13120 - STIS Observations of the Galactic nova Mon 2012: a new type of > 100 MeV gamma ray emitter

Cycle: 19, 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?*
01	(1) NOVA-MON-2012	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	26-Sep-2012 21:54:49.0	yes

1 Total Orbits Used

ABSTRACT

We propose a single orbit DDT/ ToO observation sequence of Nova Mon 2012 using the HST/STIS echelle at medium resolution from 1150 - 3100A. This is the first nova ever discovered in gamma-rays at energies above 100 MeV before optical discovery. Based on optical spectroscopy, Nova Mon 2012 appears to be a close match to V382 Vel 1999 and indicates that the gamma-ray detection occurred at the start of the explosion and expansion. This is a signal of a completely new physical process in classical novae that is relevant to the whole gamut of explosive, high velocity ejection events. We have indications this is a member of the ONe class, thought to occur on the highest mass white dwarfs (WDs) and related to the recurrent novae, which are likely very close to the Chandrasekhar limit. The spectroscopic signature is enhanced Ne emission lines that indicate deep mixing between the WD envelope and the accreted material at the start of the thermonuclear runaway that leads to the explosion. This nova was likely discovered optically well after the peak and there are no useable optical lines that now indicate the enhanced composition of the heavier elements. The ultraviolet provides the only opportunity to study important nucleosynthetic products, especially neon, and the ground state transitions of the other CNO products, and to determine energetics, and the velocity and density structure of the ejecta along with direct measurement of the interstellar line of sight.

OBSERVING DESCRIPTION

The program requests one orbit with two HST/STIS medium resolution echelle spectra for N Mon 2012: one 600 sec E140M exposure and one 300 sec E230M ($\lambda_c=$1978\AA) exposure. This covers the all of the important transitions, spectral interval with the strongest continuum emission, and covers the interstellar lines and 2175\AA\ feature. Our estimates are based on the last archival V382 Vel spectra from 1999 Aug. 29, approximately the same period as our proposed observations of Nova Mon 2012. For the E230M, the expected SNR$ >$21 and the most important emission lines for our purposes will be very well exposed. For the 600 sec E140M, SNR > 21 and well exposes the continuum and especially the Ne IV] and Ne V] emission lines around 1600\AA. We therefore request a total of 900 sec exposure time; with overhead for two exposures and ACQ the total sequence, about 42 min, should fit within a single target visibility interval of one orbit.

Visit

Proposal 13120, Visit 01, implementation Thu Sep 27 01:54:57 GMT 2012

Diagnostic Status: Warning

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA, STIS/NUV-MAMA

Special Requirements: BETWEEN 10-OCT-2012:00:00:00 AND 10-DEC-2012:00:00:00

Diagnostics

(Nova Mon 2012 Short (01.002)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Nova Mon 2012 Long (01.003)) Warning (Form): Sensitive exposures should have an ETC run number provided.

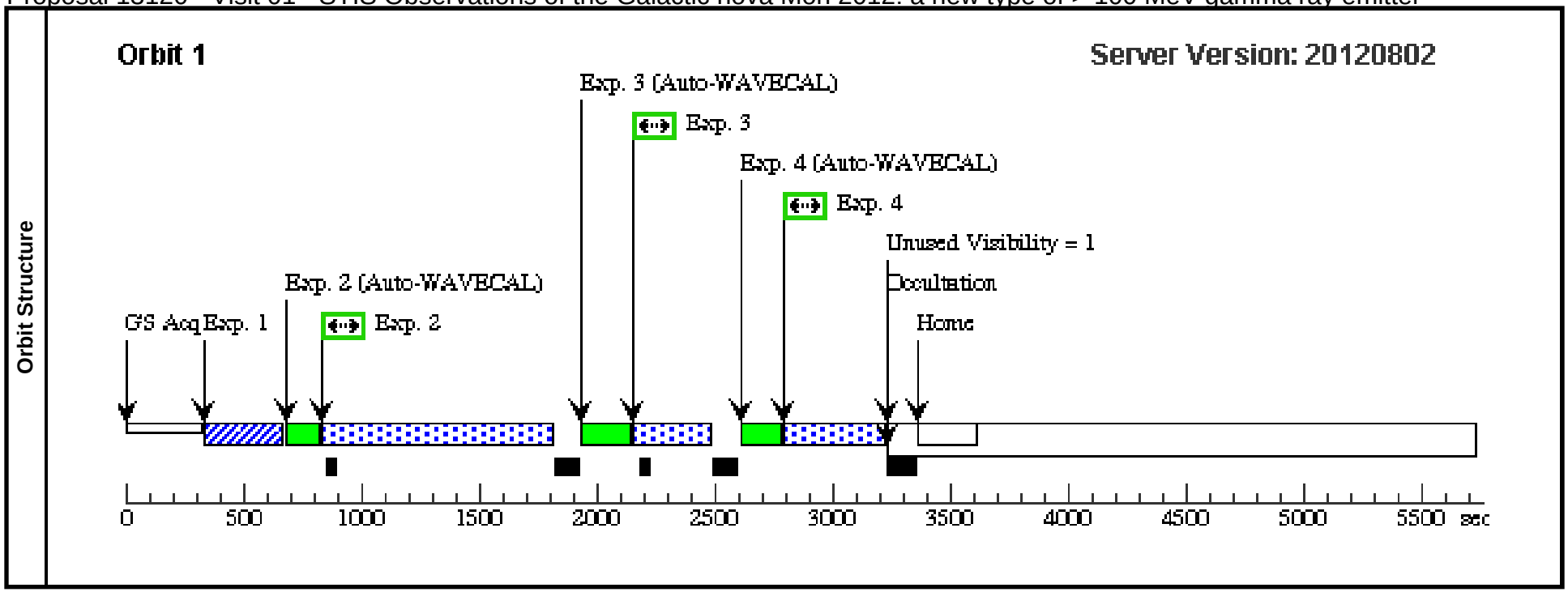
(Nova Mon 2012 short (01.004)) Warning (Form): Sensitive exposures should have an ETC run number provided.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NOVA-MON-2012	RA: 06 39 38.5700 (99.9107083d) Dec: +05 53 53.40 (5.89817d) Equinox: J2000		V=10.6+/-0.2	Reference Frame: ICRS

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	Nova Mon 2012 Short (429800)	(1) NOVA-MON-2012	STIS/CCD, ACQ, F25ND3	MIRROR				10 Secs *[==>]*	***[1]***
2	Nova Mon 2012 Short	(1) NOVA-MON-2012	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				950 Secs *[==>960.0 Secs]*	***[1]***
3	Nova Mon 2012 Long	(1) NOVA-MON-2012	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 1978 A				300 Secs *[==>310.0 Secs]*	***[1]***
4	Nova Mon 2012 short	(1) NOVA-MON-2012	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				400 Secs *[==>410.0 Secs]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20120802
Exp. 3 (Auto-WAVECAL)
Exp. 3
Exp. 4 (Auto-WAVECAL)
Exp. 4
Unused Visibility = 1
Occultation
Exp. 2 (Auto-WAVECAL)
GS Acq
Exp. 1
Exp. 2
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec