17591 - Probing the long-term evolution of obscuring winds and their impact in NGC 5548

Cycle: 31, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Dr. Missagh Mehdipour (PI) (Contact)	**University of Michigan**
Dr. Gerard A. Kriss (CoI)	Space Telescope Science Institute
Dr. Jelle Kaastra (CoI) (ESA Member)	Space Research Organization Netherlands
Dr. Elisa Costantini (CoI) (ESA Member)	Space Research Organization Netherlands
Dr. Liyi Gu (CoI) (ESA Member)	Space Research Organization Netherlands
Dr. Junjie Mao (CoI)	Tsinghua University
Dr. Hermine Landt (CoI) (ESA Member)	Durham University
Dr. Daniele Rogantini (CoI)	University of Chicago
Dr. Jon Matthew Miller (CoI)	University of Michigan

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) NGC-5548	COS/FUV COS/NUV	2	09-Dec-2025 10:00:41.0	yes

2 Total Orbits Used

ABSTRACT

The link between obscuration and outflows in AGN was first discovered in NGC 5548. This archetypal Sy-1 galaxy underwent major changes due to obscuring winds from the accretion disk. These remarkable winds, captured by joint X-ray/UV spectroscopy, have significant impact on their environment. Swift monitoring shows that over the last 10 years the obscuration in NGC 5548 has gradually declined. This presents a valuable opportunity for analyses that have not been feasible before due to too much obscuration. The lowered obscuration facilitates high-resolution RGS spectroscopy of the outflow to ascertain its evolution. We need to constrain the intrinsic continuum with NuSTAR and EPIC+OM, and the UV outflow with HST/COS. We request joint XMM (180 ks), NuSTAR (70 ks), and HST (2 orbits) spectra.

OBSERVING DESCRIPTION

This HST observation (2 orbits) was approved as part of a joint XMM program to obtain the HST/COS spectrum of NGC 5548 to study the obscuring wind in this AGN.

The HST observation needs to be taken simultaneously as justified in the XMM proposal (the source and the obscuring wind are variable).

Therefore, please coordinate with the XMM planners. The most likely XMM visibility window is: 2024-12-21 to 2025-02-03

The HST exposure time is based on our 2021/2022 observations of NGC 5548 (Mehdipour, M. et al. 2022, ApJL, 934, L24), which required 2 orbits per visit to observe Ly-alpha, N V, and C IV with gratings G130M and G160M. We have confirmed this with the ETC tool. Two orbits yields a S/N of at least 10 per resolution element in the continuum using the G130M grating with central wavelength 1222 and 1291 (for modeling Ly-alpha and N V) and using the G160M grating with central wavelengths 1600 and 1623 (for modeling Si IV and C IV). This is adequate to measure the parameters of the broad UV absorption lines associated with the obscurer, as well as the narrow absorption lines (including low ionization lines) associated with the warm absorber outflows.

For the BUFFER-TIME, we obtained the recommended buffer (2/3 of the buffer fill time) from the ETC for each exposure.

In order to obtain the requisite S/N in the minimum number of orbits, we request the use of Lifetime Position 4 for both the G130M and G160M observations. This was requested as required in the Phase 1 proposal with XMM. This will also replicate our observations from 2021/2022 and enable a one-to-one comparison.

Because we are using two different CENWAVES with each grating and two FP-POS positions in each, we already accomplish the actual objectives of switching between different FP-POS settings:

(1) Better science return: the spectrum is placed at four different locations on the detector, enabling us to detect and reject detector anomalies like dead spots, hot spots, grid-wire shadows, etc.

(2) Spread the flux across the detector in multiple locations, especially in bright emission lines, to decrease charge depletion and extend the lifetime of the detectors.

We do not want to sacrifice S/N with unnecessary extra exposures and increased overhead during each visit by using all 4 FP-POS settings with each CENWAVE. When only one CENWAVE is used, then 4 FP-POS settings makes sense, but that's not the case for our observations. Our chosen FPPOS settings reflect our S/N requirements while still meeting the objectives of using different FP-POS settings in our program.

Reduced gyro does not impact the feasibility of our program. Also, orientation limitation would not impact our program.

Proposal 17591 - Visit 01 - Probing the long-term evolution of obscuring winds and their impact in NGC 5548

Visit

Proposal 17591, Visit 01, completed Tue Dec 09 15:00:42 GMT 2025

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 100%; BETWEEN 01-FEB-2025:10 AND 01-FEB-2025:19:21; BETWEEN 03-FEB-2025:11 AND 03-FEB-2025:18:27

Diagnostics

(Visit 01) Warning (Form): For the best data quality, it is generally required to use all four FP-POS positions at a given COS cenwave (or 2 positions for certain exception cases). See extended explanation in the diagnostic browser.

(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

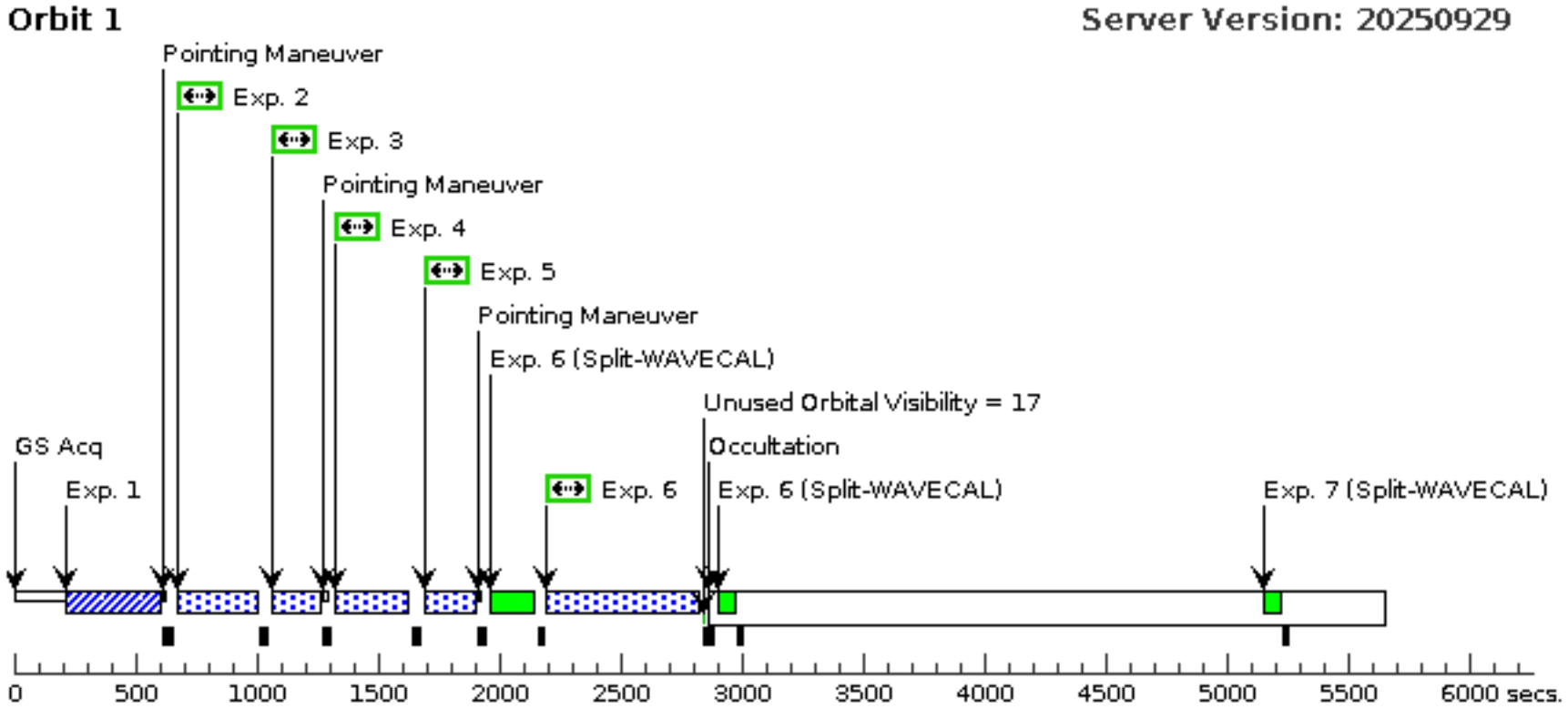
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-5548	RA: 14 17 59.5400 (214.4980833d) Dec: +25 08 12.60 (25.13683d) Equinox: J2000	Proper Motion RA: -1.6053682911936426E-5 sec of time/yr Proper Motion Dec: 2.6700000000000004E-4 arcsec/yr Epoch of Position: 2015.5	V=13.73	Reference Frame: ICRS

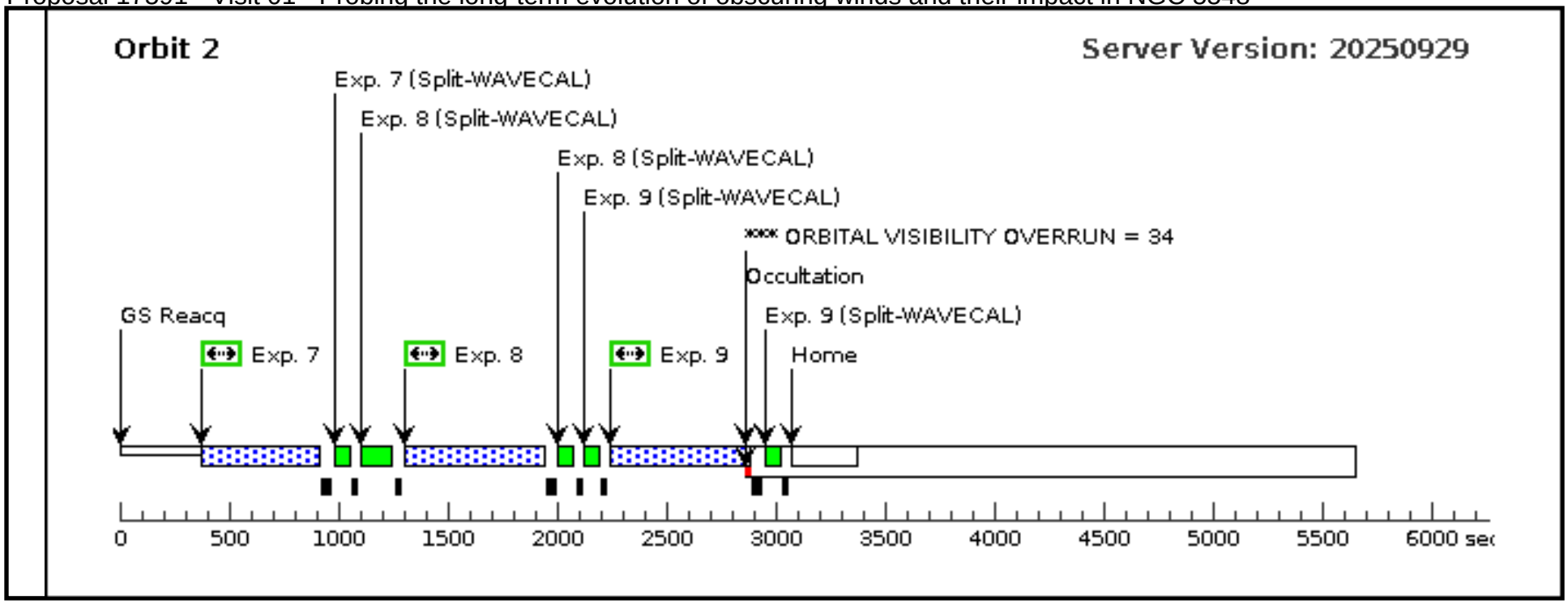
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[ACCRETION DISK, BLR, SEYFERT, WIND]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(1537535)	(1) NGC-5548	COS/NUV, ACQ/IMAGE, BOA	MIRRORA				81 Secs (81 Secs) *[==>]*	***[1]***
Comments: Using the NGC 5548 HST UV continuum (1367 A) lightcurve published by Kriss et al. (2019), we took the lowest observed flux (1.8e-14 erg/cm^2/s/A), to calculate the required exposure time to obtain S/N ratio of 30 for ACQ/IMAGE with BOA.									
2	(1542897)	(1) NGC-5548	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1268; FP-POS=1			145 Secs (145 Secs) *[==>]*	***[1]***
Comments: Using the NGC 5548 HST UV continuum (1367 A) lightcurve published by Kriss et al. (2019) and the mean flux of the 2014 campaign (4.3e-14 erg/cm^2/s/A), the exposure time is calculated.									
3	(1542897)	(1) NGC-5548	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1268; FP-POS=2			145 Secs (145 Secs) *[==>]*	***[1]***
Comments: Using the NGC 5548 HST UV continuum (1367 A) lightcurve published by Kriss et al. (2019) and the mean flux of the 2014 campaign (4.3e-14 erg/cm^2/s/A), the exposure time is calculated.									
4	(1542898)	(1) NGC-5548	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=967; FP-POS=3			157 Secs (157 Secs) *[==>]*	***[1]***
Comments: Using the NGC 5548 HST UV continuum (1367 A) lightcurve published by Kriss et al. (2019) and the mean flux of the 2014 campaign (4.3e-14 erg/cm^2/s/A), the exposure time is calculated.									
5	(1542898)	(1) NGC-5548	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=967; FP-POS=4			157 Secs (157 Secs) *[==>]*	***[1]***
Comments: Using the NGC 5548 HST UV continuum (1367 A) lightcurve published by Kriss et al. (2019) and the mean flux of the 2014 campaign (4.3e-14 erg/cm^2/s/A), the exposure time is calculated.									
6	(1542901)	(1) NGC-5548	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=2067; FP-POS=1			584 Secs (584 Secs) *[==>]*	***[1]***
Comments: Using the NGC 5548 HST UV continuum (1367 A) lightcurve published by Kriss et al. (2019) and the mean flux of the 2014 campaign (4.3e-14 erg/cm^2/s/A), the exposure time is calculated.									
7	(1542901)	(1) NGC-5548	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=2067; FP-POS=2			488 Secs (488 Secs) *[==>]*	***[2]***
Comments: Using the NGC 5548 HST UV continuum (1367 A) lightcurve published by Kriss et al. (2019) and the mean flux of the 2014 campaign (4.3e-14 erg/cm^2/s/A), the exposure time is calculated.									
8	(1542900)	(1) NGC-5548	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=2281; FP-POS=3			586 Secs (586 Secs) *[==>]*	***[2]***
Comments: Using the NGC 5548 HST UV continuum (1367 A) lightcurve published by Kriss et al. (2019) and the mean flux of the 2014 campaign (4.3e-14 erg/cm^2/s/A), the exposure time is calculated.									
9	(1542900)	(1) NGC-5548	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=2281; FP-POS=4			586 Secs (586 Secs) *[==>]*	***[2]***
Comments: Using the NGC 5548 HST UV continuum (1367 A) lightcurve published by Kriss et al. (2019) and the mean flux of the 2014 campaign (4.3e-14 erg/cm^2/s/A), the exposure time is calculated.									

Orbit Structure

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Exp. 8 (Split-WAVECAL)
Exp. 8 (Split-WAVECAL)
Exp. 9 (Split-WAVECAL)
*** ORBITAL VISIBILITY OVERRUN = 34
Occultation
Exp. 9 (Split-WAVECAL)
GS Reacq
Exp. 7
Exp. 8
Exp. 9
Home
0
500
1000
1500
2000
2500
3000
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4000
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