



17799 - Ultraviolet properties of the heavy-metal hot subdwarf in the long period binary: SB 744

Cycle: 32, Proposal Category: GO

(UV Initiative)

(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) SB-744 WAVE	STIS/CCD STIS/FUV-MAMA	3	14-Oct-2024 10:00:16.0	yes

3 Total Orbits Used

ABSTRACT

Hot subdwarfs are evolved low-mass stars found at the blue end of the Horizontal Branch, typically formed through binary evolution scenarios. These stars undergo significant mass loss, either through common envelope interactions or Roche lobe overflow (RLOF) evolution during the red giant branch phase. Alternatively, they may form via the merger of two helium core white dwarfs.

One such star, SB 744, was chosen for radial velocity follow-up from a sample of long-period composite spectrum subdwarf binaries, to explore its RLOF evolution, orbital characteristics, masses and chemical compositions of the components. Our spectral analysis revealed prominent F and Pb lines in the optical spectrum and suggested a rich UV spectrum of the sdOB type primary.

The presence of fluorine, a rare observation in stellar spectra, is linked to the nucleosynthesis processes in asymptotic giant branch stars and subsequent convective mixing in their atmospheres. Alternatively, the merger of two white dwarfs can induce flash nucleosynthesis, producing fluorine that is then mixed into the atmosphere.

The binarity of SB 744 and the detection of fluorine and heavy metals in the spectrum of the sdOB star suggest a possible triple system progenitor where the inner binary experienced a merger. Although supported by binary evolution models, such a scenario has yet to be directly observed. A comprehensive UV spectral analysis of the sdOB star could confirm this hypothesis, with HST STIS observations offering precise measurements of metal abundances (including C, N, O, F, Si, and Fe) and the search for lines of heavy elements.

OBSERVING DESCRIPTION

One visit for SB744 with three HST orbits and three science exposures, each exposures followed by a wavecal:

A STIS/E140M (0.2x0.2) spectrum with S/N > 40 at 1350 AA is our goal.

TIME-TAG mode is requested with a buffer time of 246 sec.

Proposal 17799 - SB744 (01) - Ultraviolet properties of the heavy-metal hot subdwarf in the long period binary: SB 744

Visit	Proposal 17799, SB744 (01), implementation								Mon Oct 14 14:00:17 GMT 2024	
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA									
	Special Requirements: (none)									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SB-744	RA: 01 48 44.0375 (27.1834896d) Dec: -26 36 12.82 (-26.60356d) Equinox: J2000	Proper Motion RA: 91.847 mas/yr Proper Motion Dec: -46.360999954231374 mas/yr Parallax: 0.002175800000000003" Epoch of Position: 2000	V=12.31 disentangled sdOB V-Magnitude : 12.8	Reference Frame: ICRS				
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.									
	SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.									
	Category=STAR Description=[COMPOSITE SPECTRAL TYPE, G V-IV, HORIZONTAL BRANCH STAR, SDB, SDO]									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	acquisition	(1) SB-744	STIS/CCD, ACQ, F28X50LP	MIRROR				1 Secs (1 Secs)	
									[==>]	[1]
	2	Science (1932566)	(1) SB-744	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				2306 Secs (2306 Secs)	
									[==>]	[1]
	3	wavecal	WAVE	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				[==>]	[1]
	4	Science (1932579)	(1) SB-744	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	BUFFER-TIME=24 6;			2622 Secs (2622 Secs)	
						WAVECAL=NO			[==>]	[2]
	5	wavecal	WAVE	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				[==>]	[2]
	6	Science (1932579)	(1) SB-744	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	BUFFER-TIME=24 6;			2622 Secs (2622 Secs)	
					WAVECAL=NO			[==>]	[3]	
7	wavecal	WAVE	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				[==>]	[3]	



