11716 - In Search of the Lost Remnant of M31 RV: Shedding Light on the New Class of Luminous Red Transients

Cycle: 17, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Howard E. Bond (PI)	**Space Telescope Science Institute**	**bond@stsci.edu**

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) M31-RV	WFC3/UVIS	1	01-Jul-2009 21:21:10.0	yes

1 Total Orbits Used

ABSTRACT

M31 RV is a luminous red variable star that appeared in the bulge of M31 in 1988. During its outburst, which lasted a few months, it was one of the brightest stars in the Local Group. Unlike a classical nova, it was extremely cool during the eruption, and it never became optically thin or exposed a hot, blue source. There has been renewed interest in M31 RV recently, because of its remarkable similarities to V838 Mon, a luminous Galactic variable star that underwent a similar rapid expansion to become a red supergiant, and which is currently illuminating a spectacular light echo, extensively observed by HST. The outburst mechanism for this new class of luminous transients remains unknown, and is one of the major current challenges to our understanding of stellar physics.

Bond and Siegel have examined WFPC2 frames of the site of M31 RV, obtained fortuitously in 1999 as parallel observations during spectroscopic

studies of the nucleus of M31. The explosion site shows only a pure old population of red giants, with no obvious remnant of M31 RV. I propose now to obtain second-epoch images of the site, in the same filters, to determine whether there is an object in the field that has faded or varied, and if so what its brightness and color is. This information may provide new constraints on proposed outburst mechanisms, such as stellar mergers or collisions, and could lead to a spectroscopic observation in a future HST cycle.

OBSERVING DESCRIPTION

Previous description: I will obtain ACS/HRC images of the site of M31 RV in F555W and F814W. A three-point dither pattern will be used, with exposures of 450 sec in V and 300 sec in I at each of the 3 points.

June 2009 revision: Since ACS/HRC was not repaired in AM4, I am changing to WFC3/UVIS. A three-point dither will be used, with exposures of 565 sec in V and 325 sec in I at each of the 3 points. I am greatly increasing the total exposure time possible during the single orbit by using the UVIS1-M512-SUB subarray.

Visit

Proposal 11716, Visit 01, implementation Thu Jul 02 01:21:14 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

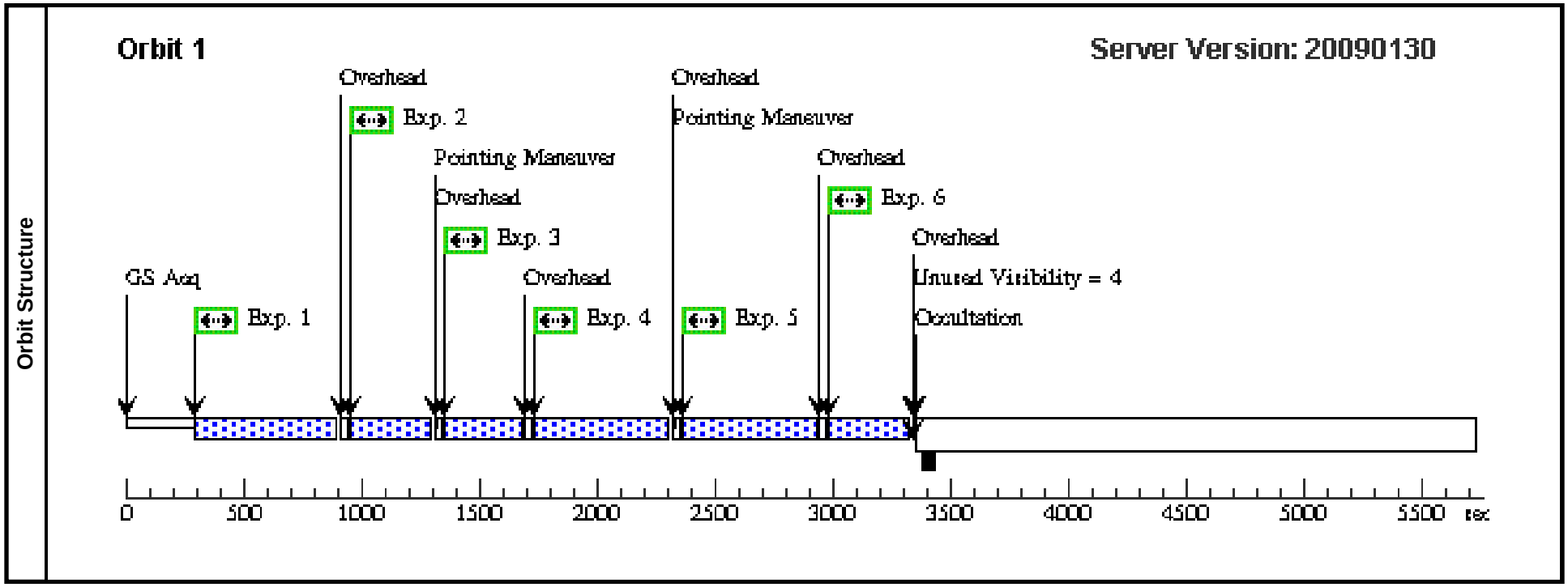
Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M31-RV	RA: 00 43 2.4330 (10.7601375d) Dec: +41 12 56.17 (41.21560d) Equinox: J2000		V=22	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) M31-RV	WFC3/UVIS, ACCUM, UVIS1-M512-SUB	F555W	CR-SPLIT=NO	POS TARG -0.0924, -0.0917		565 Secs *[==>569.0 Secs]*	 ***[1]***
2		(1) M31-RV	WFC3/UVIS, ACCUM, UVIS1-M512-SUB	F814W	CR-SPLIT=NO	POS TARG -0.0924, -0.0917		325 Secs *[==>329.0 Secs]*	 ***[1]***
3		(1) M31-RV	WFC3/UVIS, ACCUM, UVIS1-M512-SUB	F814W	CR-SPLIT=NO	POS TARG 0,0		325 Secs *[==>329.0 Secs]*	 ***[1]***
4		(1) M31-RV	WFC3/UVIS, ACCUM, UVIS1-M512-SUB	F555W	CR-SPLIT=NO	POS TARG 0,0		565 Secs *[==>569.0 Secs]*	 ***[1]***
5		(1) M31-RV	WFC3/UVIS, ACCUM, UVIS1-M512-SUB	F555W	CR-SPLIT=NO	POS TARG 0.0924,0 .0917		565 Secs *[==>569.0 Secs]*	 ***[1]***
6		(1) M31-RV	WFC3/UVIS, ACCUM, UVIS1-M512-SUB	F814W	CR-SPLIT=NO	POS TARG 0.0924,0 .0917		325 Secs *[==>329.0 Secs]*	 ***[1]***


Orbit Structure
Orbit 1
Server Version: 20090130
GS Acq
Exp. 1
Overhead
Exp. 2
Pointing Maneuver
Overhead
Exp. 3
Overhead
Exp. 4
Overhead
Pointing Maneuver
Exp. 5
Overhead
Exp. 6
Overhead
Unused Visibility = 4
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec