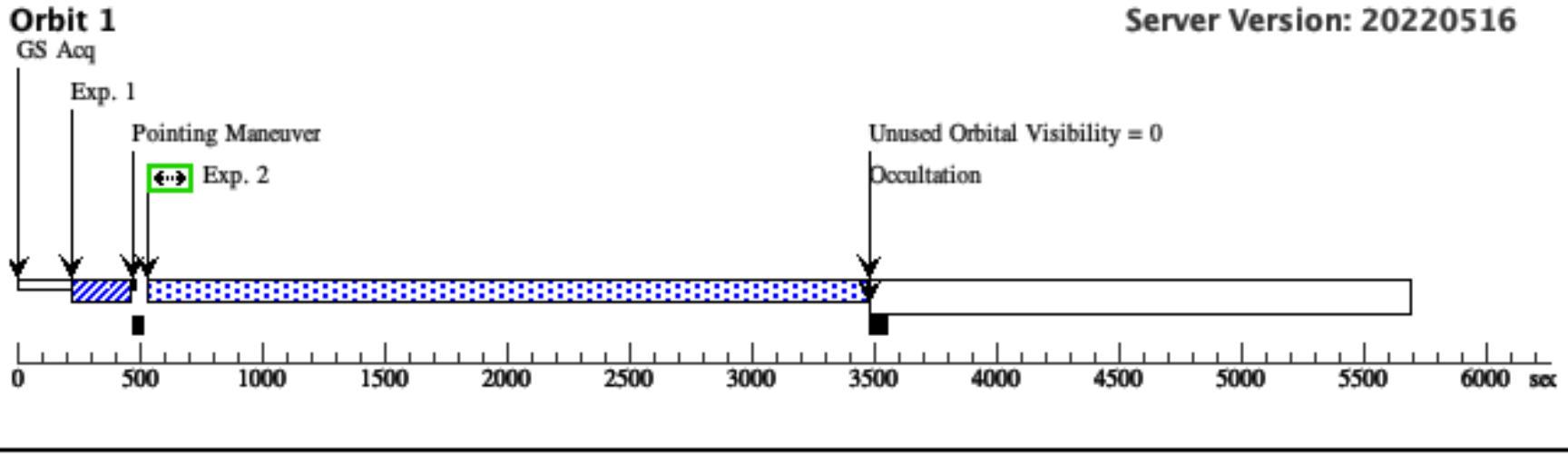
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-1313-P1	RA: 03 18 17.5990 (49.5733292d) Dec: -66 29 52.13 (-66.49781d) Equinox: J2000	Epoch of Position: 2015.5	V=18.34+/-0.05 F275W =17.3	Reference Frame: ICRS

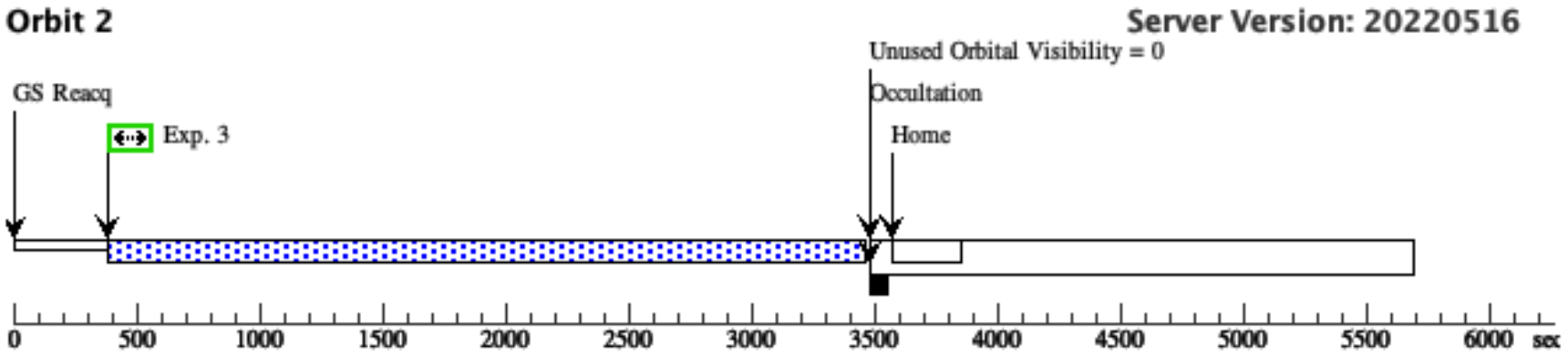
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[YOUNG ASSOCIATION]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ_NGC 1313-P1 (COS.ta.180 9135)	(1) NGC-1313-P1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				3.5 Secs (3.5 Secs) *[==>]*	***[1]***
2	NGC1313-P 1 (COS.sp.149 4552)	(1) NGC-1313-P1	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=47 12; FP-POS=3			860 Secs (2772 Secs) *[==>2772.0 Secs]*	***[1]***
3	NGC1313-P 1 (COS.sp.149 4552)	(1) NGC-1313-P1	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=47 12; FP-POS=4			945 Secs (3030 Secs) *[==>3030.0 Secs]*	***[2]***

Orbit Structure





Visit

Proposal 17180, NGC1313-P2 (02) Wed Jun 29 20:00:38 GMT 2022

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(NGC1313-P2 (02)) 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

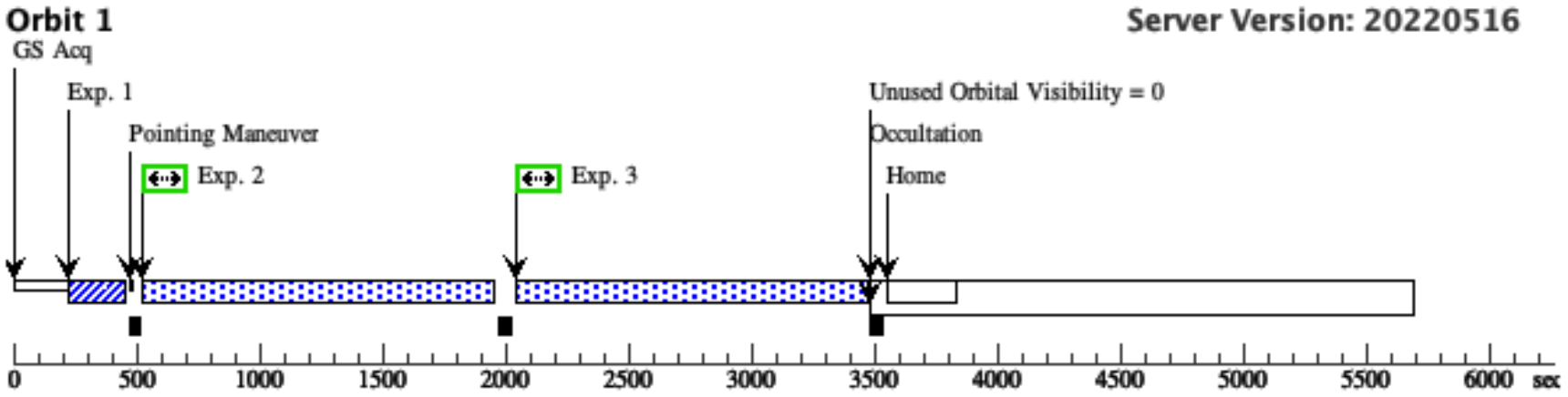
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	NGC-1313-P2	RA: 03 18 15.8014 (49.5658392d) Dec: -66 29 53.09 (-66.49808d) Equinox: J2000	Epoch of Position: 2015.5	V=18.14+/-0.05 F275W = 16.3	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[YOUNG ASSOCIATION]
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_NGC 1313-P2 (COS.ta.180 9136)	(2) NGC-1313-P2	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				1.2 Secs (1.2 Secs) *[==>]*	*[1]*
2	NGC1313-P 2 (COS.sp.149 4548)	(2) NGC-1313-P2	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=34 74.0; FP-POS=3			860 Secs (1264 Secs) *[==>1264.0 Secs]*	*[1]*
3	NGC1313-P 2 (COS.sp.149 4548)	(2) NGC-1313-P2	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=34 74.0; FP-POS=4			945 Secs (1378 Secs) *[==>1378.0 Secs]*	*[1]*

Orbit Structure



Visit

Proposal 17180, NGC1313-P3 (03) Wed Jun 29 20:00:38 GMT 2022

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(NGC1313-P3 (03)) 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

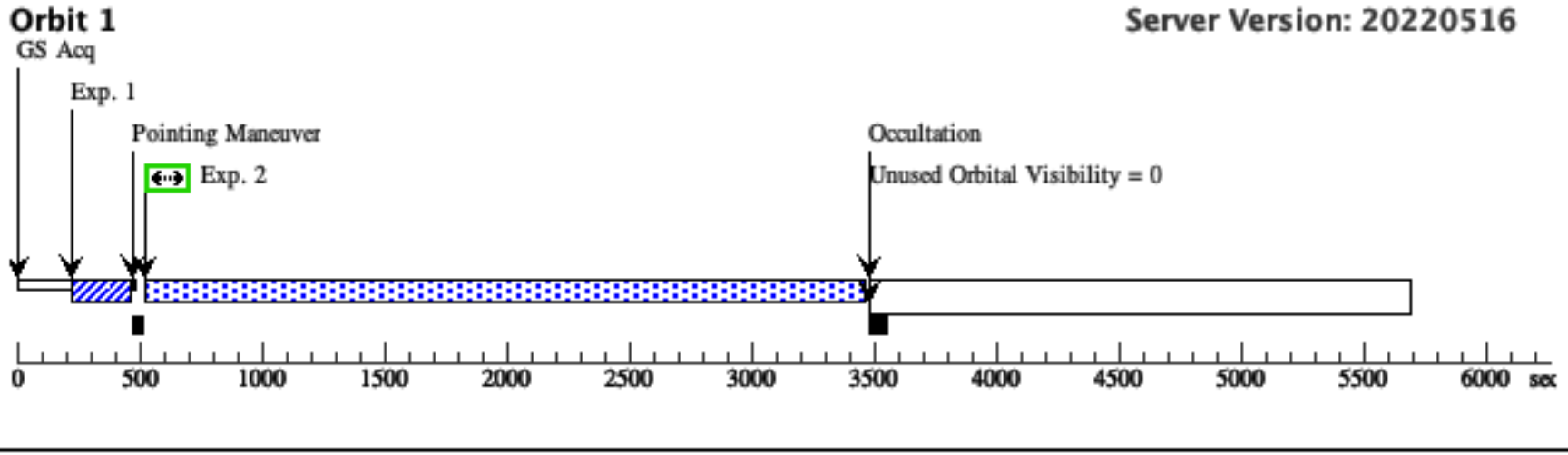
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	NGC-1313-P3	RA: 03 18 8.2531 (49.5343879d) Dec: -66 29 42.03 (-66.49501d) Equinox: J2000	Epoch of Position: 2015.5	V=18.31+/-0.05 F275W = 17	Reference Frame: ICRS

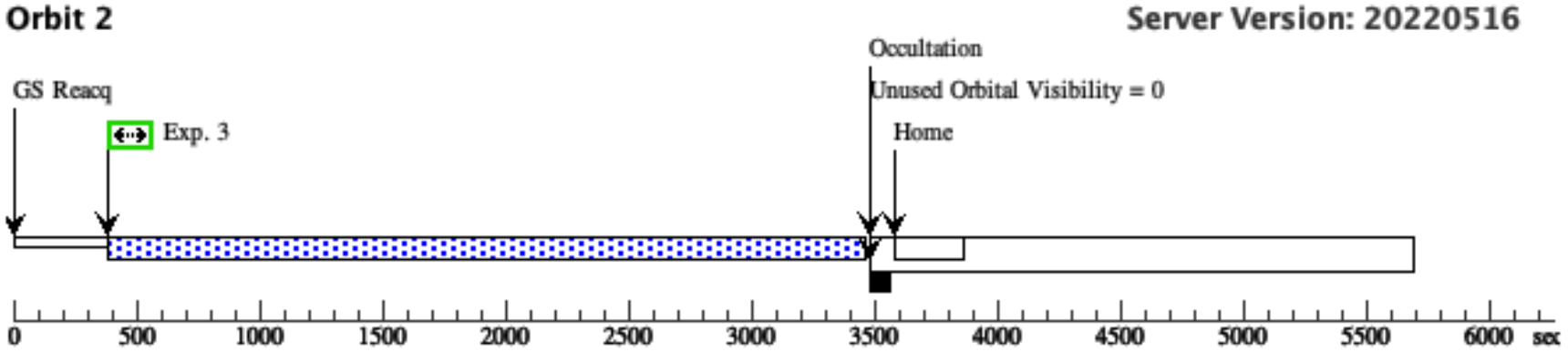
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[YOUNG ASSOCIATION]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ_NGC 1313-P3 (COS.ta.180 9137)	(3) NGC-1313-P3	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				2.6 Secs (2.6 Secs) *[==>]*	***[1]***
2	NGC1313-P 3 (COS.sp.149 4554)	(3) NGC-1313-P3	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=44 92.0; FP-POS=3			860 Secs (2774 Secs) *[==>2774.0 Secs]*	***[1]***
3	NGC1313-P 3 (COS.sp.149 4554)	(3) NGC-1313-P3	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=44 92.0; FP-POS=4			945 Secs (3030 Secs) *[==>3030.0 Secs]*	***[2]***

Orbit Structure





Visit

Proposal 17180, NGC1313-P4 (04) Wed Jun 29 20:00:38 GMT 2022

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(NGC1313-P4 (04)) 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

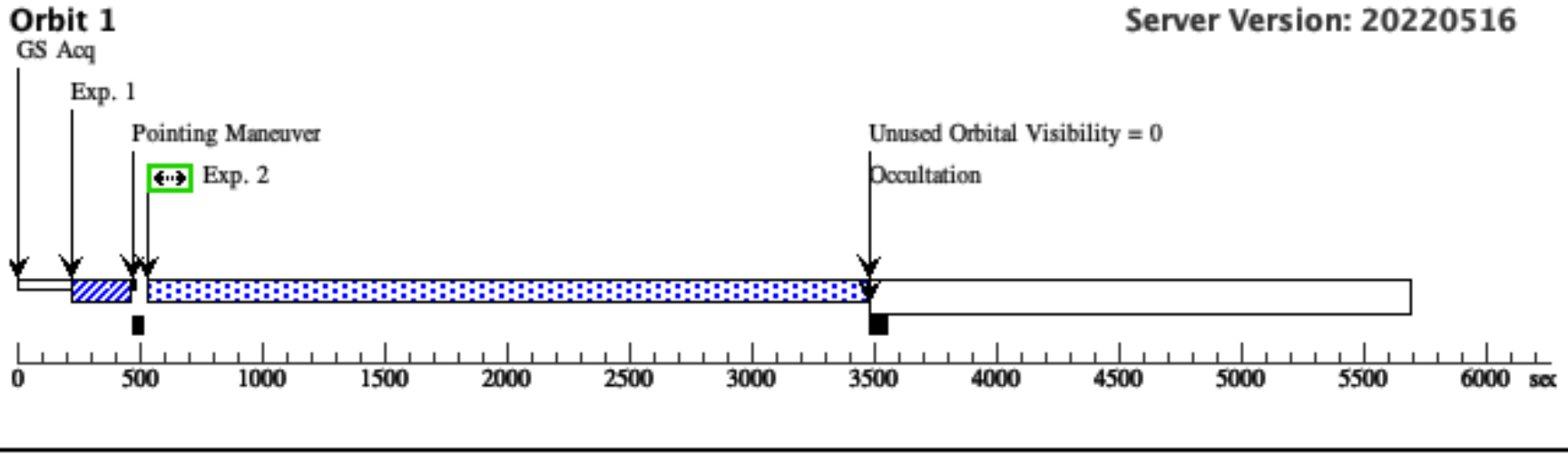
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	NGC-1313-P4	RA: 03 18 6.3653 (49.5265221d) Dec: -66 30 23.18 (-66.50644d) Equinox: J2000	Epoch of Position: 2015.5	V=19.18+/-0.05 F275W = 17.4	Reference Frame: ICRS

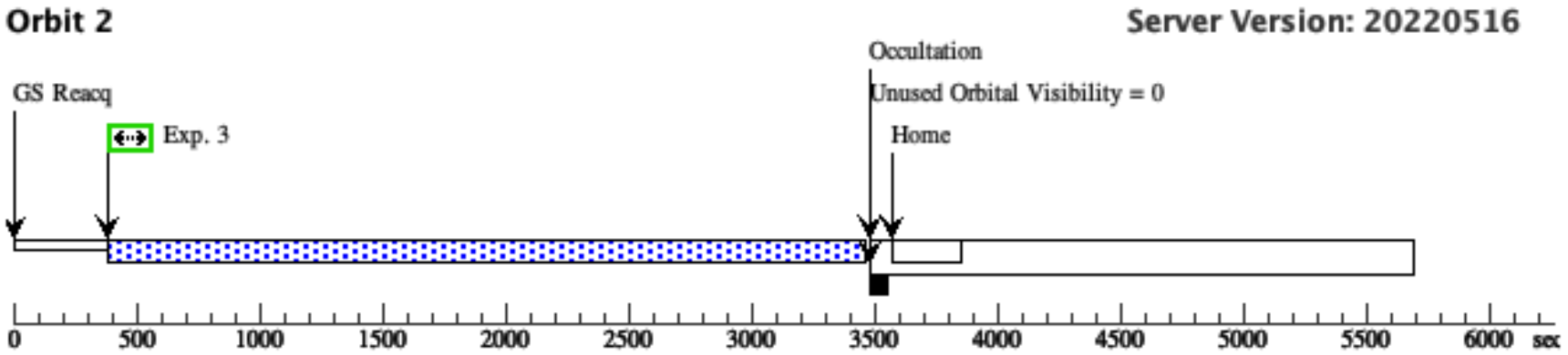
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[YOUNG ASSOCIATION]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ_NGC 1313-P4 (COS.ta.180 9138)	(4) NGC-1313-P4	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				3.4 Secs (3.4 Secs) *[==>]*	***[1]***
2	NGC1313-P 4 (COS.sp.149 4562)	(4) NGC-1313-P4	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=45 67; FP-POS=3			860 Secs (2772 Secs) *[==>2772.0 Secs]*	***[1]***
3	NGC1313-P 4 (COS.sp.149 4562)	(4) NGC-1313-P4	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=45 67; FP-POS=4			945 Secs (3030 Secs) *[==>3030.0 Secs]*	***[2]***

Orbit Structure





Visit

Proposal 17180, NGC1313-P5 (05) Wed Jun 29 20:00:38 GMT 2022

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(NGC1313-P5 (05)) 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
(5)	NGC-1313-P5	RA: 03 18 3.1204 (49.5130017d) Dec: -66 30 14.16 (-66.50393d) Equinox: J2000	Epoch of Position: 2015.5	V=18.23+/-0.05 F275W = 16.5	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STELLAR CLUSTER
Description=[YOUNG ASSOCIATION]
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_NGC 1313-P5 (COS.ta.180 9139)	(5) NGC-1313-P5	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				1.5 Secs (1.5 Secs) *[==>]*	*[1]*
2	NGC1313-P 5 (COS.sp.149 4573)	(5) NGC-1313-P5	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=37 08; FP-POS=3			860 Secs (1264 Secs) *[==>1264.0 Secs]*	*[1]*
3	NGC1313-P 5 (COS.sp.149 4573)	(5) NGC-1313-P5	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=37 08; FP-POS=4			945 Secs (1378 Secs) *[==>1378.0 Secs]*	*[1]*

Orbit Structure