



12589 - The Current Ultraviolet Spectrum of S Doradus: As Hot as it Gets

Cycle: 19, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Mr. Noel D. Richardson (PI)	Georgia State University Research Foundation	richardson@chara.gsu.edu
Dr. Douglas R. Gies (CoI)	Georgia State University Research Foundation	gies@chara.gsu.edu
Dr. D. John Hillier (CoI)	University of Pittsburgh	hillier@pitt.edu

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-S-DOR	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	07-Jul-2011 21:36:28.0	yes

2 Total Orbits Used

ABSTRACT

We propose to measure the ultraviolet flux of the prototype of the Luminous Blue Variables (LBVs) in the LMC, S Doradus, as it goes into the current optical minimum that corresponds to a maximum ultraviolet flux. During this time, the strength of the optical wind line H-alpha grows, with several high excitation emission lines emerging from the wind. In a similar state, the Galactic LBVs AG Carinae and HR Carinae have been found to show signs of rapid rotation. We aim to measure accurately the bolometric luminosity of this star at a visual minimum, examine the wind sensitive lines in the ultraviolet such as Si IV 1400, C IV 1550, and Mg II 2800, and determine a projected rotational velocity at this epoch. These observations can only be made with the echelle mode of HST/STIS, and they will help reveal the stellar and wind properties of one of the brightest stars in the Large Magellanic Cloud at an epoch when we view deep into its atmosphere.

OBSERVING DESCRIPTION

We propose to obtain a full UV spectrum of S Doradus spanning 1150 to 3100 Å using the echelle mode of STIS. In order to accurately gauge the wind lines of S Dor, we need a signal to noise ratio of approximately 40–50 spanning the entire range. As the star heads into an optical minimum, we anticipate that the star will have a high ultraviolet flux at these epochs. We estimated the current UV flux using IUE low resolution data (SWP45241 and LWP23596) taken at a similar optical state as the current epochs. From the ETC for COS and STIS, we find that the expected UV flux is too bright for COS, and is at the threshold count rate for first order UV spectroscopy with STIS. Our estimates from the STIS ETC show that the global count rate will be less than 40,000 counts per second for the echelle modes E140M and E230M, well below the threshold value of 80,000 for variable sources.

We estimate that there are 60 minutes of visibility for this target per orbit. In the first orbit, we require 6 minutes for acquisition, 6 minutes for STIS acquisition and search, and 8 minutes for the overhead of the first exposure with the MAMA detectors, including wavelength calibration. This leaves 40 minutes for science exposures. We begin our science exposures in the NUV with the E230M echelle mode. Our first 600 second exposure will be with the central wavelength at 2707 Å and will have an estimated global count rate near 35,000 counts per second, and yield an individual spectrum S/N per resolution element of 45. We will then change the grating tilt of the E230M to a central wavelength of 1978 Å. We will then collect one exposure of 1800 seconds to complete this observation. Global count rates will be near 15,000 counts per second, yielding a S/N of 35 for this exposure. This will fill the first orbit.

In a second orbit, we will need 5 minutes for guide star reacquisition, and we will change to the E140M grating. We will begin by re-acquiring the star with the new setup, which is an additional 6 minutes. We will make one exposure of S Dor with the E140M setup, with an exposure time of 3500 seconds. This will produce a global count rate of 5,200 counts per second, and will yield a S/N of 30 per resolving element.

Proposal 12589 - Visit 01 - The Current Ultraviolet Spectrum of S Doradus: As Hot as it Gets

Fri Jul 08 01:36:33 GMT 2011

Visit	Proposal 12589, Visit 01 Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD, STIS/FUV-MAMA, STIS/NUV-MAMA Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	V-S-DOR	RA: 05 18 14.3540 (79.5598083d) Dec: -69 15 1.10 (-69.25031d) Equinox: J2000		V=10.0+/-1.5	Reference Frame: ICRS				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(STIS.im.18 6685)	(1) V-S-DOR	STIS/CCD, ACQ, F25ND3	MIRROR				5 Secs [==>]	[1]
	2	(STIS.sp.19 5924)	(1) V-S-DOR	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				600 Secs [==>]	[1]
	3	(STIS.sp.18 6638)	(1) V-S-DOR	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 1978 A				1800 Secs [==>1800.0 Secs]	[1]
	4	(STIS.sp.18 6637)	(1) V-S-DOR	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				3500 Secs [==>3347.0 Secs]	[2]

