



# 12757 - A DETAILED CHANDRA/HST STUDY OF THE FIRST z approx 1 CLUSTER BLINDLY DISCOVERED IN THE PLANCK ALL SKY SURVEY

Cycle: 19, Proposal Category: GO

(Availability Mode: SUPPORTED)

## INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
<b>Prof. Pasquale Mazzotta (PI)</b>	<b>Smithsonian Institution Astrophysical Observatory</b>	<b>mazzotta@head.cfa.harvard.edu</b>
Dr. Monique Arnaud (CoI) (ESA Member)	Commissariat a l'Energie Atomique (CEA)	monique.arnaud@cea.fr
Dr. Etienne Pointecouteau (CoI)	Universie de Toulouse	pointeco@cesr.fr
Dr. Gabriel W. Pratt (CoI) (ESA Member)	Commissariat a l'Energie Atomique (CEA)	gabriel.pratt@cea.fr
Dr. Rocco Piffaretti (CoI) (ESA Member)	Commissariat a l'Energie Atomique (CEA)	rocc.piffaretti@cea.fr
Dr. Nabila Aghanim (CoI) (ESA Member)	Institut d'Astrophysique Spatiale	nabila.aghanim@ias.u-psud.fr
Dr. Hans Bohringer (CoI) (ESA Member)	Max-Planck-Institut fur extraterrestrische Physik	hxb@mpe.pmg.de
Dr. Haakon Dahle (CoI) (ESA Member) (Contact)	University of Oslo	hdahle@astro.uio.no
Dr. Marian Douspis (CoI) (ESA Member)	Institut d'Astrophysique Spatiale	marian.douspis@ias-u-psud.fr
Dr. Sebastien Fromenteau (CoI) (ESA Member)	Institut d'Astrophysique Spatiale	fromenteau@apc.univ-paris7.fr
Dr. Guillaume Hurier (CoI) (ESA Member)	Universite de Grenoble I	hurier@lpsc.in2p3.fr
Dr. Jose-Alberto Rubino-Martin (CoI) (ESA Member)	Instituto de Astrofisica de Canarias	jalberto@iac.es
Dr. Jean-Baptise Melin (CoI) (ESA Member)	Commissariat a l'Energie Atomique (CEA)	jean-baptise.melin@cea.fr
Dr. Jessica Democles (CoI) (ESA Member)	Commissariat a l'Energie Atomique (CEA)	jessica.democles@cea.fr
Dr. Herve Bourdin (CoI)	Universita di Roma Tor Vergata	herve.bourdin@roma2.infn.it
Dr. James Bartlett (CoI)	Jet Propulsion Laboratory	bartlett@apc.univ-paris7.fr

## 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	(6) PLCKG266.6-27.3-V02-COPY	ACS/WFC	1	03-Oct-2011 21:17:11.0	yes
02	(7) PLCKG266.6-27.3-V03-COPY	ACS/WFC	1	03-Oct-2011 21:17:18.0	yes
03	(8) PLCKG266.6-27.3-V04-COPY	ACS/WFC	1	03-Oct-2011 21:17:23.0	yes
04	(9) PLCKG266.6-27.3-V05-COPY	ACS/WFC	1	03-Oct-2011 21:17:29.0	yes
05	(6) PLCKG266.6-27.3-V02-COPY	ACS/WFC	1	03-Oct-2011 21:17:34.0	yes
06	(7) PLCKG266.6-27.3-V03-COPY	ACS/WFC	1	03-Oct-2011 21:17:40.0	yes
07	(8) PLCKG266.6-27.3-V04-COPY	ACS/WFC	1	03-Oct-2011 21:17:47.0	yes
08	(9) PLCKG266.6-27.3-V05-COPY	ACS/WFC	1	03-Oct-2011 21:17:52.0	yes

8 Total Orbits Used

### **ABSTRACT**

PLCKG266.6-27.3 is the first Planck blindly discovered cluster of galaxies at  $z=1$ . Consistent with expectations for high  $z$  Planck-detected clusters, a 10ks XMM observation confirms that it is an exceptional system: with its  $L_{500}=15 \times 10^{44} \text{ ergs}^{-1}$ ,  $T_{500}=11.6 \pm 1.4 \text{ keV}$ , and  $M_{500}=7.8 \pm 1.0 \times 10^{14} M_{\odot}$  it is the most luminous cluster known at  $z > 0.5$  and one of the most (if not the most) massive cluster at redshift  $z > 1$ . Furthermore, unlike other high redshift clusters, PLCKG266.6-27.3 is likely to be a relaxed system so potentially ideal to make accurate hydrostatic mass measurements. We propose a joint Chandra-HST observation of PLCKG266.6-27.3 to confirm the relaxed dynamical status and, for the first time, to compare weak lensing and hydrostatic measurements in a  $z=1$  cluster.

### **OBSERVING DESCRIPTION**

Observation of 4 partially overlapping mosaic tiles to map out an area around the center of a newly discovered high-redshift galaxy cluster. Observations in two filters (F606W and F814W) for each tile, one field/filter per orbit (each split into 4 dithered 619s exposures).

<b>Visit</b>	Proposal 12757, Visit 01 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 23D TO 29 D; ORIENT 113D TO 119 D; ORIENT 203D TO 209 D; ORIENT 293D TO 299 D									
<b>Patterns</b>	#	Primary Pattern		Secondary Pattern	Exposures					
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=5.011	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)					
<b>Fixed Targets</b>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(6)	PLCKG266.6-27.3-V02-COPY	RA: 06 15 47.1339 (93.9463912d) Dec: -57 44 42.55 (-57.74515d) Equinox: J2000		V=23.0+/-1.0	Reference Frame: ICRS				
<b>Exposures</b>	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(6) PLCKG266.6-27.3-V02-COPY	ACS/WFC, ACCUM, WFC	F606W		POS TARG 0.0,0.0	Pattern 1, Exps 1-1 in Tile Visit 01 (1)	500 Secs [==>619 Secs (Pattern 1)] [==>619 Secs (Pattern 2)] [==>619 Secs (Pattern 3)] [==>619 Secs (Pattern 4)]	[1]
<b>Orbit Structure</b>	Orbit 1 <span style="float: right;">Server Version: 20110811</span>									
	<p>The diagram shows a timeline for Orbit 1 from 0 to 5500 seconds. Key events include:</p> <ul style="list-style-type: none"> <li>GS Acq at approximately 300s.</li> <li>Exp. 1 exposures (green boxes) at approximately 400s, 1200s, 2000s, and 2800s.</li> <li>Pointing Maneuvers (vertical arrows) at approximately 1200s, 2000s, and 2800s.</li> <li>Occultation (black bars) at approximately 1300s, 2100s, 2900s, and 3600s.</li> <li>Unused Visibility = 2 (black bar) at approximately 3600s.</li> <li>A blue checkered bar represents the observation window from approximately 400s to 3600s.</li> </ul>									

<b>Visit</b>	Proposal 12757, Visit 02 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01									
<b>Patterns</b>	#	<b>Primary Pattern</b>	<b>Secondary Pattern</b>	<b>Exposures</b>						
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=5.011	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)					
<b>Fixed Targets</b>	#	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>				
	(7)	PLCKG266.6-27.3-V03-COPY	RA: 06 16 5.5211 (94.0230046d) Dec: -57 45 54.60 (-57.76517d) Equinox: J2000		V=23.0+/-1.0	Reference Frame: ICRS				
<b>Exposures</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		(7) PLCKG266.6-27.3-V03-COPY	ACS/WFC, ACCUM, WFC	F606W		POS TARG 0.0,0.0	Pattern 1, Exps 1-1 in Tile Visit 02 (1)	500 Secs [==>619 Secs (Pattern 1)] [==>619 Secs (Pattern 2)] [==>619 Secs (Pattern 3)] [==>619 Secs (Pattern 4)]	[1]
<b>Orbit Structure</b>	<b>Orbit 1</b> <span style="float: right;"><b>Server Version: 20110811</b></span>									
	<p>The diagram illustrates the orbit structure for Orbit 1, spanning from 0 to 5500 seconds. Key events include:</p> <ul style="list-style-type: none"> <li><b>GS Acq</b> (Green box) at approximately 300 seconds.</li> <li><b>Exp. 1</b> (Green boxes) at approximately 400, 1200, 2000, and 2800 seconds.</li> <li><b>Pointing Maneuvers</b> (Vertical arrows) at approximately 1200, 2000, and 2800 seconds.</li> <li><b>Occultation</b> (Black bars) at approximately 1300-1400, 2000-2100, 2800-2900, and 3500-3600 seconds.</li> <li><b>Unused Visibility = 2</b> (Vertical arrow) at approximately 3500 seconds.</li> </ul> <p>A blue checkered bar represents the observation window, which is interrupted by occultation periods. The x-axis is labeled in seconds (sec) with major ticks every 500 units.</p>									

<b>Visit</b>	Proposal 12757, Visit 03 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01									
<b>Patterns</b>	#	<b>Primary Pattern</b>	<b>Secondary Pattern</b>	<b>Exposures</b>						
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=5.011	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)					
<b>Fixed Targets</b>	#	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>				
	(8)	PLCKG266.6-27.3-V04-COPY	RA: 06 15 39.1747 (93.9132279d) Dec: -57 47 15.36 (-57.78760d) Equinox: J2000		V=23.0+/-1.0	Reference Frame: ICRS				
<b>Exposures</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	(8) PLCKG266.6-27.3-V04-COPY	ACS/WFC, ACCUM, WFC	F606W	POS TARG 0.0,0.0	Pattern 1, Exps 1-1 in Tile Visit 03 (1)	500 Secs		[==>619 Secs (Pattern 1)] [==>619 Secs (Pattern 2)] [==>619 Secs (Pattern 3)] [==>619 Secs (Pattern 4)]	[1]
<b>Orbit Structure</b>	<b>Orbit 1</b>									
	<p style="text-align: right;"><b>Server Version: 20110811</b></p>									

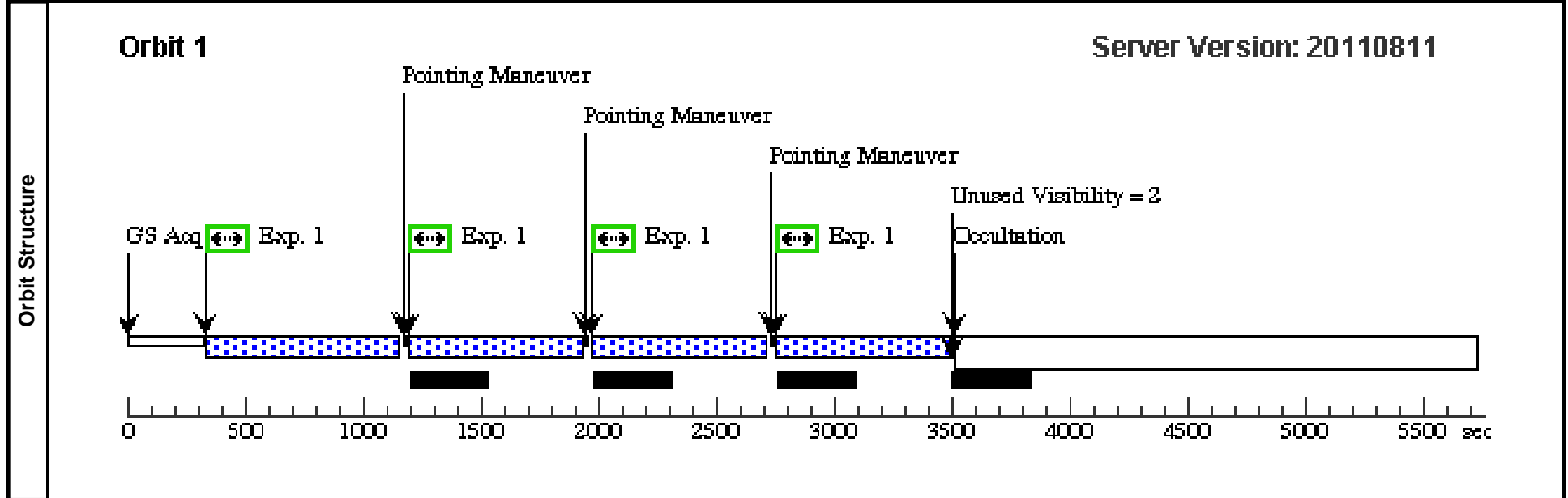
<b>Visit</b>	Proposal 12757, Visit 04 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01									
<b>Patterns</b>	#	Primary Pattern		Secondary Pattern	Exposures					
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=5.011	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)					
<b>Fixed Targets</b>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(9)	PLCKG266.6-27.3-V05-COPY	RA: 06 15 57.5618 (93.9898408d) Dec: -57 48 27.49 (-57.80764d) Equinox: J2000		V=23.0+/-1.0	Reference Frame: ICRS				
<b>Exposures</b>	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(9) PLCKG266.6-27.3-V05-COPY	ACS/WFC, ACCUM, WFC	F606W		POS TARG 0.0,0.0	Pattern 1, Exps 1-1 in Tile Visit 04 (1)	500 Secs [==>619 Secs (Pattern 1)] [==>619 Secs (Pattern 2)] [==>619 Secs (Pattern 3)] [==>619 Secs (Pattern 4)]	[1]
<b>Orbit Structure</b>	Orbit 1 <span style="float: right;">Server Version: 20110811</span>									
	<p>The diagram shows a timeline from 0 to 5500 seconds. Key events include: GS Acq at ~30s, Exp. 1 at ~40s, Pointing Maneuvers at ~1200s, ~1950s, and ~2800s, and Occultation at ~3500s. A blue checkered bar represents the observation window, and black bars below the timeline indicate occultation periods. The text 'Unused Visibility = 2' is noted near the occultation event.</p>									

<b>Visit</b>	Proposal 12757, Visit 05 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 23D TO 29 D; ORIENT 113D TO 119 D; ORIENT 203D TO 209 D; ORIENT 293.0D TO 299.0 D		

<b>Patterns</b>	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=5.011	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false	

<b>Fixed Targets</b>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(6)	PLCKG266.6-27.3-V02-COPY	RA: 06 15 47.1339 (93.9463912d) Dec: -57 44 42.55 (-57.74515d) Equinox: J2000		V=23.0+/-1.0	Reference Frame: ICRS

<b>Exposures</b>	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(6) PLCKG266.6-27.3-V02-COPY	ACS/WFC, ACCUM, WFC	F814W		POS TARG 0.0,0.0	Pattern 1, Exps 1-1 in Tile Visit 05 (1)	500 Secs	[==>619 Secs (Pattern 1)] [==>619 Secs (Pattern 2)] [==>619 Secs (Pattern 3)] [==>619 Secs (Pattern 4)]



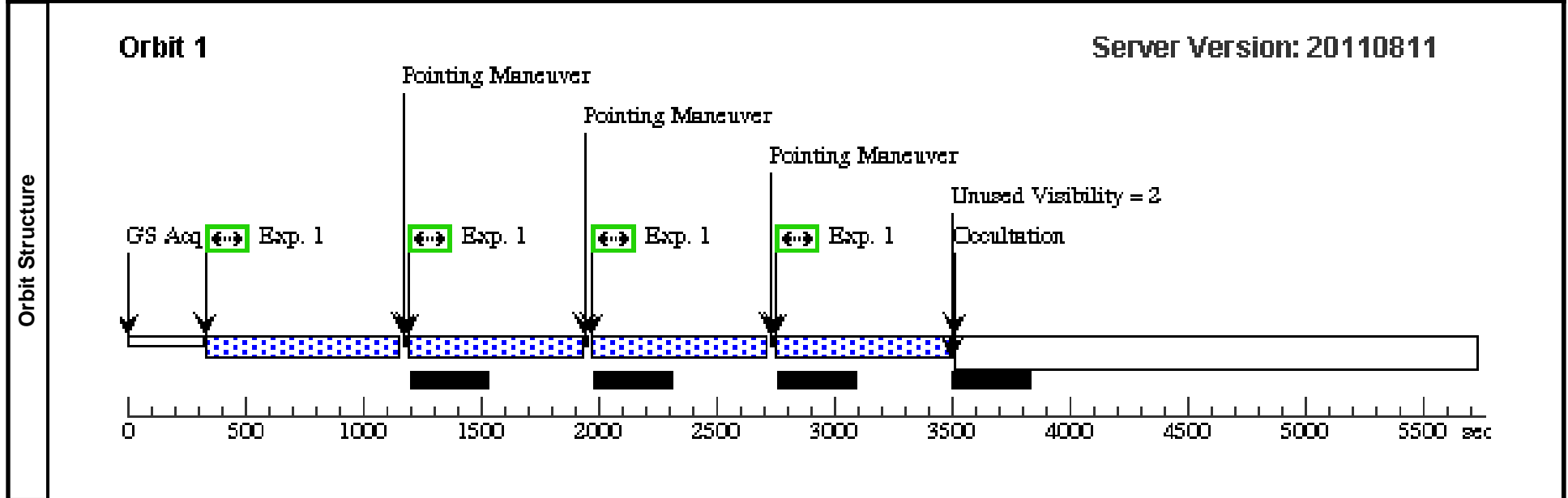
<b>Visit</b>	Proposal 12757, Visit 06 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 05									
<b>Patterns</b>	#	<b>Primary Pattern</b>	<b>Secondary Pattern</b>		<b>Exposures</b>					
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=5.011	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)					
<b>Fixed Targets</b>	#	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>				
	(7)	PLCKG266.6-27.3-V03-COPY	RA: 06 16 5.5211 (94.0230046d) Dec: -57 45 54.60 (-57.76517d) Equinox: J2000		V=23.0+/-1.0	Reference Frame: ICRS				
<b>Exposures</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	(7) PLCKG266.6-27.3-V03-COPY	ACS/WFC, ACCUM, WFC	F814W	POS TARG 0.0,0.0	Pattern 1, Exps 1-1 i n Tile Visit 06 (1)	500 Secs		[==>619 Secs (Pattern 1)] [==>619 Secs (Pattern 2)] [==>619 Secs (Pattern 3)] [==>619 Secs (Pattern 4)]	[1]
<b>Orbit Structure</b>	<b>Orbit 1</b> <span style="float: right;"><b>Server Version: 20110811</b></span>									
	<p>The diagram illustrates the orbit structure over a 5500-second period. Key events include:</p> <ul style="list-style-type: none"> <li><b>GS Acq</b>: Green box at approximately 400s.</li> <li><b>Exp. 1</b>: Four exposure periods, each preceded by a <b>Pointing Maneuver</b> (indicated by a downward arrow). The exposures occur at approximately 1200s, 2000s, 2800s, and 3600s.</li> <li><b>Occultation</b>: A black bar at the end of the orbit, starting around 3500s.</li> <li><b>Unused Visibility = 2</b>: A period between 3500s and 4000s.</li> </ul>									

<b>Visit</b>	Proposal 12757, Visit 07 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 05		

<b>Patterns</b>	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=5.011	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false	(1)

<b>Fixed Targets</b>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(8)	PLCKG266.6-27.3-V04-COPY	RA: 06 15 39.1747 (93.9132279d) Dec: -57 47 15.36 (-57.78760d) Equinox: J2000		V=23.0+/-1.0	Reference Frame: ICRS

<b>Exposures</b>	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(8) PLCKG266.6-27.3-V04-COPY	ACS/WFC, ACCUM, WFC	F814W		POS TARG 0.0,0.0	Pattern 1, Exps 1-1 in Tile Visit 07 (1)	500 Secs [==>619 Secs (Pattern 1)] [==>619 Secs (Pattern 2)] [==>619 Secs (Pattern 3)] [==>619 Secs (Pattern 4)]	[1]



<b>Visit</b>	Proposal 12757, Visit 08 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 05		

<b>Patterns</b>	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=5.011	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false	

<b>Fixed Targets</b>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(9)	PLCKG266.6-27.3-V05-COPY	RA: 06 15 57.5618 (93.9898408d) Dec: -57 48 27.49 (-57.80764d) Equinox: J2000		V=23.0+/-1.0	Reference Frame: ICRS

<b>Exposures</b>	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(9) PLCKG266.6-27.3-V05-COPY	ACS/WFC, ACCUM, WFC	F814W		POS TARG 0.0,0.0	Pattern 1, Exps 1-1 in Tile Visit 08 (1)	500 Secs	[==>619 Secs (Pattern 1)] [==>619 Secs (Pattern 2)] [==>619 Secs (Pattern 3)] [==>619 Secs (Pattern 4)]

