



## 10715 - CSL-1: a peculiar gravitational lens and possible cosmic string

Cycle: 14, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

### INVESTIGATORS

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### VISITS

<i>Visit</i>	<i>Targets</i>	<i>Configurations</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) CSL-1	ACS/WFC	3	15-Nov-2005 21:26:18.0	yes
02	(1) CSL-1	ACS/WFC	3	15-Nov-2005 21:26:24.0	yes

6 Total Orbits Used

### ABSTRACT

## Proposal 10715 - Overview

Much recent work (see for instance Huterer & Vachaspati 2003; Kibble 2004; Polchinski 2004) has emphasized the importance that the peculiar object CSL-1 could bear on elementary particle physics and cosmology, in the case that its nature as the first observational evidence for lensing of a galaxy by a cosmic string could be confirmed. CSL-1 was discovered by the proponents who also proposed several observational tests to definitively pinpoint its nature (Sazhin et al. 2003, 2004). With this proposal we plan to carry the most important of such tests: id est, to use the ACS/WFC to detect the sharp morphological features produced by a cosmic string and to check whether the other gravitational lens candidates, detected by the authors in the region around CSL-1 on photometric grounds only (Sazhin et al. 2004), present similar peculiar features. Following Kibble (2004) and many others, we wish to stress that, could its link to a cosmic string be confirmed, CSL-1 will provide the first measurement ever of the energy scale of the symmetry breaking and of the energy scale of the Grand Unification Theory (GUT), and will open a new way to investigate fundamental physics using astronomical instruments.

### **OBSERVING DESCRIPTION**

This program is aimed at detecting peculiar morphological features in the image of the candidate gravitational lens named CSL1. The object consists of two early type galaxies separated by a projected angular distance of  $\sim 2''$ . To successfully complete the program we need to achieve an angular resolution of  $\sim 0.1$  arcsec and reach a low surface brightness level. We will use the ACS/WFC with the F814W filter, which has a high throughput to minimize the observing time and allows a good sampling of the HST PSF with minimum distortions or backscattering effects. The target will be offset by  $-13 \times 10$  pixels from the WFC reference point to displace it from the amplifier readout boundary.

We will split the observations in 2 visits, each one consisting of 3 orbits. In each visit we will perform dithering adopting a sub-pixel dither pattern, in order to allow pixel subsampling while minimizing the geometric distortions, remove cosmic rays and hot pixels. Each visit consists of 6 exposures (2 per orbit) arranged in two 3pt sub-pixel patterns offset by  $-2 \times 2$  pixels, for a total exposure time of 14948 s. The two visits will be further offset by  $6 \times 72$  pixels in POS-TARG coordinates in order to cover the inter-chip gap.

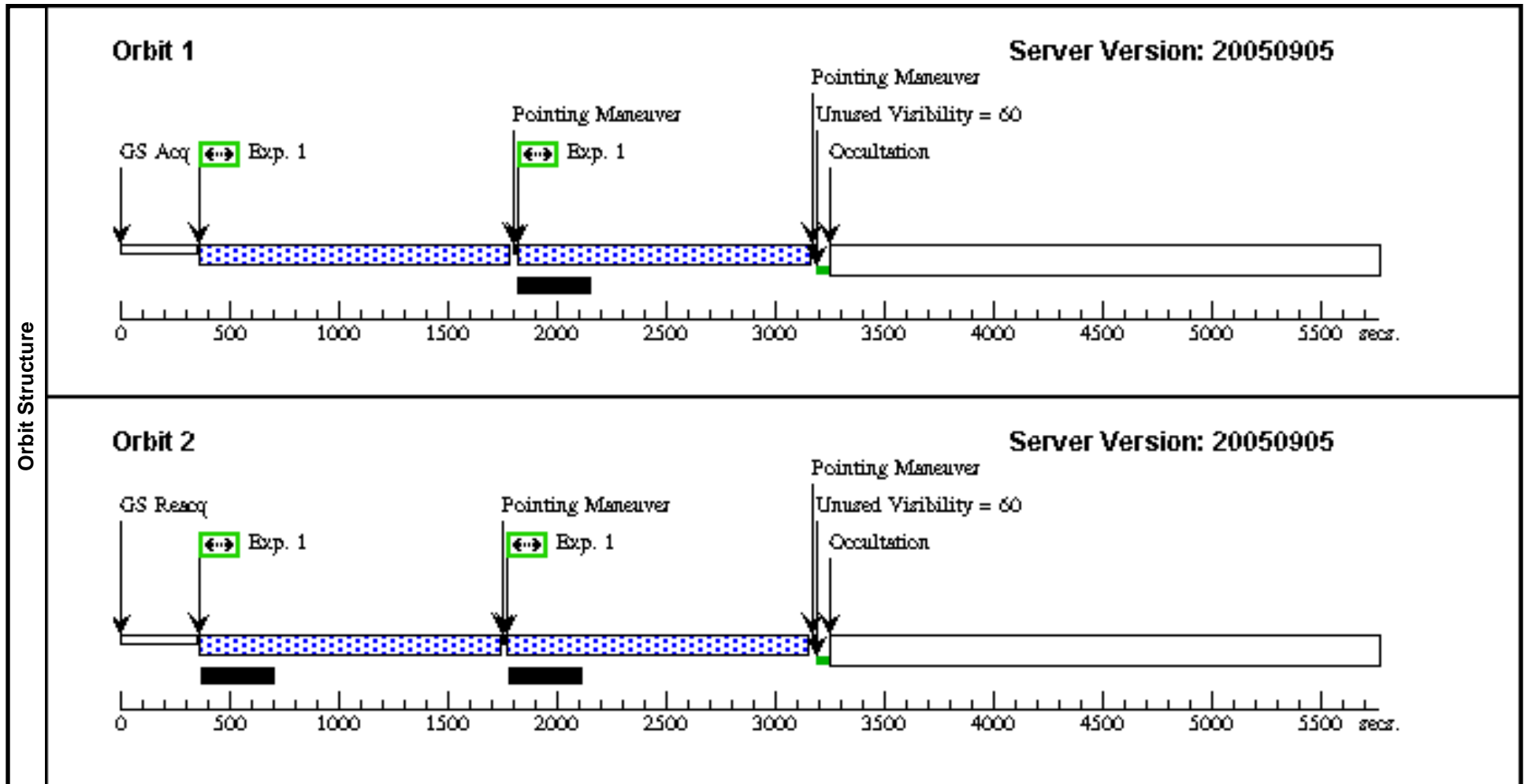
### **ADDITIONAL COMMENTS**

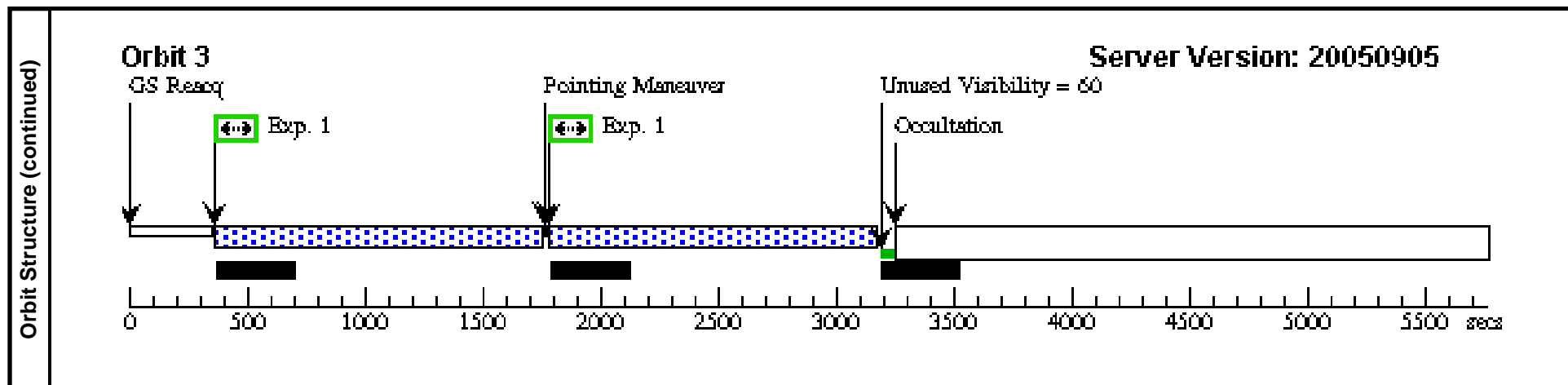
The dither pattern coordinates do not take into account the changes in the X,Y distortion coefficient due to the off center position of the target from the WFC aperture reference point. We ask the Contact Scientist to contact us in case this effects are believe to seriously affect the 1/3 pixel subsampled image reconstruction in the data reduction phase.

Proposal 10715 - Overview

Wed Nov 16 02:26:27 GMT 2005

<b>Visit</b>	<b>Proposal 10715, Visit 01</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: ACS/WFC Special Requirements: PCS MODE FINE <i>Comments: Orbits 1, 2 and 3 of our program</i>									
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>				<b>Secondary Pattern</b>			
(1)		Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.134 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=132.6 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.172 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.2 Angle Between Sides= Center Pattern=false	(1)				
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>				
	(1)	CSL-1	RA: 12 23 30.6000 (185.8775000d) Dec: -12 38 56.70 (-12.64908d) Equinox: J2000 Plate Id: 015J	Redshift: 0.46	V=21.0+/-0.13	Coordinate Source: IMAGE_TIED_TO_GSC_FRAME				
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time/[Actual Dur.]</b>	<b>Orbit</b>
	1	2pt line dither pattern plus 3pt subpixel dither subpattern	(1) CSL-1	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO	POS TARG -13,10	Pattern 1-1 (1)	1250.0 Secs	
									[==>1215.0 Secs (Pattern 1,1)]	[1]
									[==>1215.0 Secs (Pattern 1,2)]	[2]
									[==>1256.0 Secs (Pattern 1,3)]	[3]
									[==>1256.0 Secs (Pattern 2,1)]	[1]
								[==>1266.0 Secs (Pattern 2,2)]	[2]	
								[==>1266.0 Secs (Pattern 2,3)]	[3]	





Proposal 10715 - Visit 02 - CSL-1: a peculiar gravitational lens and possible cosmic string

Wed Nov 16 02:26:28 GMT 2005

<b>Visit</b>	<b>Proposal 10715, Visit 02</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: ACS/WFC Special Requirements: PCS MODE FINE; SCHED 30%; SAME ORIENT AS 01 <i>Comments: Orbits 4, 5 and 6 of our program</i>									
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>				<b>Secondary Pattern</b>			
(1)		Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.134 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=132.6 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.172 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.2 Angle Between Sides= Center Pattern=false	(1)				
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>		<b>Targ. Coord. Corrections</b>		<b>Fluxes</b>		<b>Miscellaneous</b>	
	(1)	CSL-1	RA: 12 23 30.6000 (185.8775000d) Dec: -12 38 56.70 (-12.64908d) Equinox: J2000 Plate Id: 015J	Redshift: 0.46	V=21.0+/-0.13	Coordinate Source: IMAGE_TIED_TO_GSC_FRAME				
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time/[Actual Dur.]</b>	<b>Orbit</b>
	1	2pt line dither pattern plus 3pt subpixel dither subpattern	(1) CSL-1	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO	POS TARG -13.296, 13.581	Pattern 1-1 (1)	1300.0 Secs	
									[==>1215.0 Secs (Pattern 1,1)]	[1]
									[==>1215.0 Secs (Pattern 1,2)]	[2]
									[==>1256.0 Secs (Pattern 1,3)]	[3]
									[==>1256.0 Secs (Pattern 2,1)]	[1]
								[==>1266.0 Secs (Pattern 2,2)]	[2]	
								[==>1266.0 Secs (Pattern 2,3)]	[3]	

