



13685 - Emission line imaging of the bipolar shell in the Helium Nova V445 Puppis

Cycle: 22, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) V-V445-PUP	WFC3/UVIS	2	24-Jul-2014 21:23:53.0	yes

2 Total Orbits Used

ABSTRACT

Explosive detonations on the surfaces of accreting white dwarfs play a key role in establishing viable progenitor pathways towards Type Ia supernova explosions. If the white dwarf is accreting hydrogen deficient material, helium shell-flash driven eruptions can occur on its surface. Thus far only one such helium nova event has been observed in Nova Puppis 2000 = V445 Pup. We have discovered an expanding bipolar shell involving fast moving ejecta of He-rich material surrounding this binary. This used state of art ground-based AO imaging and IFU spectroscopy. However, we have now reached the limit of what can be done from the ground and therefore request high spatial resolution HST imaging of the ejecta in V445

Proposal 13685 (STScI Edit Number: 0, Created: Thursday, July 24, 2014 8:23:54 PM EST) - Overview

Pup. These Cycle 22 observations are the 2nd epoch of our HST campaign, to be compared with the existing Cycle 20 data. These narrow band images will allow us to map the expanding ejecta in the [OII], [OIII] and HeI lines, to be directly compared with kinematical measurements based on the same lines. This will allow us to determine a robust distance using the expansion parallax method and study the ionisation structure of the shells and knots we have seen in our broadband AO images. Splitting the observations over two cycles is necessary in order to provide sufficient baseline to accurately measure the on-sky expansion which is estimated to proceed at an angular speed of 0.3"/year.

OBSERVING DESCRIPTION

Our imaging targets an extended source resolving the ejecta of a nova eruption in 2000 using WFC3/UVIS. The filters are chosen to target previously detected emission lines covering [OIII] with F502N, [OII] with FQ727N and HeI with F680N. We have supporting ground-based data that map the kinematics of these lines using IFU spectroscopy while the target position is accurately known from recent ground-based imaging.

All our exposures use the same 3-point dither pattern to improve sampling and permit cosmic ray rejection. Exposure times are scaled to reflect the observed relative line strengths while at the same time pack the 2-orbit long visit efficiently. Thus F680N receives the longest exposure time and takes up the whole of orbit 1, followed by F502N and some short FQ727N exposures in orbit 2.

We have chosen the optimal UVIS aperture for our F502N and F680N exposures, while the FQ727N exposures will use the quadrant D sub-array only in sync with the filter and to save some overheads.

We have decided to enable the post-FLASH as an extra option, since we believe our relatively short exposure times with narrow-band filters will benefit from this procedure. We verified background levels using the ETC and request a post-flash level of 15e for the F502N and FQ727 exposures as these have the lowest background per exposure (<5e), while 10e is sufficient for the F680N exposure (with ~5e).

----- Realtime Justification -----

N/A

----- Calibration Justification -----

N/A

----- Additional Comments -----

This set of images is a repeat of the sequence of filters observed in Cycle 20

Proposal 13685 - Epoch2 (01) - Emission line imaging of the bipolar shell in the Helium Nova V445 Puppis

Fri Jul 25 01:23:54 GMT 2014

Visit	<p>Proposal 13685, Epoch2 (01), implementation</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/UVIS</p> <p>Special Requirements: (none)</p> <p><i>Comments: Cycle 22 epoch, to be matched with Cycle 20 imaging</i></p>
	<p>(FQ727 (01.003)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.</p>

Diagnosics	<p>(FQ727 (01.003)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.</p>
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Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(2)	<p>Pattern Type=WFC3-UVIS-DITHER- LINE-3PT</p> <p>Purpose=DITHER</p> <p>Number Of Points=3</p> <p>Point Spacing=0.135</p> <p>Line Spacing=</p>	<p>Coordinate Frame=POS-TARG</p> <p>Pattern Orientation=46.84</p> <p>Angle Between Sides=</p> <p>Center Pattern=true</p>	

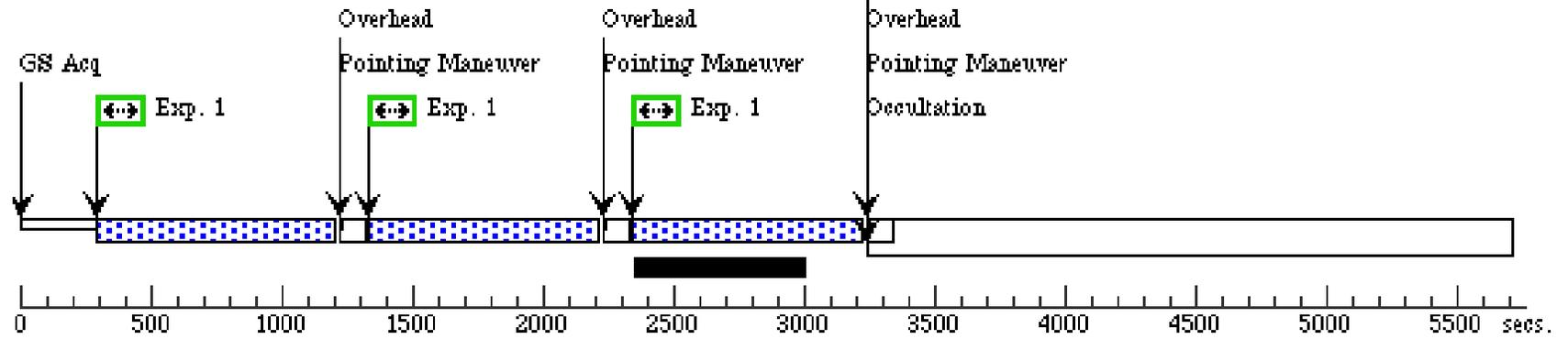
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	V-V445-PUP	<p>RA: 07 37 56.9000 (114.4870833d)</p> <p>Dec: -25 56 58.90 (-25.94969d)</p> <p>Equinox: J2000</p>		<p>V=19.74+/-0.1</p> <p>J=17.36 +/- 0.07</p>	Reference Frame: ICRS
<p><i>Comments: Position determined from recent good seeing CCD imaging at the Magellan telescope with a WCS referenced to ICRS. Note that target is currently significantly fainter than on DSS plates as the nova eruption casued extensive local extinction.</i></p>						

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	<p><i>Comments: F680N over 3pt dither</i></p> <p><i>post-FLASH of 10e to reflect low expected background</i></p>	1	F680	(1) V-V445-PUP	WFC3/UVIS, ACCUM, UVIS	F680N	FLASH=15.0		Pattern 2, Exps 1-1 i n Epoch2 (01) (2)	879 Secs (2637 Secs)
									[==>(Pattern 1)]	[1]
									[==>(Pattern 2)]	
									[==>(Pattern 3)]	
<p><i>Comments: F502N over 3pt dither</i></p> <p><i>post-FLASH of 15e to reflect low expected background</i></p>	2	F502	(1) V-V445-PUP	WFC3/UVIS, ACCUM, UVIS	F502N	FLASH=15		Pattern 2, Exps 2-2 i n Epoch2 (01) (2)	540 Secs (1620 Secs)	
									[==>(Pattern 1)]	[2]
									[==>(Pattern 2)]	
									[==>(Pattern 3)]	
<p><i>Comments: FW727 over 3pt dither, quadrant D sub-array</i></p> <p><i>post-FLASH of 15e to reflect low expected background</i></p>	3	FQ727	(1) V-V445-PUP	WFC3/UVIS, ACCUM, UVIS-QUAD-SUB	FQ727N	FLASH=15		Pattern 2, Exps 3-3 i n Epoch2 (01) (2)	207 Secs (621 Secs)	
									[==>(Pattern 1)]	[2]
									[==>(Pattern 2)]	
									[==>(Pattern 3)]	

Orbit 1

Server Version: 20140605

Unused Orbital Visibility = 1



Orbit Structure

Orbit 2

Server Version: 20140605

