15668 - Monitoring and Imaging Classical Novae

Cycle: 26, Proposal Category: GO

(Availability Mode: AVAILABLE)

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) V-V392-PER	WFC3/UVIS	1	16-Oct-2019 11:00:20.0	yes
02	(1) V-V392-PER	WFC3/UVIS	1	16-Oct-2019 11:00:22.0	yes
03	(1) V-V392-PER	STIS/CCD	2	16-Oct-2019 11:00:24.0	yes

4 Total Orbits Used

ABSTRACT

We request 36.0 hours of VLA time during NRAO semester 2019A: 12.0 hours (4 targets, 8 epochs total, 1.5 hours per epoch) during B-configuration to build the radio light curves of 4 classical novae and 24.0 hours (5 targets, 8 epochs total, 3.0 hours per epoch) during A-configuration to image the expanding thermal ejecta of 5 novae. These VLA observations are crucial to completing our study of these novae, and to testing our theory of gamma-ray production in novae. The high angular resolution during A-configuration is essential to the interpretation of the radio light curves and to learn how the nova morphologies have evolved since the previous A-configuration in 2018. We further request 4 orbits of Hubble Space Telescope (HST) time to image optically-thin line emission and to obtain spatially-resolved spectroscopic data on V392 Per. These HST images will provide information about diffuse material in the ejecta that is not detectable by VLA and provide more details on the kinematics of the explosions at angular resolutions comparable to the VLA in A-configuration, tying together the radio and optical data sets on this source.

OBSERVING DESCRIPTION

This project is a coordinated campaign to use the highest-resolutions in both VLA interferometry and HST direct and spectral imaging to study the expanding thermal ejecta of a recent classical nova that was detected in gamma-ray emission. The goal of this proposal is to identify the differences between gamma-ray quiet and gamma-ray bright novae that explain their discrepant gamma-ray luminosities. Within a larger program monitoring the brightness and expansion of multiple recent novae, we have been awarded 3.0 hours of JVLA A-configuration time to spatially resolve and monitor the gamma-bright classical novae V392 Peg = Nova Peg 2018, along with four orbits of HST imaging and spectroscopy described herein.

We will use WFC3 to obtain narrow-band [OIII] and Halpha+[NII] images, with the F502N and F657N filters respectively, of the young remnant around gamma-ray bright nova V392 Peg. The WFC3-UVIS-DITHER-BOX pattern will be used to take dithered images in each filter so that we can remove cosmic-ray and CCD artifacts as well as drizzle the images to improved spatial resolution of at least 0.03"/pixel. We will also use STIS, with the G430L grating, to obtain a spatially resolved spectrum. For the STIS observation, we will use a 4-point STIS-ALONG-SLIT dither pattern with CR-SPLIT=2 readouts at each dither point. Including one such exposure pattern in each of two spectroscopic orbits allows us to build up a total of approximately 3400 seconds of spectral exposure in approximately 400 second sub-exposures. We have found that the large number of STIS sub-exposures are necessary and minimally sufficient to reliably filter the large number of bad pixels found on the STIS detector. The goal of the WFC3 imaging is to detect, or place meaningful contraints on, emission from substracture within the remnant, for comparison with radio and HST images of gamma-ray-bright novae. The goal of the STIS specroscopy is to provide 3-D kinematics of the V392 Per remnant in [O III] and H-beta, as well as evidence for resolved structure in high-ionization-state lines such as [NeV] and [FeVII] that tend to trace shocks. We will use both imaging and spectroscopy to obtain (or set a minimum distance for) expansion parallax distance estimates to V392 Per.

As V392 Per is fading rapidly to its quiescent brightness level, we request that the singlet WFC3 imaging orbit in Visit 01 be scheduled as quickly as possible in 2019. Based on whether or not the remnant is resolved, and its relative brightness in F502N and F657N, we will adjust the observing plans in Visits 02 and 03. For example, if the resolved remnant is only bright in F657N, we might drop the F502N filter from Visit 02 and dedicate the full orbit to F657N, and might request switching from the G430L grating to G750L in Visit 03. If the remnant is sufficiently bright and clearly resoved in our Visit 01 imaging, we might combine Visits 02 and 03 into a single, 3-orbit visit of STIS spectroscopy to get better signal-to-noise in fainter emission lines.

Within Visit 01, we take a single WFC3-UVIS-DITHER-LINE sequence of three 10-second images in each of F502N and F657N, as insurance against a large distance to V392 Per and an as-yet spatially unresolved remant. Given the most recent AAVSO V-band photometry (Dec 2018) and ARAS optical spectroscopy (June 2018), and conservatively assuming that all the V-band flux is in [O III] 4959, 5007 line emission and all the R-band flux is in the H-alpha line, the WFC3 XTC suggests that a point source should not saturate in 10 seconds in either filter. If the central pixels of V392 Per do saturate in our longer 155-second images, then we will want to test the short, 10-second images against theoretical and empirical WFC3 PSFs to see if the object is marginally resolved. As such, and as we have done in past nova observations, we request the use of BLADE=A special requirement with the two sets of 10-second exposures in Visit 01 to minimize vibrations from the shutter.

Visit

Proposal 15668, Visit 01: 1 orbit of WFC3 imaging on V392 Per (01), completed Wed Oct 16 15:00:25 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 100%

Comments: The purpose of Visit 01 is to take narrow-band WFC3 images of the expanding remnant of Nova Persei 2018 = V392 Per, to pair with our awarded VLA A-configuration radio interfermetry to be taken in the 2019A semester during A-configuration (2019 Aug 2 - 2019 Oct 28). This visit should be scheduled as soon as possible, and before Visits 02 & 03, in order to provide preview imaging to determine the relative brightness of the nebular ejecta, its resolved dimensions (if any) and to select a major axis for optimal slit orientation for the STIS spectra in Visit 03 to follow. V392 Per is fading to its quiescent level quickly, so we would like this initial visit to be scheduled as quickly as is feasible. [The WFC3 scheduling window is completely open until solar proximity ends it on 2019-Apr-21.]
This imaging visit is for one orbit, for a total of ~620 seconds in F502N ([O III]) and ~620 seconds in F657N (Halpha+[N II]). One science goal is to use WFC3 image expansion proper motion and STIS spectra to determine an expansion parallax distance to V392 Per. There is a slight chance it will still be an unresolved point source in the WFC3 imaging. Hence the series of very short, yet well-dithered exposures to insure against saturation and yet provide a good test of a partially-resolved PSF. The longer exposures are to search for faint nebulosity out to 0.5 arcsec (at the expected size/surface brightness). Exposure times estimated from the ETC and by scaling our past F502N and F657N images of V339 Del and V959 Mon up to the anticipated maximum brightness of V392 Per in early-2019. In order to record the sharpest PSF and best test whether the object is marginally-resolved in the shorter exposures, we request the use of the BLADE=A shutter option. If newer ground-based photometry or spectra indicate dramatic or unexpected changes, we may request an adjustment of exposure times within this orbit. Flash levels are set using the minimum ETC recommendation that did not trigger a warning flag.
If the nebular ejecta are unresolved or if they are sufficiently bright that this single orbit is sufficient for our morphology and expansion parallax science goals, we may request that the single orbit for Visit 02 be merged into the STIS spectroscopy Visit 03. If the nebular ejecta are detected in only one of the two filters, we may request that the null filter be dropped from Visit 02 and all exposure time be dedicted to the successful filter.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.519 Line Spacing=0.336	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(2), (4)
(3)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1), (3)

Fixed Targets

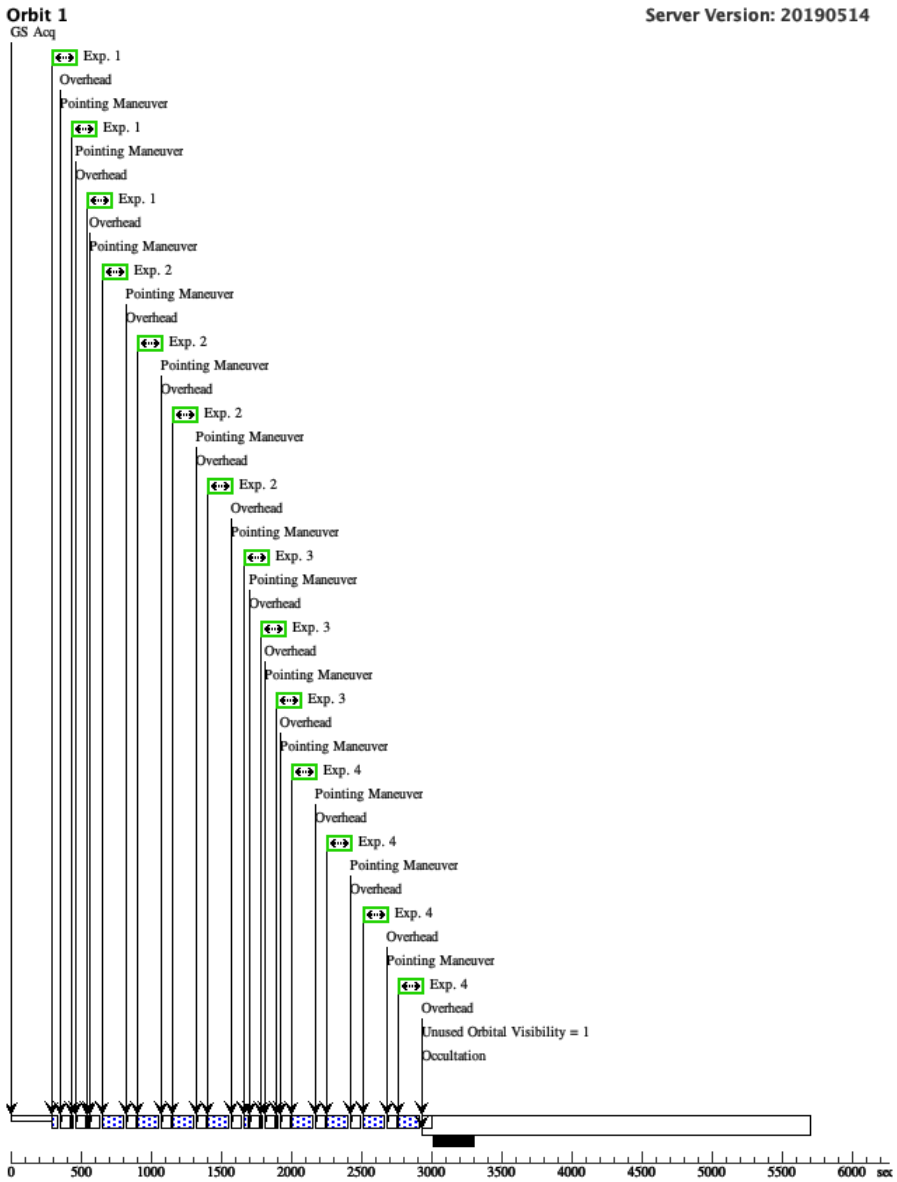
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-V392-PER Alt Name1: NOVA-PER-2018	RA: 04 43 21.3695 (70.8390396d) Dec: +47 21 25.87 (47.35719d) Equinox: J2000	Proper Motion RA: 0.193 mas/yr Proper Motion Dec: -1.749 mas/yr Parallax: 2.573E-4" Epoch of Position: 2015.5	V=15.1+/-1.0 B=15.7, R=14.5	Reference Frame: ICRS

Comments: V-band flux of 15.1+/-0.1 from an AAVSO CCD measurement on 2018/12/03. At the average, fairly linear fading rate 0.00653 mag/day in V from August 2018 to December 2018 seen in AAVSO data, it would fade by roughly 2.5 magnitudes more in the coming year, through December 2019. However V392 Per has a typical quiescent (outside of dwarf nova outburst) brightness of V = 16.0 +/-0.5, and has rarely been below V = 17.0 in the last 20 years.
B & R magnitudes from AAVSO data in late 2018 as well; recent (B-V)=+0.6 and (V-R)=+0.6
Category=EXT-STAR
Description=[CIRCUMSTELLAR MATTER, CLASSICAL NOVA, DWARF NOVA, EJECTA, SHELL]
Extended=YES

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Exp 01: 1x3 x10.0=30.0 second F502N integration (WFC3UVIS.im.1306803)	(1) V-V392-PER	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F502N	FLASH=12; BLADE=A		Pattern 3, Exps 1-1 in Visit 01: 1 orbit of WFC3 imaging on V392 Per (01) (3)	10.0 Secs (30 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
	Comments: Post-flash = 12 e- based on ETC WFC3UVIS.im.1306803 *We use a single iteration of the 3-point WFC3-UVIS-DITHER-LINE-3PT with short 10.0 sec integrations at each point to provide insurance against saturation. Conservatively, 1) if the nova is an unresolved point source, and 2) if the V=15.1 flux levels detected by recent AAVSO observers is entirely [O III] 4959,5007 line emission, then 10 second exposures should not saturate, based on calculations using on WFC3UVIS.im.1306803*								
2	Exp 02: 1x4 x155.0=620 second F502N integration (WFC3UVIS.im.1306803)	(1) V-V392-PER	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F502N	FLASH=12		Pattern 1, Exps 2-2 in Visit 01: 1 orbit of WFC3 imaging on V392 Per (01) (1)	155.0 Secs (620 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
	Comments: Post-flash = 12 e- based on WFC3UVIS.im.1306803 *We use a single iteration of the 4-point WFC3-UVIS-DITHER-BOX with 3x expanded throws with 155 second subexposures: assuming a resolved spatial distribution for the [O III] line flux, at V=15.1 these should not saturate the brightest few pixels of central point source in F502N; but if it does the larger dither pattern will help keep saturated and bloomed pixels/columns separated. Accurate photometry and PSF analysis of the central point source will then come from the shorter exposures. Estimates based on the ETC WFC3UVIS.im.1306803 and on scaling our previous images of V959 Mon and T Pyx.*								
3	Exp 01: 1x3 x10.0=30.0 second F657N exposure (WFC3UVIS.im.1307502)	(1) V-V392-PER	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F657N	FLASH=12; BLADE=A		Pattern 3, Exps 3-3 in Visit 01: 1 orbit of WFC3 imaging on V392 Per (01) (3)	10.0 Secs (30 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
	Comments: Post-flash = 12 e- based on ETC WFC3UVIS.im.1307502 *We use a single iteration of the 3-point WFC3-UVIS-DITHER-LINE-3PT with short 10.0 sec integrations at each point to provide insurance against saturation. Conservatively, 1) if the nova is an unresolved point source, and 2) if the V=15.1 flux levels detected by recent AAVSO observers is entirely H-alpha line emission, then 10 second exposures should not saturate, based on calculations using on WFC3UVIS.im.1307502*								
4	Exp 04: 1x4 x155.0=620 sec F657N exposure (WFC3UVIS.im.1307502)	(1) V-V392-PER	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F657N	FLASH=12		Pattern 1, Exps 4-4 in Visit 01: 1 orbit of WFC3 imaging on V392 Per (01) (1)	155.0 Secs (620 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
	Comments: Post-flash = 12 e- based on WFC3UVIS.im.1307502 *We use a single iteration of the 4-point WFC3-UVIS-DITHER-BOX with 3x expanded throws with 155 second subexposures: assuming a resolved spatial distribution for the H-alpha line flux, at V=14.5 these should not saturate the brightest few pixels of central point source in F502N; but if it does, the larger dither pattern will help keep saturated and bloomed pixels/columns separated. Accurate photometry and PSF analysis of the central point source will then come from the shorter exposures. Estimates based on the ETC WFC3UVIS.im.1307502 and on scaling our previous images of V959 Mon and T Pyx.*								

Orbit Structure



Visit

Proposal 15668, Visit 02: 1 orbit of WFC3 imaging on V392 Per (02), implementation Wed Oct 16 15:00:25 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 100%; GROUP 02,03 WITHIN 15D

Comments: The purpose of Visit 02 is to take deeper WFC3 images of the expanding remnant of Nova Persei 2018 = V392 Per, following the preliminary results of Visit 01. If the remnant is resolved and detectable in both F502N and F656N, we will image it again in both filters. If it is only detectable in one filter we will likely restructure this orbit after Visit 01 is executed and drop the null filter in order to commit all of the observing time to the successful filter. If V392 is still an unresolved point source, or if the imaging of Visit 01 is sufficiently bright and resolved for our morphological and expansion parallax goals, we may request that this orbit be merged into the STIS spectroscopy in Visit 03. Depending on the timing needed to align the STIS slit PA with the major axis of the remnant, we might request that this orbit be scheduled contemporaneous with Visit 03.
As initially structured, this imaging visit is for one orbit, for a total of ~960 seconds in F502N ([O III]) and ~960 seconds in F657N (Halpha+[N II]). One science goal is to use WFC3 image expansion proper motion and STIS spectra to determine an expansion parallax distance to V392 Per. Initial exposure times estimated from the ETC and by scaling our past F502N and F657N images of V339 Del and V959 Mon to the anticipated brightness of V392 Per in early-2019. We will adjust the filter selection and exposure times as needed after Visit 01 executes. Flash levels are set using the minimum ETC recommendation that did not trigger a warning flag.

NOTE ADDED 10/15/2019: After reviewing WFC3 imaging from Visit 01 and our contemporaneous VLA radio imaging, we note that the radio remnant has FWHM ~0.2" and is extended along an axis with PA=150 or 330 deg E of N. We are therefore requesting that the STIS spectroscopy in Visit 03 have this same approximate PA (150+/-20 or 330+/-20 degrees), corresponding to ORIENT=175--215 or 355--35 degrees and that this visit (02) be taken within 15 days of Visit 03.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX	Coordinate Frame=POS-TARG		(1), (2)
	Purpose=DITHER	Pattern Orientation=23.884		
	Number Of Points=4	Angle Between Sides=81.785		
	Point Spacing=0.519	Center Pattern=false		
	Line Spacing=0.336			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-V392-PER	RA: 04 43 21.3695 (70.8390396d)	Proper Motion RA: 0.193 mas/yr	V=15.1+/-1.0	Reference Frame: ICRS
	Alt Name1: NOVA-PER-2018	Dec: +47 21 25.87 (47.35719d)	Proper Motion Dec: -1.749 mas/yr	B=15.7,	
		Equinox: J2000	Parallax: 2.573E-4"	R=14.5	
			Epoch of Position: 2015.5		

Comments: V-band flux of 15.1+/-0.1 from an AAVSO CCD measurement on 2018/12/03. At the average, fairly linear fading rate 0.00653 mag/day in V from August 2018 to December 2018 seen in AAVSO data, it would fade by roughly 2.5 magnitudes more in the coming year, through December 2019. However V392 Per has a typical quiescent (outside of dwarf nova outburst) brightness of V = 16.0 +/-0.5, and has rarely been below V = 17.0 in the last 20 years.
B & R magnitudes from AAVSO data in late 2018 as well; recent (B-V)=+0.6 and (V-R)=+0.6
Category=EXT-STAR
Description=[CIRCUMSTELLAR MATTER, CLASSICAL NOVA, DWARF NOVA, EJECTA, SHELL]
Extended=YES

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Exp 02: 1x4 x280.0=1120 second F502N integration (WFC3UVIS.im.1306803)	(1) V-V392-PER	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F502N	FLASH=12		Pattern 1, Exps 1-1 in Visit 02: 1 orbit of WFC3 imaging on V392 Per (02) (1)	280.0 Secs (1120 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Comments: Post-flash = 12 e- based on WFC3UVIS.im.1306803
We use a single iteration of the 4-point WFC3-UVIS-DITHER-BOX with 3x expanded throws with 160 second subexposures: at V=15.1 these should not saturate the brightest few pixels of central point source in F502N; but if it does the larger dither pattern will help keep saturated and bloomed pixels/columns separated. Estimates based on the ETC WFC3UVIS.im.1306803 and on scaling our previous images of V959 Mon and T Pyx.

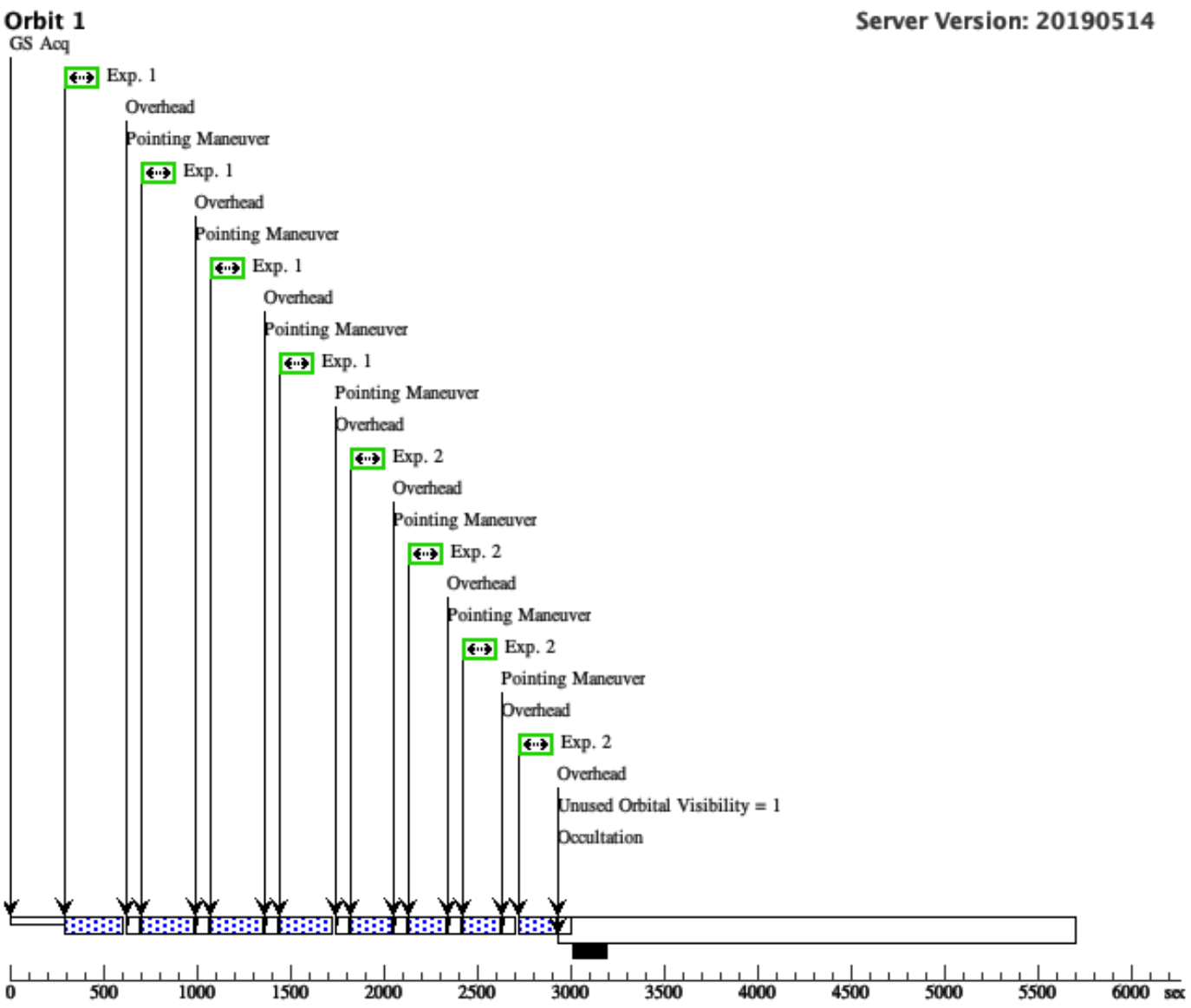
NOTE ADDED 10/15/2019: Analysis of F502N exposures from Visit 01 suggest that, if the source does not fade in this filter, a maximum safe exposure time is around 600 seconds, so using 280 sec is fine (see WFC3 UVIS.im.1385513)

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
2	Exp 04: 1x4 x200.0=800 sec F657N exposure (WFC3UVIS.im.1307502)	(1) V-V392-PER	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F657N	FLASH=12		Pattern 1, Exps 2-2 in Visit 02: 1 orbit of WFC3 imaging on V392 Per (02) (1)	200.0 Secs (800 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Comments: Post-flash = 12 e- based on WFC3UVIS.im.1307502
We use a single iteration of the 4-point WFC3-UVIS-DITHER-BOX with 3x expanded throws with 160 second subexposures. Scaling from [O III] to H-alpha using previous HST spectra of young nova remanants, these exposures are unlikely to saturate at the central point source in F657N; but if it does the larger dither pattern will help keep saturated and bloomed pixels/columns separated. Estimates based on the ETC WFC3UVIS.im.1307502 and on scaling our previous images of V339 Del and V5668 Sgr.

NOTE ADDED 10/15/2019: Analysis of F657N exposures from Visit 01 suggest that, if the source does not fade in this filter, a maximum safe exposure time is around 200 seconds, giving max single pixel counts of 56,000 electrons (see WFC3UVIS.im.1385510)

Orbit Structure



Visit

Proposal 15668, Visit 03: 2 orbits of STIS CCD G430L spectra on V392 Per (03), implementation Wed Oct 16 15:00:25 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: SCHED 100%; ORIENT 175D TO 215 D; ORIENT 355D TO 35 D; GROUP 03,02 WITHIN 15D

Comments: The purpose of Visit 03 is to use 2 orbits to take STIS CCD G430L spectra of the expanding and fading remnant of Nova Persei 2018 = V392 Per, after the remnant has been imaged by the WFC3 imaging Visit 01. Ideally, we would like to use the WFC3 imaging from Visit 01 to identify a major axis in the remnant to use as an optimal slit PA for the STIS spectra here in Visit 03; hence Orient Ranges will likely be added after Visit 01 is executed. As the determination of this broad roll angle range and scheduling window will need to wait until the Visit 01 WFC3 imaging is taken and then quickly analyzed, our current request for this visit to follow Visit 01 by at least 30 days, but not more than 120 days. While a specific PA to match the major axis is preferrable, we will provide up to +/-15 degrees of slop in our follow up request. The 120 day window and 30-degree roll range of should give plenty of scheduling opportunities, but if it does not, we are certainly willing to drop the PA requirement and take spectra at any arbitrary angle, or aligned with the minor axis. If the imaging in Visit 01 showed that the remnant was not visible in F502N [O III] emission, but was still strong in F657N H-alpha emission, we would request the abiility to switch the STIS grating in Visit 03 from G430L to G750L.
This spectroscopic visit is for a total of two orbits, for a total of ~1400+2040=3440 seconds in STIS CCD G430L. After analyzing the imaging in Visit 01, we may need to request an adjustment of exposure times within this orbit. If the WFC3 imaging in Visit 01 show that the nebular ejecta are unresolved or if they are sufficiently bright that the single WFC3 orbit is sufficient for our morphology and expansion parallax science goals, we may request that the single orbit for Visit 02 be merged into the STIS spectroscopy here in Visit 03.

NOTE ADDED 10/15/2019: After reviewing WFC3 imaging from Visit 01 and our contemporaneous VLA radio imaging, we note that the radio remnant has FWHM ~0.2" and is extended along an axis with PA=150 or 330 deg E of N. We are therefore requesting that the STIS spectroscopy in this Visit (03) have this same approximate PA (150+/-20 or 330+/-20 degrees), corresponding to ORIENT=175--215 or 355--35 odegrees and that the WFC3 imaging in Visit 02 be taken within 15 days of this visit (03).

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(3), (4)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=0.5332	Center Pattern=true		
	Line Spacing=			

Fixed Targets

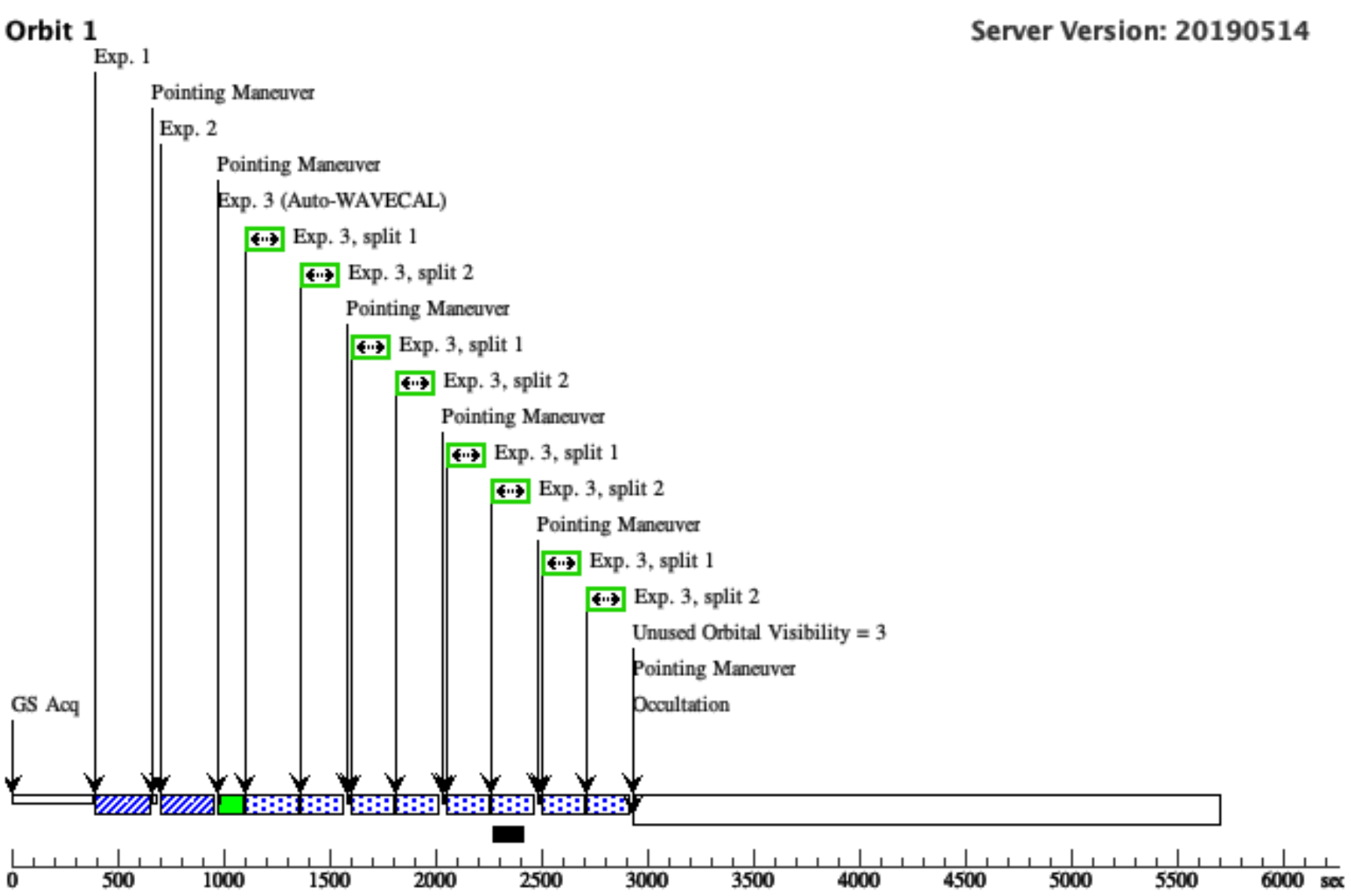
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V-V392-PER	RA: 04 43 21.3695 (70.8390396d)	Proper Motion RA: 0.193 mas/yr	V=15.1+/-1.0	Reference Frame: ICRS
	Alt Name1: NOVA-PER-2018	Dec: +47 21 25.87 (47.35719d)	Proper Motion Dec: -1.749 mas/yr	B=15.7,	
		Equinox: J2000	Parallax: 2.573E-4"	R=14.5	
			Epoch of Position: 2015.5		

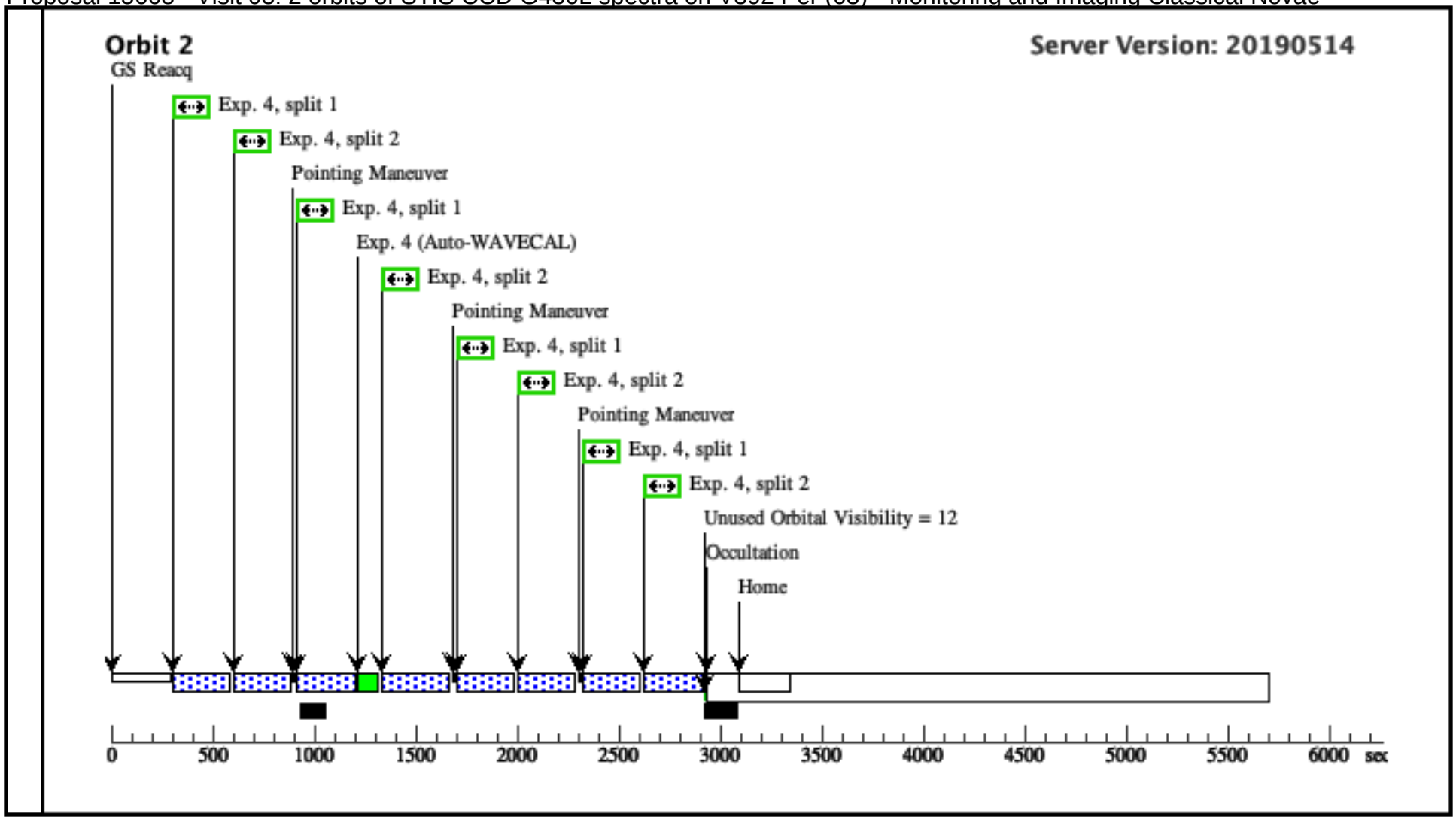
Comments: V-band flux of 15.1+/-0.1 from an AAVSO CCD measurement on 2018/12/03. At the average, fairly linear fading rate 0.00653 mag/day in V from August 2018 to December 2018 seen in AAVSO data, it would fade by roughly 2.5 magnitudes more in the coming year, through December 2019. However V392 Per has a typical quiescent (outside of dwarf nova outburst) brightness of V = 16.0 +/-0.5, and has rarely been below V = 17.0 in the last 20 years.
B & R magnitudes from AAVSO data in late 2018 as well; recent (B-V)=+0.6 and (V-R)=+0.6
Category=EXT-STAR
Description=[CIRCUMSTELLAR MATTER, CLASSICAL NOVA, DWARF NOVA, EJECTA, SHELL]
Extended=YES

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	V392Per-ACQ (STIS.ta.1307507)	(1) V-V392-PER	STIS/CCD, ACQ, 50CCD	MIRROR	ACQTYPE=DIFFUSE; CHECKBOX=5; DIFFUSE-CENTER=FLUX-CENTROID			3 Secs (3 Secs) *[==>]*	***[1]***
	Comments: Acquistion imaging for V392 Per, which we expect to be a faint point source surrounded by small-scale (<0.5 arcsec) bright nebular structures of higher intensity. The most current AAVSO CCD photometry of V392 Per has it at V=15.1, R=14.5, likely dominated by the [O III] 4959,5007 and H-alpha lines. An exposure time of 3 seconds should be below saturation, even assuming the worst case scenario of all of the flux being concentrated in an unresolved point source and due entirely to the line emission. Even if the ACQ exposure mildly saturates, we are using the 52x2 slit, so a small aperture centering error is not critical. Additionally, We will be able to use the WFC3 imaging from the preceding Visit 01 to determine whether the 3-second ACQ and ACQ-PEAK will be suitable, or if it needs to be shortened or lengthened, or if an OFFSET from a nearby star will be needed.								
2	V392Per-PEAK (STIS.ta.1307509)	(1) V-V392-PER	STIS/CCD, ACQ/PEAK, 52X0.1E1	MIRROR				3 Secs (3 Secs) *[==>]*	***[1]***
	Comments: Peak-up imaging for V392 Per, which we expect to be a faint point source surrounded by small-scale (<0.5 arcsec) bright nebular structures of higher intensity. The most current AAVSO CCD photometry of V392 Per has it at V=15.1, R=14.5, likely dominated by the [O III] 4959,5007 and H-alpha lines. An exposure time of 3 seconds should be below saturation, even assuming the worst case scenario of all of the flux being concentrated in an unresolved point source and due entirely to the line emission. Even if the ACQ exposure mildly saturates, we are using the 52x2 slit, so a small aperture centering error is not critical. Additionally, we will be able to use the WFC3 imaging from the preceding Visit 01 to determine whether this 3-second ACQ and ACQ-PEAK will be suitable, or if it needs to be shortened or lengthened, or if an OFFSET from a nearby star will be needed.								
3	Orbit 1: V392Per G430L 1x8x167.5= 1340 sec (STIS.sp.1307524)	(1) V-V392-PER	STIS/CCD, ACCUM, 52X2E1	G430L 4300 A	CR-SPLIT=2		Pattern 2, Exps 3-3 in Visit 03: 2 orbits of STIS CCD G430L spectra on V392 Per (03) (2)	335 Secs (1340 Secs) *[==>(Pattern 1, Split 1)]* *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]* *[==>(Pattern 3, Split 1)]* *[==>(Pattern 3, Split 2)]* *[==>(Pattern 4, Split 1)]* *[==>(Pattern 4, Split 2)]*	***[1]***
	Comments: We use a CR-SPLIT=2 at each of the 4-points of a centered STIS-ALONG-SLIT dither pattern with 0.5332 arcsec = 10.5 pixel steps, here with 350 second subexposures (CRSPLIT=2 into 175 seconds each). In combination with the multiple orbits, the half-integer pixel step size will allow us to flag and remove cosmic rays, bad pixels and likely increase the STIS spatial resolution. Exposure estimates based on the ETC and on scaling our previous spectra of V339 Del and V959 Mon. *NOTE ADDED 10/15/2019: Analysis of WFC3 F502N exposures from Visit 01 suggest that, if the source does not fade in this filter, a maximum safe exposure time is around 1,200 seconds, so the 502 sec, CR-SPLIT=2 exposures here should be well below saturation. (see STIS.sp.1385520)*								
4	Orbit 2: V392Per G430L 1x8x251.0 = 2008 sec (STIS.sp.1385519)	(1) V-V392-PER	STIS/CCD, ACCUM, 52X2E1	G430L 4300 A	CR-SPLIT=2		Pattern 2, Exps 4-4 in Visit 03: 2 orbits of STIS CCD G430L spectra on V392 Per (03) (2)	502 Secs (2008 Secs) *[==>(Pattern 1, Split 1)]* *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]* *[==>(Pattern 3, Split 1)]* *[==>(Pattern 3, Split 2)]* *[==>(Pattern 4, Split 1)]* *[==>(Pattern 4, Split 2)]*	***[2]***
	Comments: We use a CR-SPLIT=2 at each of the 4-points of a centered STIS-ALONG-SLIT dither pattern with 0.5332 arcsec = 10.5 pixel steps, here with 510 second subexposures (CRSPLIT=2 into 255 seconds each). In combination with the multiple orbits, the half-integer pixel step size will allow us to flag and remove cosmic rays, bad pixels and likely increase the STIS spatial resolution. Exposure estimates based on the ETC and on scaling our previous spectra of V339 Del and V959 Mon. *NOTE ADDED 10/15/2019: Analysis of WFC3 F502N exposures from Visit 01 suggest that, if the source does not fade in this filter, a maximum safe exposure time is around 1,200 seconds, so the 502 sec, CR-SPLIT=2 exposures here should be well below saturation. (see STIS.sp.1385520)*								

Orbit Structure




Orbit 2
Server Version: 20190514
GS Reacq
Exp. 4, split 1
Exp. 4, split 2
Pointing Maneuver
Exp. 4, split 1
Exp. 4 (Auto-WAVECAL)
Exp. 4, split 2
Pointing Maneuver
Exp. 4, split 1
Exp. 4, split 2
Pointing Maneuver
Exp. 4, split 1
Exp. 4, split 2
Unused Orbital Visibility = 12
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec