



11689 - Direct Observations of Dark Matter from a Second Bullet: The Spectacular Abell 2744

Cycle: 17, Proposal Category: GO
(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Dr. Renato A. Dupke (PI)	University of Michigan	rdupke@umich.edu
Dr. Narciso Benitez (CoI) (ESA Member)	Instituto de Astrofisica de Andalucia (IAA)	txitxo@pha.jhu.edu
Dr. Jesse Krick (CoI)	California Institute of Technology	jkrick@ipac.caltech.edu
Prof. Joel N. Bregman (CoI)	University of Michigan	jbregman@umich.edu
Dr. Dan Coe (CoI)	Jet Propulsion Laboratory	coe@pha.jhu.edu
Dr. Laerte sodre (CoI)	Universidade de Sao Paulo	laerte@astro.iag.usp.br
Dr. Thomas J. Broadhurst (CoI)	Tel Aviv University - Wise Observatory	tjb@wise.tau.ac.il
Dr. Rebecca A. Bernstein (CoI)	University of California - Santa Cruz	rab@ucolick.org

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) ABELL-2744-NORTH	ACS/WFC	2	03-Jul-2008 22:36:45.0	yes
02	(2) ABELL-2744-SOUTH	ACS/WFC	2	03-Jul-2008 22:36:49.0	yes
03	(1) ABELL-2744-NORTH	ACS/WFC	2	03-Jul-2008 22:36:53.0	yes
04	(2) ABELL-2744-SOUTH	ACS/WFC	2	03-Jul-2008 22:36:56.0	yes
05	(1) ABELL-2744-NORTH	ACS/WFC	2	03-Jul-2008 22:36:59.0	yes

<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>
06	(2) ABELL-2744-SOUTH	ACS/WFC	2	03-Jul-2008 22:37:02.0	yes
07	(1) ABELL-2744-NORTH	ACS/WFC	2	03-Jul-2008 22:37:05.0	yes
08	(2) ABELL-2744-SOUTH	ACS/WFC	2	03-Jul-2008 22:37:08.0	yes

16 Total Orbits Used

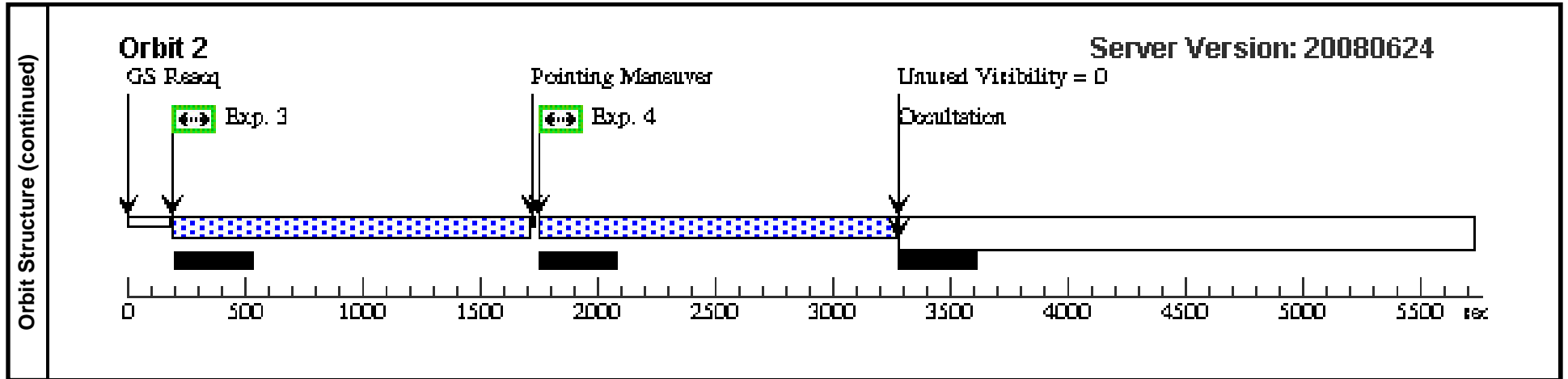
ABSTRACT

Vigorous cluster mergers provide a unique opportunity to directly "see" dark matter and to probe its properties through the analysis of the segregation of the baryonic and non-baryonic components. This is accomplished through detailed comparison of the mass distributions as traced by X-ray emitting gas and by gravitational lensing. This condition is rare and so far only one cluster has met these requirements, the so-called "bullet" cluster, producing exciting results and placing constraints to the properties of dark matter. These constraints have a broad impact on models for formation of structure and on galaxy evolution. This multi-wavelength analysis has the potential confront alternative gravity models such as MOND. Therefore, it is crucial to find new "bullet clusters" to corroborate and improve previous measurements. This is the most direct way to constrain dark matter properties and A2744 is ideal for corroborating this study since it maximizes all the requirements for this analysis. Here, we propose to carry out such analysis through combined ACS and Chandra observations of the cluster merger Abell 2744.

OBSERVING DESCRIPTION

The proposed science will be achievable with 2 overlapping pointings, using a filter and depth distribution similar to that of the GOODS survey: 3 F435W orbits, 2.5 F606W orbits and 2.5 F814W orbits

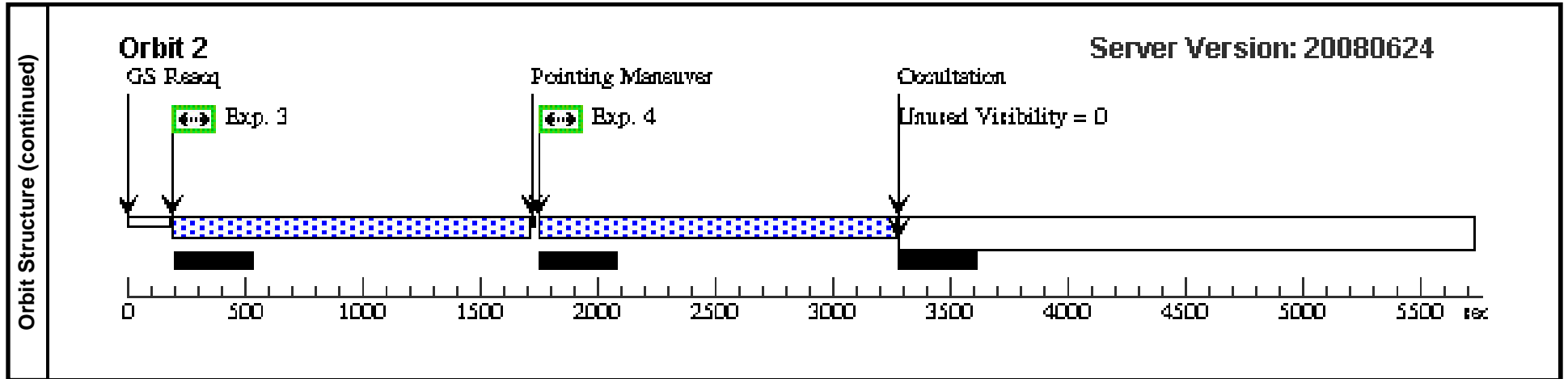
Visit	Proposal 11689, Visit 01 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 10D TO 45 D <i>Comments: 1st visit on A2744-NORTH, includes 2 F814W orbits split into 4 exposures</i>									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	ABELL-2744-NORTH	RA: 00 14 22.0770 (3.5919875d) Dec: -30 22 36.10 (-30.37669d) Equinox: J2000		V=15	Reference Frame: ICRS				
<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F814W		POS TARG 0,0		1284 Secs [==>]	[1]
	2	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F814W		POS TARG 0.248,3		1284 Secs [==>]	[1]
	3	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F814W		POS TARG 0.496,6		1394 Secs [==>]	[2]
	4	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F814W		POS TARG 0.744,9		1394 Secs [==>]	[2]
Orbit Structure	<p>Orbit 1 Server Version: 20080624</p> <p>GS Acq [Exp. 1] Pointing Maneuver [Exp. 2] Pointing Maneuver Occultation Unused Visibility = 0</p> <p>0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 sec</p>									



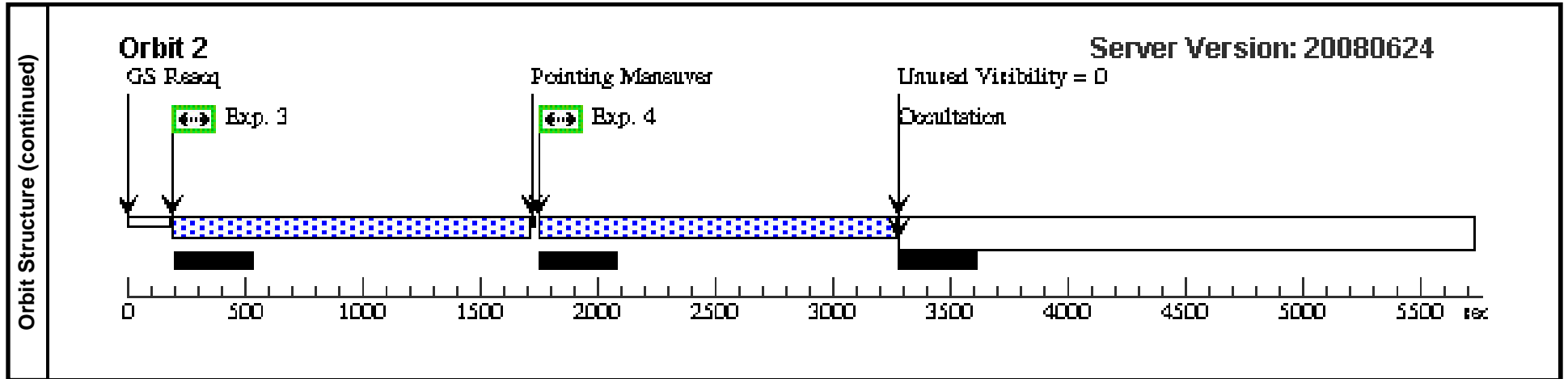
Proposal 11689 - Visit 02 - Direct Observations of Dark Matter from a Second Bullet: The Spectacular Abell 2744

Fri Jul 04 02:37:11 GMT 2008

Visit	Proposal 11689, Visit 02 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 0.0D TO 25 D <i>Comments: 1st visit on A2744-SOUTH, includes 2 F814W orbits split into 4 exposures</i>										
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
(2)		ABELL-2744-SOUTH	RA: 00 14 18.6180 (3.5775750d) Dec: -30 23 36.64 (-30.39351d) Equinox: J2000		V=15	Reference Frame: ICRS					
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
	1	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F814W		POS TARG 0,0		1284 Secs [==>]	[1]	
	2	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F814W		POS TARG 0.248,3		1284 Secs [==>]	[1]	
	3	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F814W		POS TARG 0.496,6		1394 Secs [==>]	[2]	
	4	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F814W		POS TARG 0.744,9		1394 Secs [==>]	[2]	
Orbit Structure	<p>Orbit 1 Server Version: 20080624</p> <p>Unused Visibility = 0</p> <p>The diagram shows a horizontal timeline from 0 to 5500 seconds. Key events are marked with arrows: 'GS Acq' at 0s, 'Exp. 1' (green box) at approximately 300s, 'Pointing Maneuver' at approximately 1800s, 'Exp. 2' (green box) at approximately 1900s, 'Occultation' and another 'Pointing Maneuver' at approximately 3300s. A blue checkered bar represents the observation period from approximately 300s to 3300s. A solid black bar is located below the timeline between 1800s and 2200s.</p>										
	<p>0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 sec</p>										



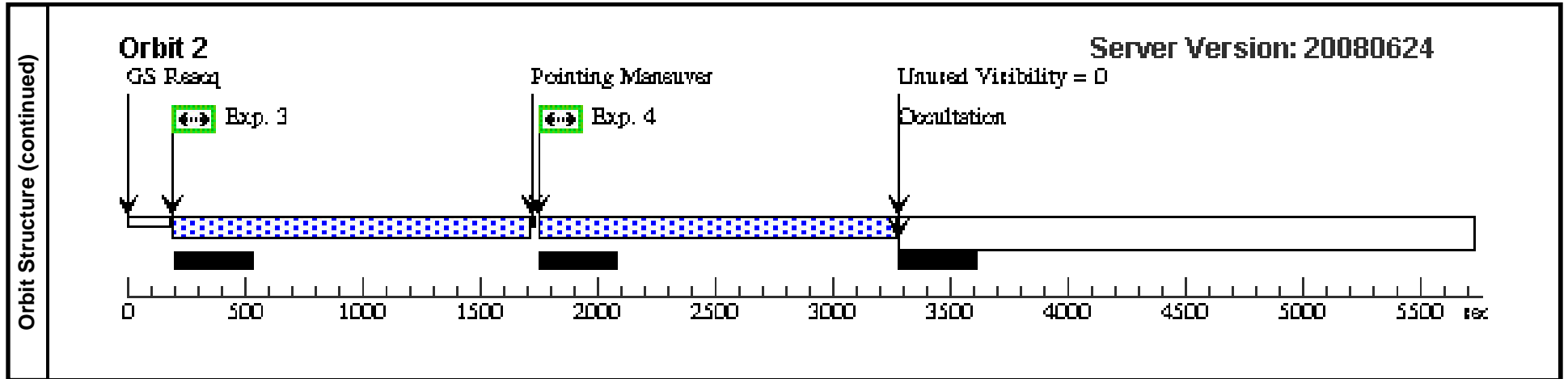
Visit	Proposal 11689, Visit 03 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 10D TO 45 D <i>Comments: 2nd visit on A2744-NORTH, includes 2 606W orbits split into 4 exposures</i>										
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
(1)		ABELL-2744-NORTH	RA: 00 14 22.0770 (3.5919875d) Dec: -30 22 36.10 (-30.37669d) Equinox: J2000		V=15	Reference Frame: ICRS	<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
	1	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F606W		POS TARG 0,0		1284 Secs [==>]	[1]	
	2	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F606W		POS TARG 0.248,3		1284 Secs [==>]	[1]	
	3	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F606W		POS TARG 0.496,6		1394 Secs [==>]	[2]	
	4	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F606W		POS TARG 0.744,9		1394 Secs [==>]	[2]	
Orbit Structure	<p>Orbit 1 Server Version: 20080624</p> <p>Timeline labels: GS Acq, Exp. 1, Pointing Maneuver, Exp. 2, Pointing Maneuver, Occultation, Unused Visibility = 0</p> <p>X-axis: 0, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 5500 sec</p>										



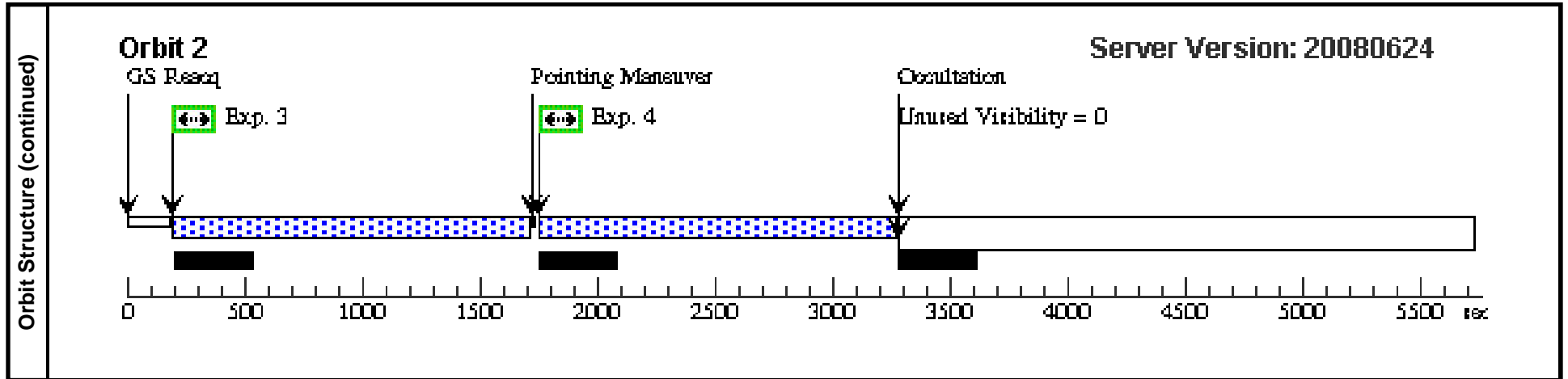
Proposal 11689 - Visit 04 - Direct Observations of Dark Matter from a Second Bullet: The Spectacular Abell 2744

Fri Jul 04 02:37:12 GMT 2008

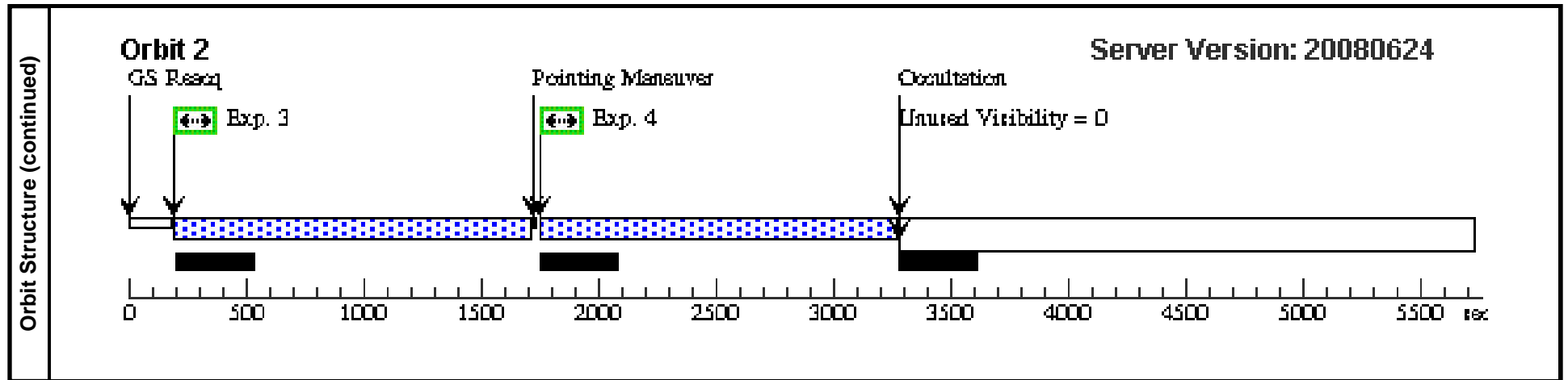
Visit	Proposal 11689, Visit 04 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 0.0D TO 25 D <i>Comments: 2nd visit on A2744-SOUTH, includes 2 606W orbits split into 4 exposures</i>										
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
(2)		ABELL-2744-SOUTH	RA: 00 14 18.6180 (3.5775750d) Dec: -30 23 36.64 (-30.39351d) Equinox: J2000		V=15	Reference Frame: ICRS					
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
	1	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F606W		POS TARG 0,0		1284 Secs [==>]	[1]	
	2	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F606W		POS TARG 0.248,3		1284 Secs [==>]	[1]	
	3	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F606W		POS TARG 0.496,6		1394 Secs [==>]	[2]	
	4	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F606W		POS TARG 0.744,9		1394 Secs [==>]	[2]	
Orbit Structure	<p>Orbit 1 Server Version: 20080624</p> <p>GS Acq [●●] Exp. 1</p> <p>Pointing Maneuver [●●] Exp. 2</p> <p>Pointing Maneuver</p> <p>Unused Visibility = 0</p> <p>Occultation</p> <p>0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 sec</p>										



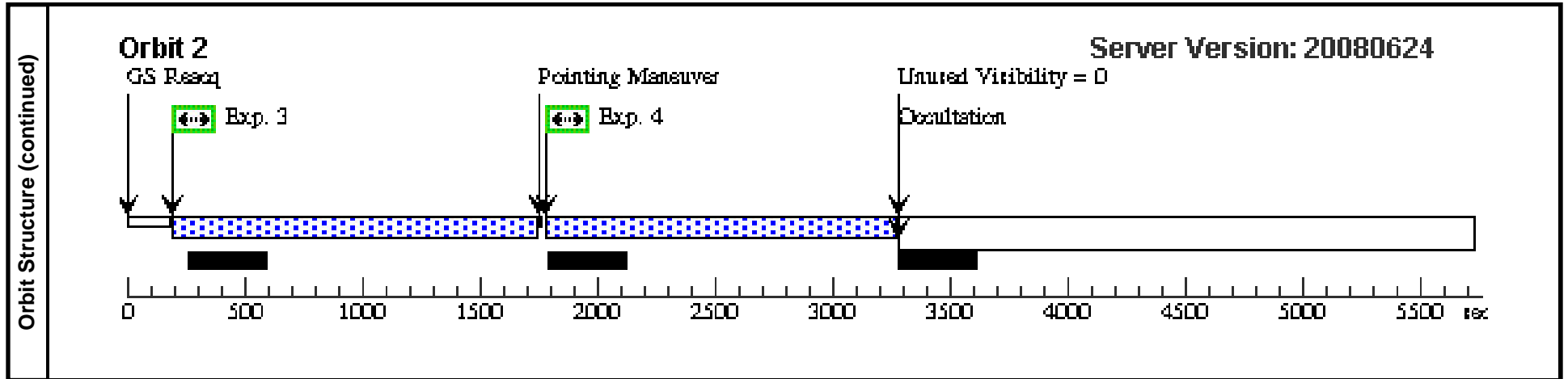
Visit	Proposal 11689, Visit 05 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 10D TO 45 D <i>Comments: 3rd visit on A2744-NORTH, includes 2 F435W orbits split into 4 exposures</i>									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	ABELL-2744-NORTH	RA: 00 14 22.0770 (3.5919875d) Dec: -30 22 36.10 (-30.37669d) Equinox: J2000		V=15	Reference Frame: ICRS				
<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG 0,0		1284 Secs [==>]	[1]
	2	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG 0.248,3		1284 Secs [==>]	[1]
	3	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG 0.496,6		1394 Secs [==>]	[2]
	4	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG 0.744,9		1394 Secs [==>]	[2]
Orbit Structure	Orbit 1 Server Version: 20080624 <p>Pointing Maneuver Unused Visibility = 0 Occultation</p> <p>GS Acq [Exp. 1]</p> <p>Pointing Maneuver [Exp. 2]</p> <p>0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 sec</p>									



Visit	Proposal 11689, Visit 06 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 0.0D TO 25 D <i>Comments: 3rd visit on A2744-SOUTH, includes 2 F435W orbits split into 4 exposures</i>										
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
(2)		ABELL-2744-SOUTH	RA: 00 14 18.6180 (3.5775750d) Dec: -30 23 36.64 (-30.39351d) Equinox: J2000		V=15	Reference Frame: ICRS					
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
	1	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG 0,0		1284 Secs [==>]	[1]	
	2	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG 0.248,3		1284 Secs [==>]	[1]	
	3	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG 0.496,6		1394 Secs [==>]	[2]	
	4	(2) ABELL-2744-SOUTH	UTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG 0.744,9		1394 Secs [==>]	[2]	
Orbit Structure	<p>Orbit 1 Server Version: 20080624</p> <p>GS Acq [Exp. 1] Pointing Maneuver [Exp. 2] Occultation Unused Visibility = 0</p> <p>0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 sec</p>										



Visit	Proposal 11689, Visit 07 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 10D TO 45 D <i>Comments: 4th visit on A2744-NORTH, includes 1/2 F814W, 1/2 F606W and 1 F435W orbits</i>									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	ABELL-2744-NORTH	RA: 00 14 22.0770 (3.5919875d) Dec: -30 22 36.10 (-30.37669d) Equinox: J2000		V=15	Reference Frame: ICRS				
<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F814W		POS TARG -0.248,-3		1254 Secs [=>1268.0 Secs]	[1]
	2	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F606W		POS TARG -0.248,-3		1255 Secs [=>1269.0 Secs]	[1]
	3	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG -0.248,-3		1362 Secs [=>]	[2]
	4	(1) ABELL-2744-N ORTH	(1) ABELL-2744-N ORTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG -0.496,-6		1363 Secs [=>]	[2]
Orbit Structure	<p>Orbit 1 Server Version: 20080624</p> <p>Timeline labels: GS Acq, Exp. 1, Exp. 2, Occultation, Unused Visibility = 0</p> <p>Timeline axis: 0, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 5500 sec</p>									



Proposal 11689 - Visit 08 - Direct Observations of Dark Matter from a Second Bullet: The Spectacular Abell 2744

Fri Jul 04 02:37:15 GMT 2008

Visit	Proposal 11689, Visit 08 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 0.0D TO 25 D <i>Comments: 4th visit on A2744-NORTH, includes 1/2 F814W, 1/2 F606W and 1 F435W orbits</i>									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(2)	ABELL-2744-SOUTH	RA: 00 14 18.6180 (3.5775750d) Dec: -30 23 36.64 (-30.39351d) Equinox: J2000			V=15	Reference Frame: ICRS			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(2) ABELL-2744-SOUTH	ACS/WFC, ACCUM, WFC	F814W		POS TARG -0.248,-3		1268 Secs [=>]	[1]
	2		(2) ABELL-2744-SOUTH	ACS/WFC, ACCUM, WFC	F606W		POS TARG -0.248,-3.		1269 Secs [=>]	[1]
	3		(2) ABELL-2744-SOUTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG -0.248,-3.		1362 Secs [=>]	[2]
	4		(2) ABELL-2744-SOUTH	ACS/WFC, ACCUM, WFC	F435W		POS TARG -0.496,-6		1363 Secs [=>]	[2]
Orbit Structure	<p>Orbit 1 Server Version: 20080624</p> <p>Timeline labels: GS Acq, Exp. 1, Exp. 2, Occultation, Unused Visibility = 0</p> <p>Timeline axis: 0, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 5500 sec</p>									

