11180 - The Morphology of the Post-Red Supergiant IRC+10420's Circumstellar Ejecta

Cycle: 16, 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) IRC+10420	WFPC2	2	18-Jan-2008 02:19:12.0	yes

2 Total Orbits Used

ABSTRACT

The extremely luminous post-red supergiant and powerful OH/IR source IRC +10420 is surrounded by a complex circumstellar nebula. Numerous small condensations, arcs, jet-like rays of knots, and intriguing semi-circular structures are easily visible in our previous WFPC2 images. We have suggested that these spatially recognizable features may be evidence for episodic mass loss events possibly from localized active regions. We now propose to obtain second epoch WFPC2 images with the Planetary Camera to measure the transverse motions of these ejecta. Spatially resolved spectra from STIS showed that the embedded arcs are kinematically distinct from the spherically expanding diffuse nebulosity.

The transverse motions in combination with radial velocities from the STIS spectra, will let us determine the morphology of IRC +10420's nebula

and the structures embedded in it, its mass loss history, and provide clues to the mass loss mechanism responsible for the discrete ejections.

OBSERVING DESCRIPTION

Our proposed second epoch images will repeat the 1996 obervations with the Planetary Camera. We used the F547M and F467M filters with a wide range of exposure times to image the bright embedded star, material close to it, and the faint outer nebulosity. These observations take one orbit.

In addition to repeating the 1996 imaging we also propose to add a series of images with the F675W filter with a range of integration times, including a long exposure intended to look or a faint outer reflection shell at about 8 arcsec reported by Kastner & Weintraub (1995) at 1.25 microns. This feature was not visible in our first epoch blue and visual images, and at its distance from the star, it may be a remnant of a prior red supergiant stage. The F675W filter will be dominated by the flux of IRC +10420's very strong Halpha emission line and so will in effect be an Halpha image. However, since IRC +10420 is a reflection nebula we are not trying to separate the Halpha emission from the continuum.

We are also adding a series of exposures with the F1042M filter. The images of
VY CMa (Smith et al 2001) with this filter yielded a different view of the ejecta showing the distribution of the reddest and dustiest features. We don't know what
this may show for IRC +10420, but its 2 micron image showed evidence for bipolarity not apparent in the visual HST images and the 8 arcsec shell was detected at 1.25 microns. The F675W and F1042M images together will take one additional orbit.

Visit

Proposal 11180, Visit 01, implementation Fri Jan 18 07:19:19 GMT 2008

Diagnostic Status: No Diagnostics

Scientific Instruments: WFPC2

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFPC2-LINE	Coordinate Frame=POS-TARG		(11)
	Purpose=DITHER	Pattern Orientation=45.0		
	Number Of Points=3	Angle Between Sides=		
	Point Spacing=0.3535	Center Pattern=false		
	Line Spacing=			
(2)	Pattern Type=WFPC2-LINE	Coordinate Frame=POS-TARG		(3)
	Purpose=DITHER	Pattern Orientation=45.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=0.322	Center Pattern=false		
	Line Spacing=			
(3)	Pattern Type=WFPC2-LINE	Coordinate Frame=POS-TARG		(2)
	Purpose=DITHER	Pattern Orientation=45.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=0.161	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	IRC+10420	RA: 19 26 48.0300 (291.7001250d)		V=11+/-0.5	Reference Frame: SIMBAD
		Dec: +11 21 16.70 (11.35464d)		B-V = 2.7	
		Equinox: J2000			

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

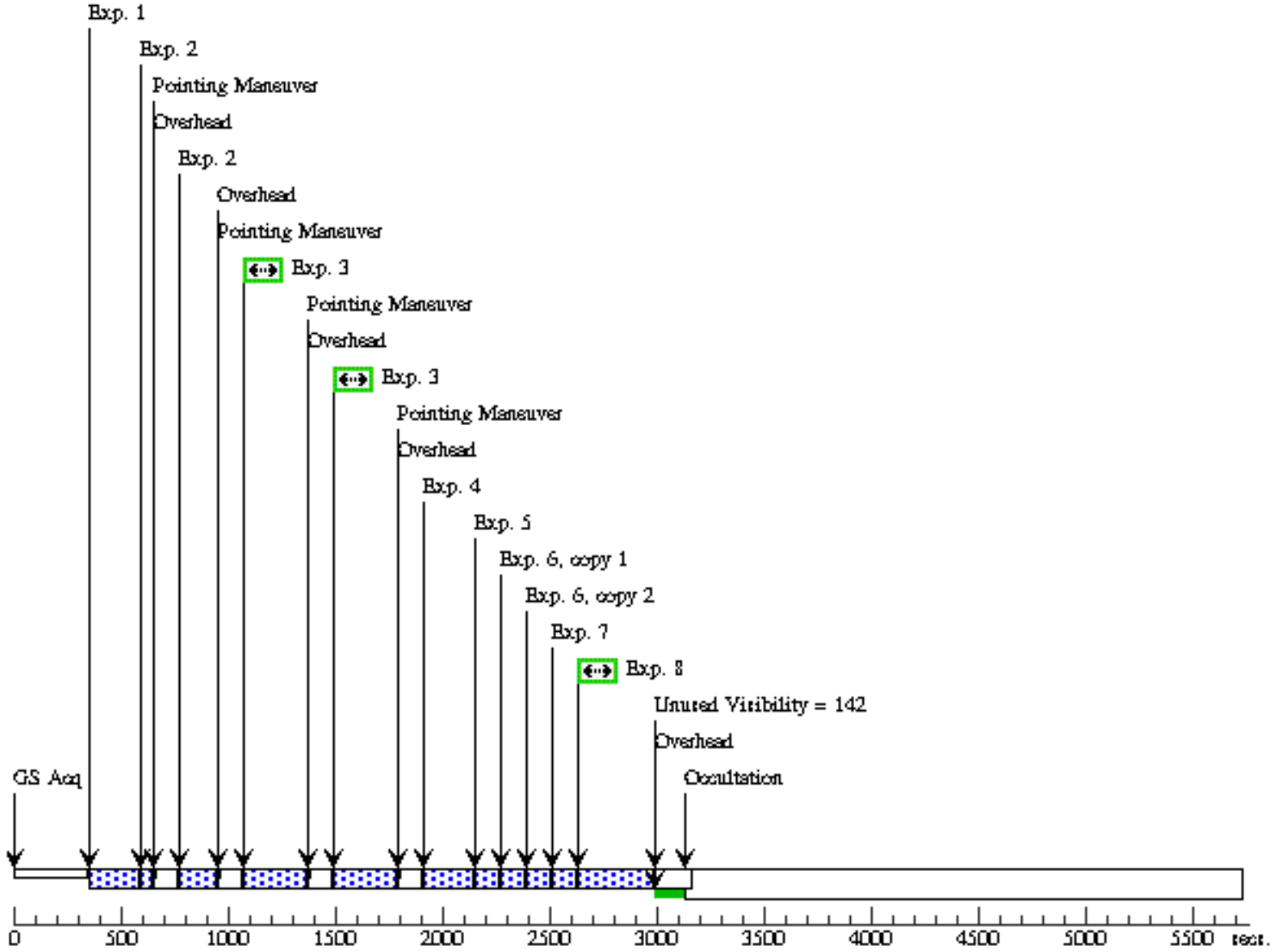
Exposures

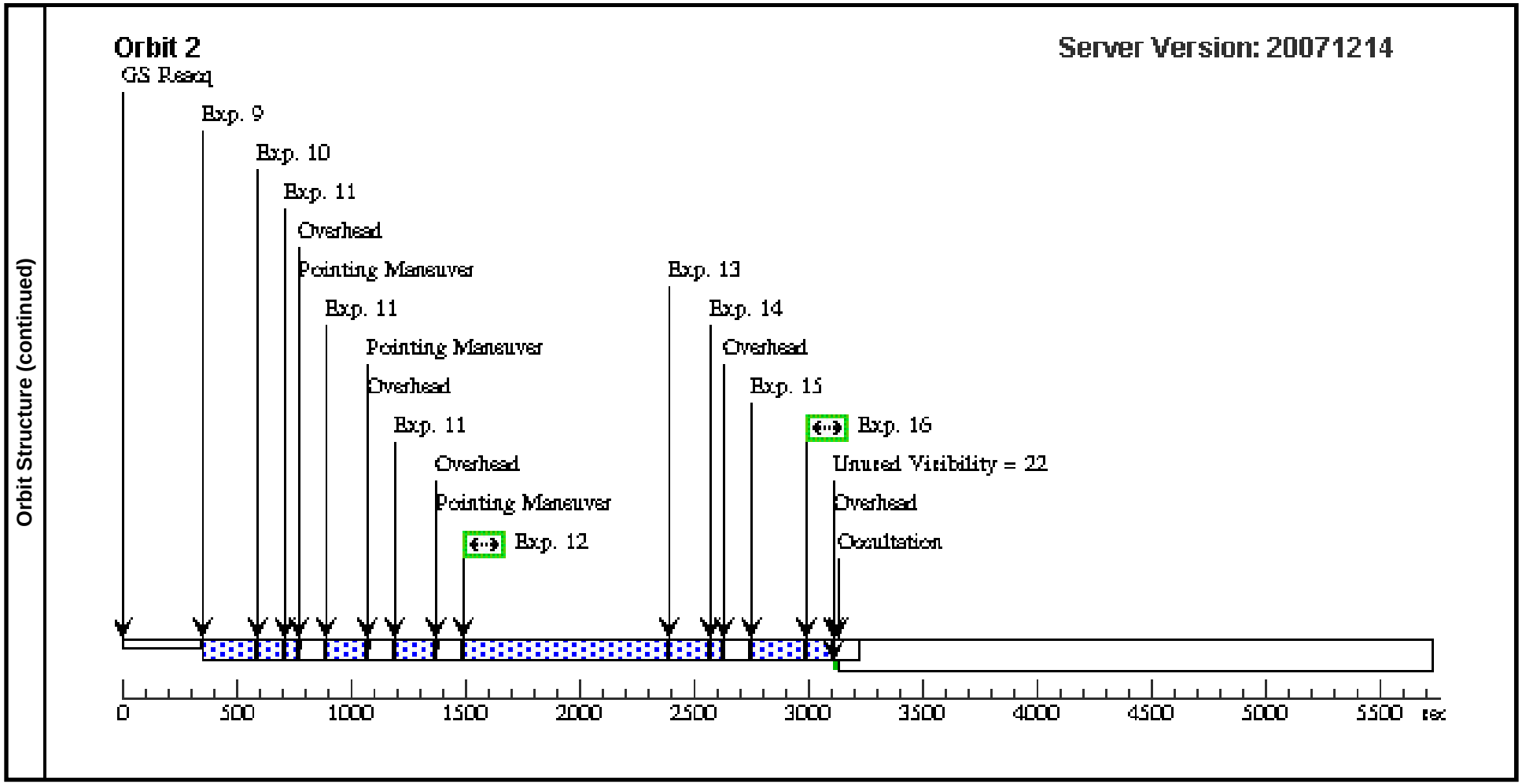
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) IRC+10420	WFPC2, IMAGE, PC1	F467M				12.0 Secs	
								[==>]	***[1]***
Comments: Short exposure to avoid bleeding of central star.									
2		(1) IRC+10420	WFPC2, IMAGE, PC1	F467M			Pattern 2-2 (3)	30.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	***[1]***
Comments: two 30s exposures dithered to duplicate the dither used in GO 6475.									
3		(1) IRC+10420	WFPC2, IMAGE, PC1	F467M			Pattern 3-3 (2)	140.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	***[1]***
Comments: two 140s exposures dithered with same spacing used in GO 6475.									

Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
4		(1) IRC+10420	WFPC2, IMAGE, PC1	F547M				0.5 Secs	
								[==>]	***[1]***
Comments: Short exposure to avoid bleeding by central star.									
5		(1) IRC+10420	WFPC2, IMAGE, PC1	F547M				3.0 Secs	
								[==>]	***[1]***
6		(1) IRC+10420	WFPC2, IMAGE, PC1	F547M				10.0 Secs X 2	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[1]***
7		(1) IRC+10420	WFPC2, IMAGE, PC1	F547M				40.0 Secs	
								[==>]	***[1]***
8		(1) IRC+10420	WFPC2, IMAGE, PC1	F547M	CR-SPLIT=DEF			300.0 Secs	
								[==>]	***[1]***
9		(1) IRC+10420	WFPC2, IMAGE, PC1	F675W				0.5 Secs	
								[==>]	***[2]***
Comments: Short exposure to avoid bleeding by central star									
10		(1) IRC+10420	WFPC2, IMAGE, PC1	F675W				5.0 Secs	
								[==>]	***[2]***
11		(1) IRC+10420	WFPC2, IMAGE, PC1	F675W			Pattern 11-11 (1)	30.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[2]***
Comments: Three 30s exposures in a line dither pattern									
12		(1) IRC+10420	WFPC2, IMAGE, PC1	F675W	CR-SPLIT=DEF			600.0 Secs	
								[==>]	***[2]***
13		(1) IRC+10420	WFPC2, IMAGE, PC1	F1042M				0.5 Secs	
								[==>]	***[2]***
Comments: Short exposure to avoid bleeding									
14		(1) IRC+10420	WFPC2, IMAGE, PC1	F1042M				5.0 Secs	
								[==>]	***[2]***
15		(1) IRC+10420	WFPC2, IMAGE, PC1	F1042M				30.0 Secs	
								[==>]	***[2]***
16		(1) IRC+10420	WFPC2, IMAGE, PC1	F1042M				100.0 Secs	
								[==>]	***[2]***

Orbit Structure




Orbit Structure (continued)
Orbit 2
Server Version: 20071214
GS Reacq
Exp. 9
Exp. 10
Exp. 11
Overhead
Pointing Maneuver
Exp. 11
Pointing Maneuver
Overhead
Exp. 11
Overhead
Pointing Maneuver
Exp. 12
Exp. 13
Exp. 14
Overhead
Exp. 15
Exp. 16
Unused Visibility = 22
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec