12868 - Unveiling the giant jet from Sanduleak's star in the Large Magellanic Cloud

Cycle: 20, Proposal Category: GO

(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) NAME-SANDULEAKS-STAR	WFC3/UVIS	3	28-Aug-2012 21:08:07.0	yes

3 Total Orbits Used

ABSTRACT

An exceptionally large jet was recently discovered around the enigmatic LMC source known as Sanduleak's star (Angeloni et al. 2011 ApJ 743, L8). To our knowledge, with a physical extent of 14 parsecs, it represents the largest stellar jet ever discovered, and the first clearly resolved stellar jet beyond the Milky Way. Because of these exceptional properties, we expect that it will become a key target where to study the formation and evolution of astrophysical jets. While the ground based images have highlighted the exceptional nature of the source and its gross morphology, their limited resolution prevents a thorough discussion of the jet's properties, origin and expansion through the surrounding environment. In order to largely improve our knowledge of the system, we propose here to obtain deep, narrow-band images in the Halpha (F656N), [NII] (F658N) and [SII] (F673N) emission lines by exploiting both the superb spatial resolution and large field of view of WFC3/UVIS.

With a reasonably short amount of telescope time, the HST observations would provide immediate scientific results, would help in the preparation of follow-up spectroscopic proposals, and would have a high PR value, considering both the outstanding properties of the jet of Sanduleak's star, and the likely spectacular outcome of the proposed imagery.

OBSERVING DESCRIPTION

Recently, we have discovered a remarkable jet from a puzzling source in the LMC that is commonly known as Sanduleak's star (Angeloni et al. 2011 ApJL, 743, 8). With a physical extent of 14 parsecs, it is the largest stellar jet ever discovered, and the first resolved stellar jet beyond the Milky Way. Given these remarkable characteristics, we had proposed to obtain with HST deep, narrow-band images of the Halpha, [NII]6583, and [SII]6731 emission lines, in order to derive the fundamental physical diagnostics of the jet by making advantage of both the superb spatial resolution and large field of view of WFC3/UVIS.

The jet total extension of 58 arcsec means that we can use the subarray UVIS 1 to place the central, bright source (V=17.4+-0.1) at the optimum center of CCD 1. We also introduced an orientation constraints in order to keep the jet axis (PA 71°) as much parallel as possible to the chip major axis.

In order to increase the efficiency of the observations - i.e., by both avoiding the large overheads due to the duffer bump and maximizing the time on target - we opt for the WFC3-UVIS-DITHER-BOX dither pattern.

Visit

Proposal 12868, Sanduleaks_Star (01), implementation Wed Aug 29 01:08:17 GMT 2012

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 105D TO 120 D; ORIENT 280D TO 300 D

Comments: We introduced a visit orientation constraint in order to keep the jet axis (PA 71°) as much parallel as possible to the chip major axis.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=true		(1-3)

Fixed Targets

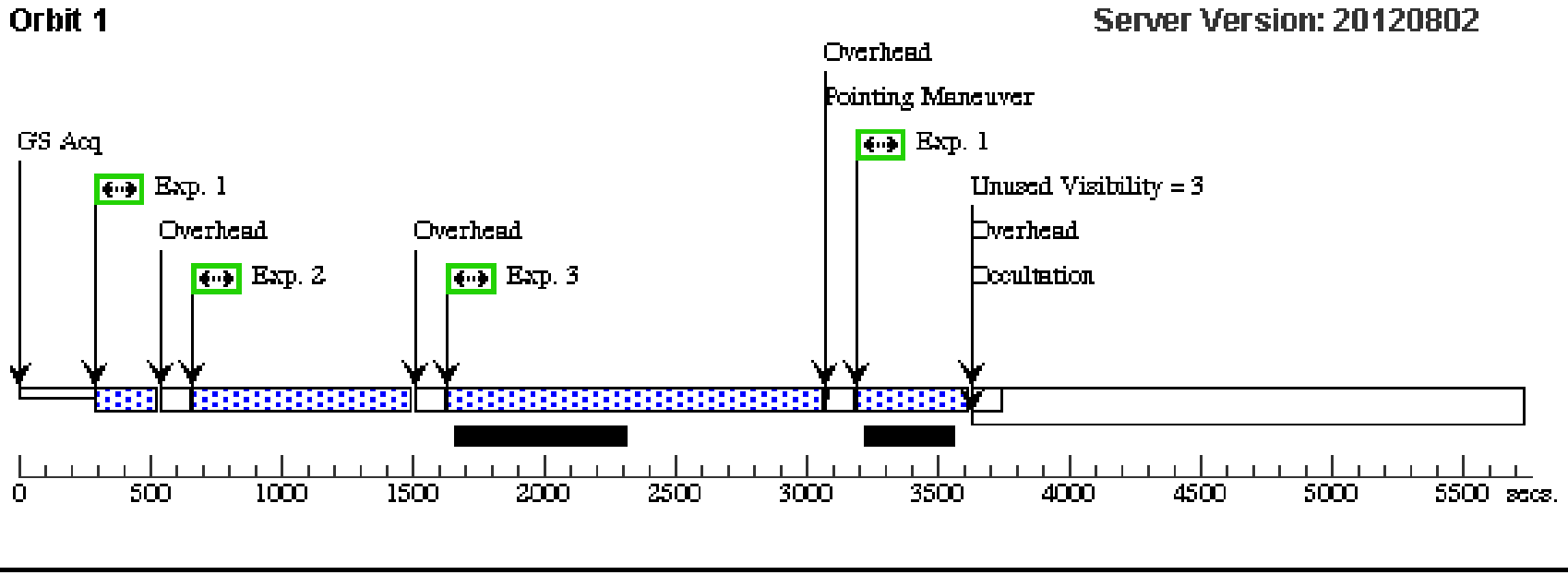
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NAME-SANDULEAKS-STAR Alt Name1: LMC-ANONYMOUS	RA: 05 45 19.5690 (86.3315375d) Dec: -71 16 6.72 (-71.26853d) Equinox: J2000	Radial Velocity: 270 km/sec	V=17.4+/-0.10	Reference Frame: ICRS

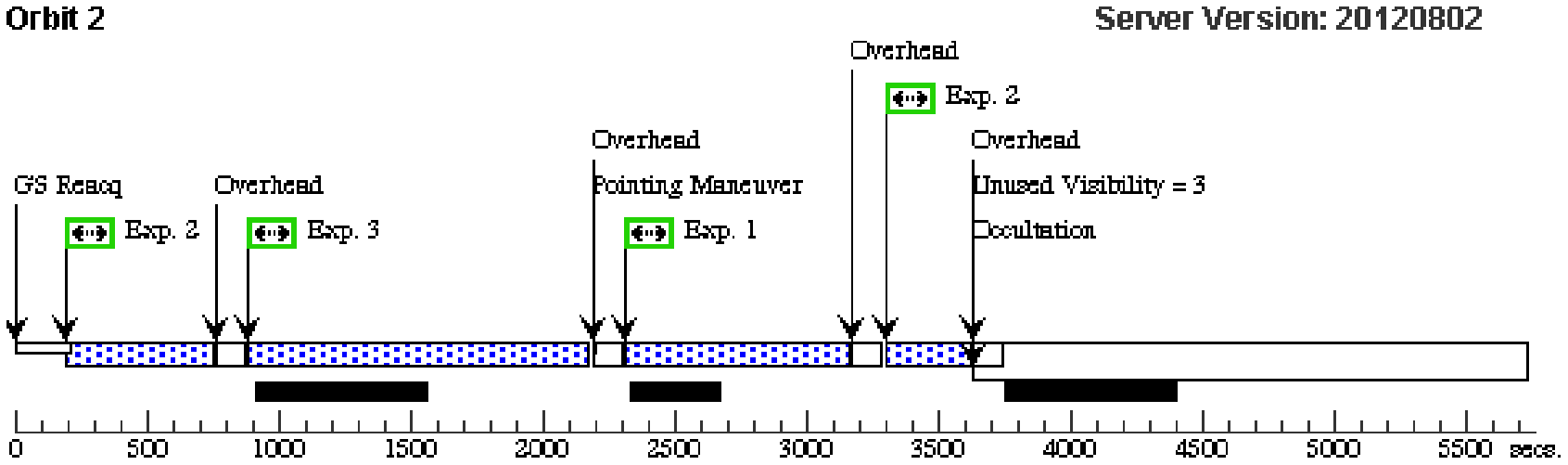
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
The object is in the Large Magellanic Cloud.

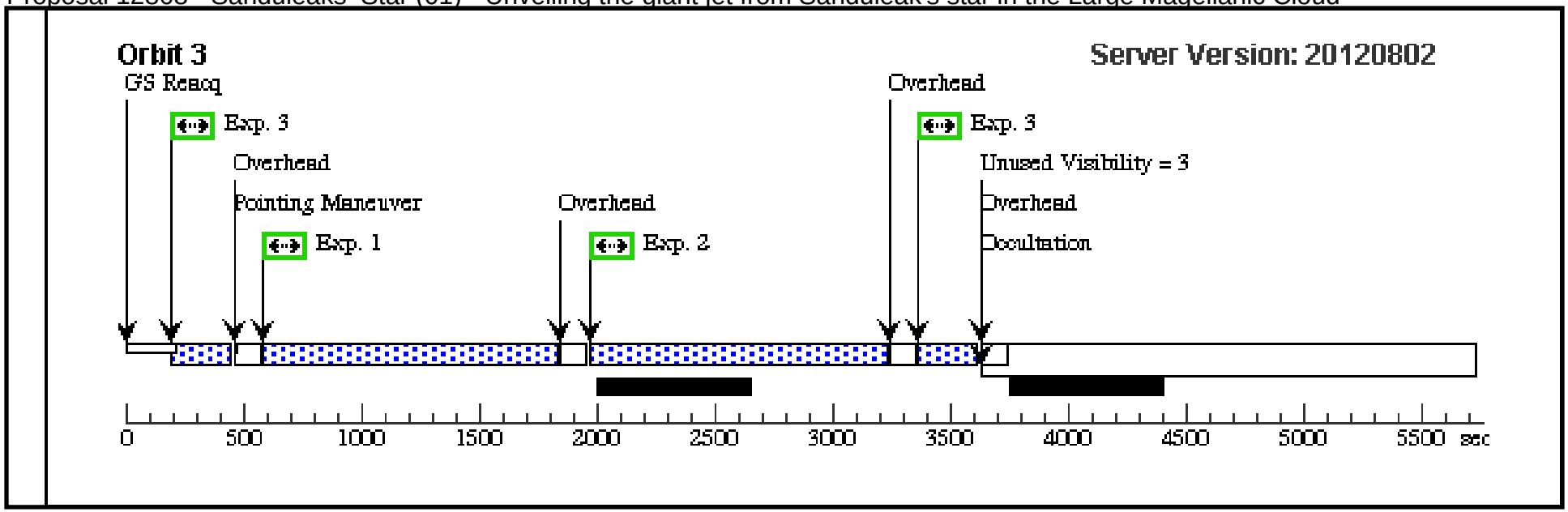
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	Halpha	(1) NAME-SANDULEAKS-STAR	WFC3/UVIS, ACCUM, UVIS1	F656N	FLASH=12		Pattern 1, Exps 1-3 in Sanduleaks_Star (01) (1)	700 Secs	
								[==>204.0 Secs (Pattern 1)] *[==>404.0 Secs (Pattern 2)]*	***[1]***
								[==>832.0 Secs (Pattern 3)]	***[2]***
								[==>1232.0 Secs (Pattern 4)]	***[3]***
2	NII	(1) NAME-SANDULEAKS-STAR	WFC3/UVIS, ACCUM, UVIS1	F658N	FLASH=12		Pattern 1, Exps 1-3 in Sanduleaks_Star (01) (1)	700 Secs	
								[==>804.0 Secs (Pattern 1)]	***[1]***
								[==>532.0 Secs (Pattern 2)] *[==>294.0 Secs (Pattern 3)]*	***[2]***
								[==>1232.0 Secs (Pattern 4)]	***[3]***
3	SII	(1) NAME-SANDULEAKS-STAR	WFC3/UVIS, ACCUM, UVIS1	F673N	FLASH=12		Pattern 1, Exps 1-3 in Sanduleaks_Star (01) (1)	700 Secs	
								[==>1405.0 Secs (Pattern 1)]	***[1]***
								[==>1270.0 Secs (Pattern 2)]	***[2]***
								[==>232.0 Secs (Pattern 3)] *[==>232.0 Secs (Pattern 4)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20120802
GS Reacq
Exp. 3
Overhead
Pointing Maneuver
Exp. 1
Overhead
Exp. 2
Overhead
Exp. 3
Unused Visibility = 3
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec