



11977 - WFPC2 12-Year Proper Motions of Two Galactic Analogs of the SN1987A Rings

Cycle: 16, Proposal Category: GO
(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) V-RY-SCT	WFPC2	1	27-Jan-2009 21:11:46.0	yes
02	(2) SHER-25	WFPC2	2	27-Jan-2009 21:11:52.0	yes

3 Total Orbits Used

ABSTRACT

This special call in Cycle 16 is a unique opportunity to measure fine-scale proper motions with the same WFPC2 camera after more than a decade has elapsed, and is the last time such an opportunity is likely to be available. We aim to apply this powerful tool to the ring nebulae around two hot supergiants: the set of ionized double-rings around the massive eclipsing binary RY Scuti, and the equatorial ring and bipolar lobes around Sher 25. These are the only two Galactic analogs of SN1987A for which this proper motion measurement is possible (others lack a first-epoch image with HST, and SN1987A is too distant). In the case of RY Scuti, the expected motions are small because the compact ring nebula is only 1-arcsec in

diameter. For Sher 25 the expected motions are small because the object is thought to be at $d=6$ kpc. The 10-12 years that have elapsed since earlier imaging epochs for these sources make it possible to accurately measure their expected sub-pixel proper motion, and hence, their ages and distances. We can discriminate between specific proposed models for the formation of these ring nebulae by measuring the relative ages of these ionized equatorial rings compared to outer structures: the bipolar lobes in the case of Sher 25, and an outer dust shell in the case of RY Scuti. These will provide the first quantitative tests of binary merger vs. rapidly rotating single star models for the shaping of SN1987A and related ring nebulae around massive stars, which until now have relied upon qualitative comparisons to structures seen in single-epoch images. The expected expansion is less than 0.1 arcsec, so there is no hope of making either measurement from the ground, and increased systematic errors associated with switching to new instruments (with different pixel scales and distortion corrections) will make this measurement more difficult even for HST after SM4.

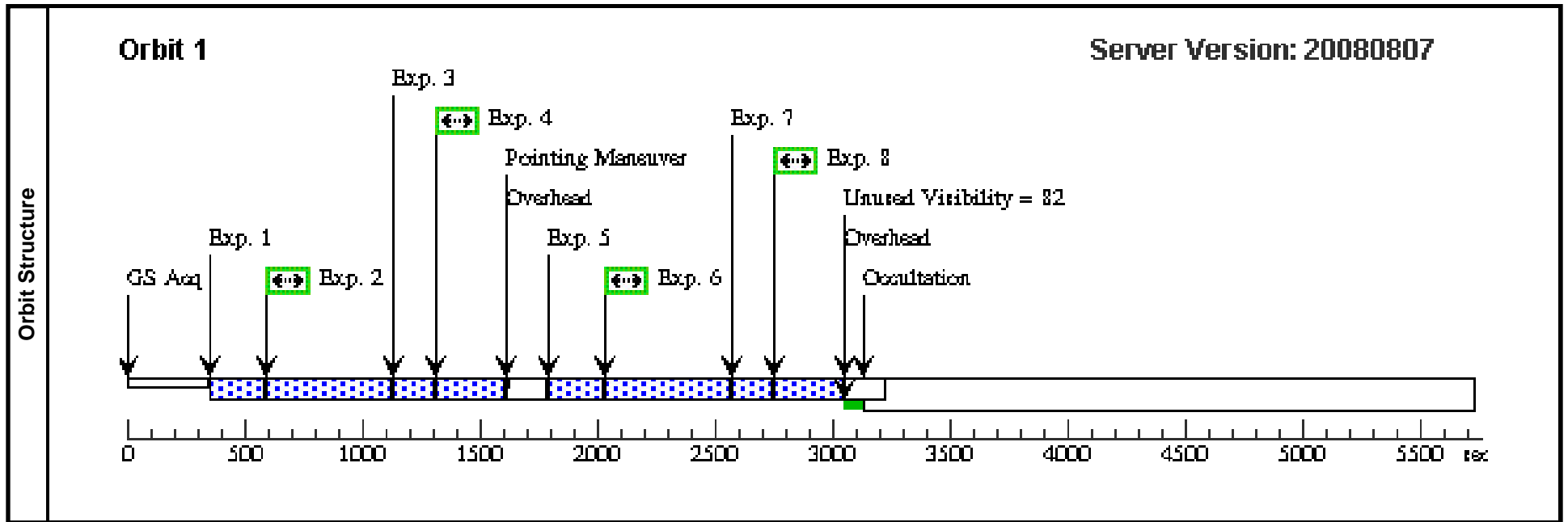
OBSERVING DESCRIPTION

The purpose of these observations is to obtain H-alpha F656N and [N II] F658N images of two targets, RY Scuti and Sher 25. These images will duplicate previous observations made about 10 years ago in order to measure proper motion expansion of the circumstellar nebular rings around these stars. Both targets are centered on the PC chip.

Proposal 11977 - Visit 01 - WFPC2 12-Year Proper Motions of Two Galactic Analogs of the SN1987A Rings

Wed Jan 28 02:11:56 GMT 2009

Visit	Proposal 11977, Visit 01, implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFPC2 Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	V-RY-SCT	RA: 18 25 31.4785 (276.3811604d) Dec: -12 41 24.19 (-12.69005d) Equinox: J2000		V=9.14	Reference Frame: ICRS				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) V-RY-SCT	WFPC2, IMAGE, PC1-FIX	F658N					18 Secs [==>]	[1]
	2	(1) V-RY-SCT	WFPC2, IMAGE, PC1-FIX	F658N	CR-SPLIT=DEF				350 Secs [==>350.0 Secs]	[1]
	3	(1) V-RY-SCT	WFPC2, IMAGE, PC1-FIX	F656N					10 Secs [==>]	[1]
	4	(1) V-RY-SCT	WFPC2, IMAGE, PC1-FIX	F656N	CR-SPLIT=DEF				260 Secs [==>260.0 Secs]	[1]
	5	(1) V-RY-SCT	WFPC2, IMAGE, PC1-FIX	F658N			POS TARG 0.11375, 0.11375		18 Secs [==>]	[1]
	6	(1) V-RY-SCT	WFPC2, IMAGE, PC1-FIX	F658N	CR-SPLIT=DEF		SAME POS AS 5		350 Secs [==>350.0 Secs]	[1]
	7	(1) V-RY-SCT	WFPC2, IMAGE, PC1-FIX	F656N			SAME POS AS 5		10 Secs [==>]	[1]
	8	(1) V-RY-SCT	WFPC2, IMAGE, PC1-FIX	F656N	CR-SPLIT=DEF		SAME POS AS 5		260 Secs [==>260.0 Secs]	[1]



Proposal 11977 - Visit 02 - WFPC2 12-Year Proper Motions of Two Galactic Analogs of the SN1987A Rings

Wed Jan 28 02:11:57 GMT 2009

Visit	Proposal 11977, Visit 02, implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFPC2 Special Requirements: ORIENT 340D TO 20 D									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(2)	SHER-25	RA: 11 15 7.6000 (168.7816667d) Dec: -61 15 14.00 (-61.25389d) Equinox: J2000		V=12.3	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(2) SHER-25	WFPC2, IMAGE, PC1-FIX	F656N	CR-SPLIT=DEF				300 Secs [==>]	[1]
	2	(2) SHER-25	WFPC2, IMAGE, PC1-FIX	F658N	CR-SPLIT=DEF				600 Secs [==>]	[1]
	3	(2) SHER-25	WFPC2, IMAGE, PC1-FIX	F658N	CR-SPLIT=DEF				600 Secs [==>]	[1]
	4	(2) SHER-25	WFPC2, IMAGE, PC1-FIX	F656N	CR-SPLIT=DEF				300 Secs [==>]	[1]
	5	(2) SHER-25	WFPC2, IMAGE, PC1-FIX	F656N	CR-SPLIT=DEF		POS TARG 0.11375, 0.11375		300 Secs [==>]	[2]
	6	(2) SHER-25	WFPC2, IMAGE, PC1-FIX	F658N	CR-SPLIT=DEF		SAME POS AS 5		600 Secs [==>]	[2]
	7	(2) SHER-25	WFPC2, IMAGE, PC1-FIX	F658N	CR-SPLIT=DEF		SAME POS AS 5		600 Secs [==>]	[2]
	8	(2) SHER-25	WFPC2, IMAGE, PC1-FIX	F656N	CR-SPLIT=DEF		SAME POS AS 5		300 Secs [==>]	[2]

