13326 - Zooming In on the Progenitors of Ultra-Luminous Supernovae with HST

Cycle: 21, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) PS1-10AFX	ACS/WFC	1	24-Jun-2013 22:19:46.0	yes
02	(2) PS1-11AP	ACS/WFC	1	24-Jun-2013 22:19:53.0	yes
03	(3) PS1-11BAM	ACS/WFC	1	24-Jun-2013 22:20:00.0	yes
04	(4) PS1-11BDN	ACS/WFC	1	24-Jun-2013 22:20:05.0	yes
05	(5) PS1-12BQF	ACS/WFC	1	24-Jun-2013 22:20:10.0	yes
06	(6) PS1-12BMY	ACS/WFC	1	24-Jun-2013 22:20:16.0	yes

6 Total Orbits Used

ABSTRACT

The advent of wide-field optical time-domain surveys is providing an opportunity to discover and decipher new classes of astronomical transient phenomena. One of the most unexpected results from Pan-STARRS and other time-domain surveys is the discovery of ultra-luminous supernovae (ULSNe), with bolometric luminosities up to 100 times higher than normal core-collapse and Type Ia supernovae (SNe), and with spectra that do not match known SN classes. These ULSNe represent a new challenge to our understanding of the deaths of massive stars, the standard core-collapse picture, and the mechanism for powering optical emission in SNe. Progress in our understanding of these mysterious explosions requires detailed studies of their light curves and spectra (available from our Pan-STARRS data and ground-based follow-up), and studies of their galactic and sub-galactic environments - the focus of this HST proposal. We propose to take advantage of HST's superb angular resolution to study the locations of the ULSNe relative to their host UV light distribution as a probe of the progenitor population (similar studies of GRBs and core-collapse SNe suggest distinct types of massive star progenitors). Seven Pan-STARRS ULSN hosts will have HST imaging through our existing Cycle 19 and 20 programs, and here we propose to essentially double that sample and obtain rest-frame UV imaging of another 6 ULSN hosts (ranging in brightness from 22-25.5 mag). This will bring the Pan-STARRS sample to a comparable number as the GOODS core-collapse SNe and GRB hosts, which are also well-matched to the Pan-STARRS sample in redshift, allowing for a detailed statistical comparison between the populations.

OBSERVING DESCRIPTION

We wish to image six ULSN host galaxies with HST/ACS, in filters corresponding to rest-frame UV emission. For the three lower-redshift (z~0.6) targets, we use F475W, and for the three higher-redshift targets (z~1.4) we use F814W. The magnitudes of our targets are known from ground-based imaging range from 22-25.5, and so one orbit per target is sufficient. We use a standard four-point dither pattern for better PSF subsampling.

Visit

Proposal 13326, Visit 01 Tue Jun 25 02:20:23 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)

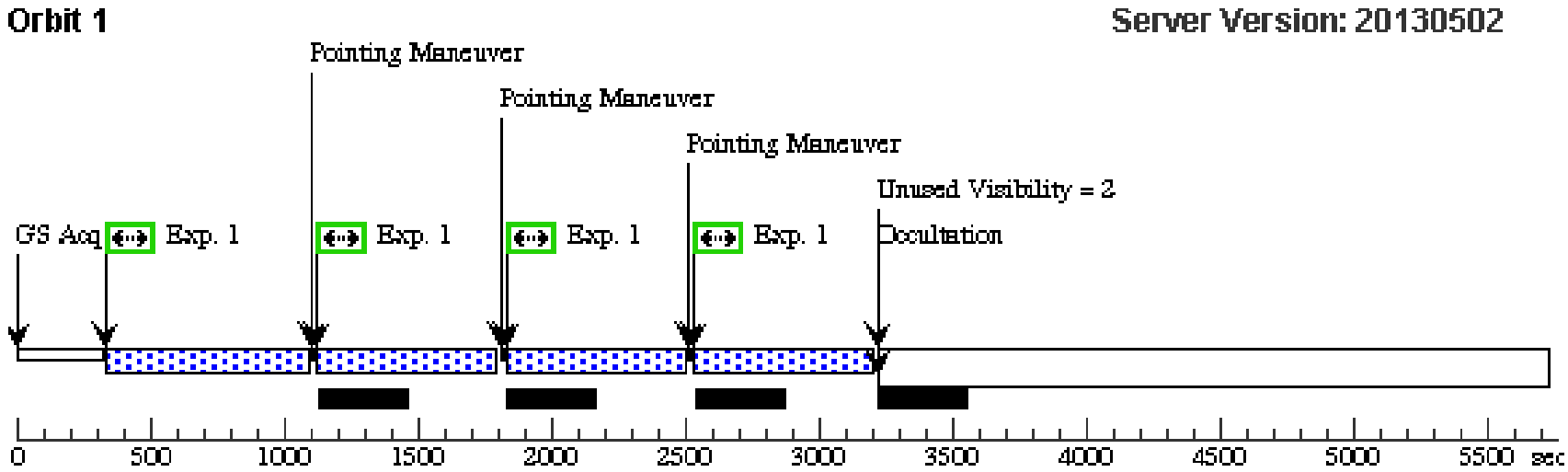
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PS1-10AFX	RA: 22 11 24.1600 (332.8506667d) Dec: +00 09 43.49 (.16208d) Equinox: J2000		V=23.70+/-0.1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) PS1-10AFX	ACS/WFC, ACCUM, WFC1-CTE	F814W			Pattern 1, Exps 1-1 in Visit 01 (1)	550 Secs (2200 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 13326, Visit 02 Tue Jun 25 02:20:25 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)

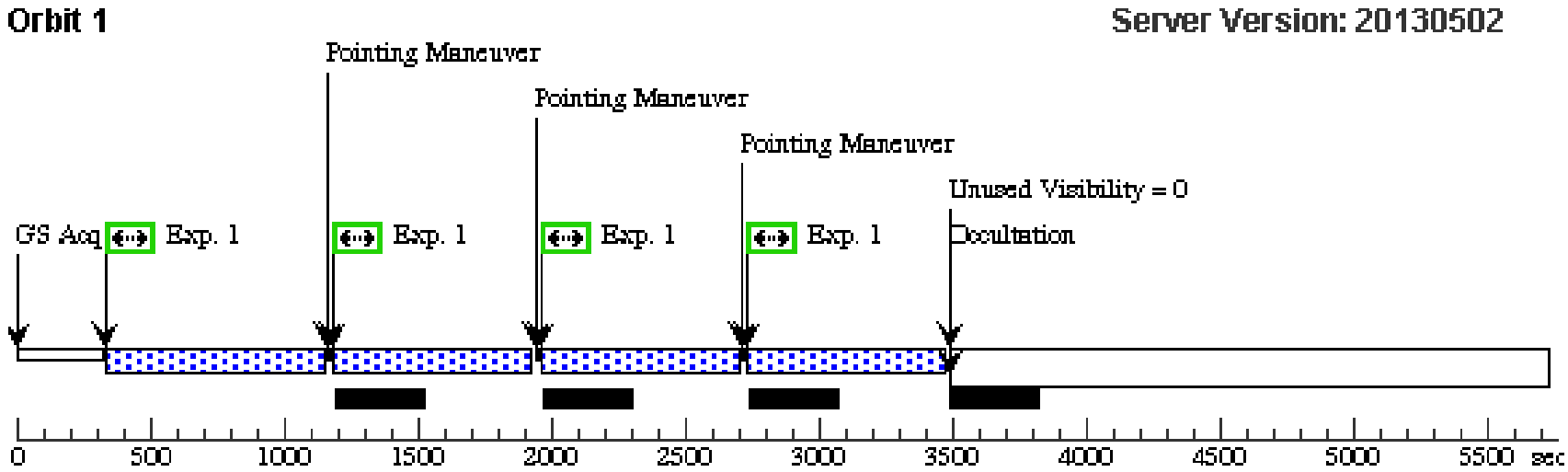
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	PS1-11AP	RA: 10 48 27.7520 (162.1156333d) Dec: +57 09 9.32 (57.15259d) Equinox: J2000		V=23.34+/-0.1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) PS1-11AP	ACS/WFC, ACCUM, WFC1-CTE	F475W			Pattern 1, Exps 1-1 in Visit 02 (1)	616 Secs (2464 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 13326, Visit 03 Tue Jun 25 02:20:25 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)

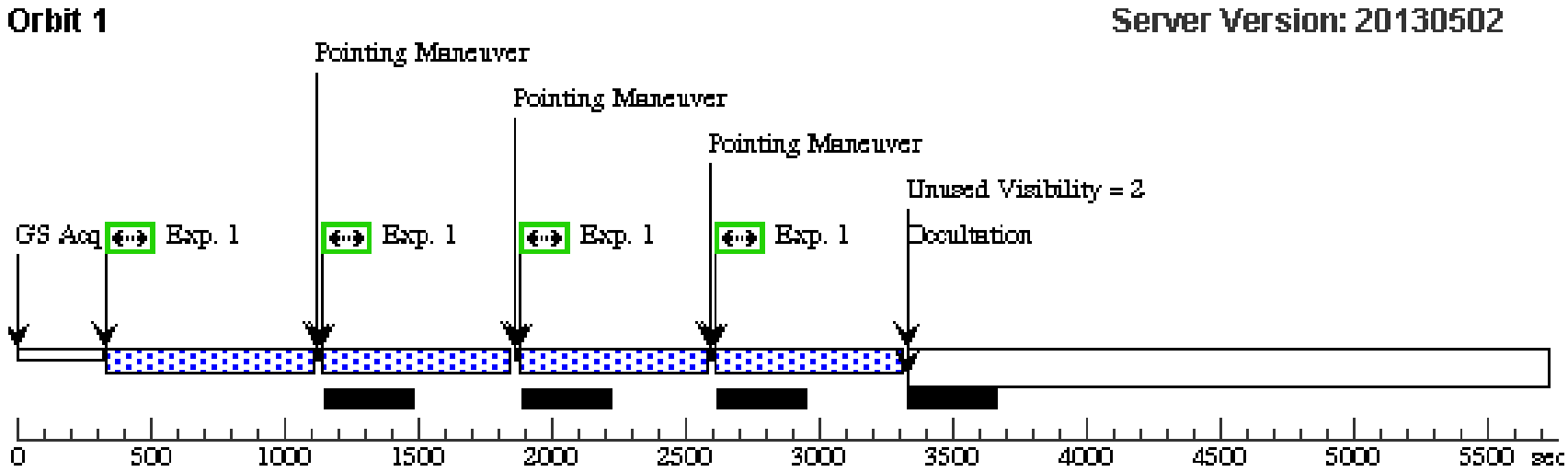
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	PS1-11BAM	RA: 08 41 14.1920 (130.3091333d) Dec: +44 01 56.95 (44.03249d) Equinox: J2000		V=23.70+/-0.15	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) PS1-11BAM	ACS/WFC, ACCUM, WFC1-CTE	F814W			Pattern 1, Exps 1-1 in Visit 03 (1)	576 Secs (2304 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 13326, Visit 04 Tue Jun 25 02:20:27 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)

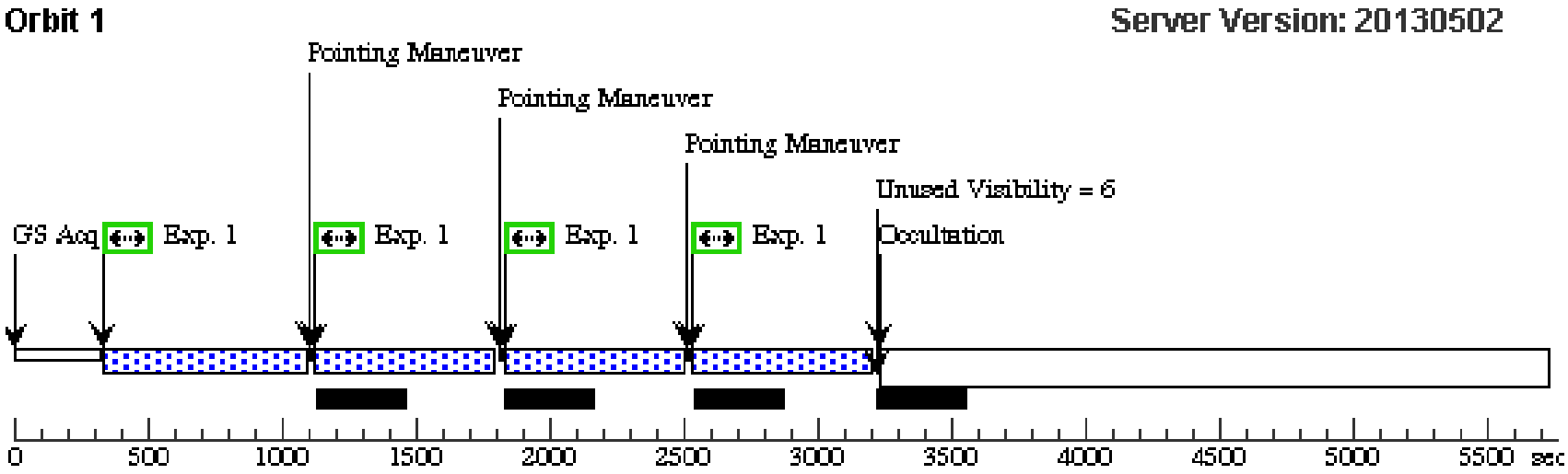
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	PS1-11BDN	RA: 02 25 46.2920 (36.4428833d) Dec: -05 03 56.57 (-5.06571d) Equinox: J2000		V=25.40+/-0.30	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(4) PS1-11BDN	ACS/WFC, ACCUM, WFC1-CTE	F475W		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 04 (1)	550 Secs (2200 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 13326, Visit 05 Tue Jun 25 02:20:27 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)

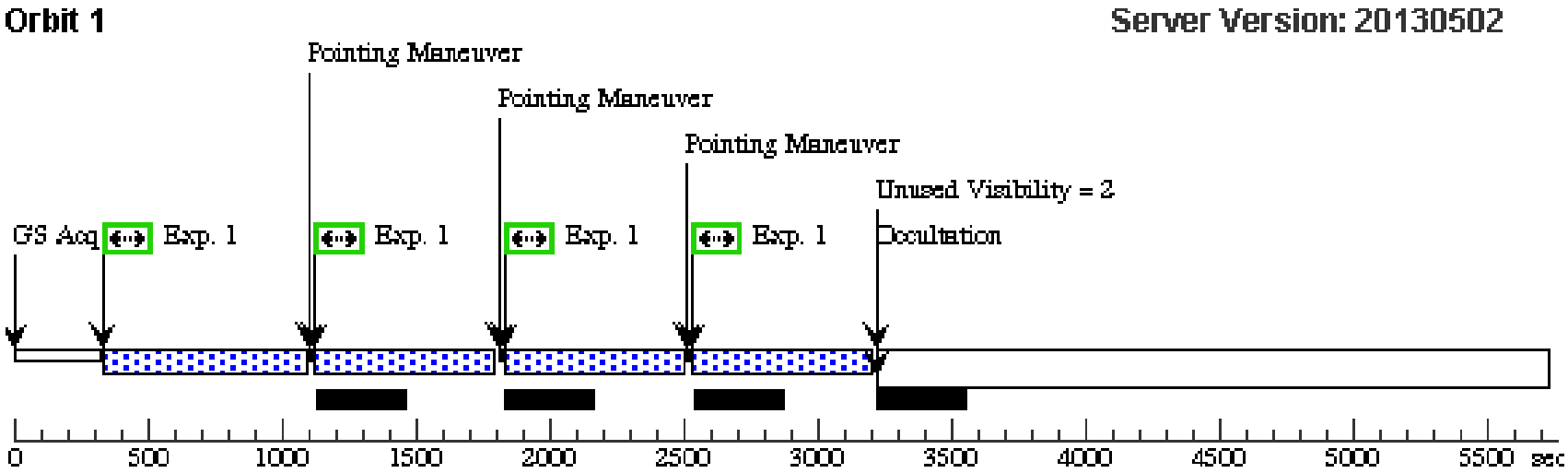
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	PS1-12BQF	RA: 02 24 54.6210 (36.2275875d) Dec: -04 50 22.72 (-4.83964d) Equinox: J2000		V=22.0+/-0.1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(5) PS1-12BQF	ACS/WFC, ACCUM, WFC1-CTE	F475W		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 05 (1)	550 Secs (2200 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 13326, Visit 06

Tue Jun 25 02:20:28 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	PS1-12BMY	RA: 03 34 13.1230 (53.5546792d) Dec: -26 31 17.21 (-26.52145d) Equinox: J2000		V=24.8+/-0.2	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(6) PS1-12BMY	ACS/WFC, ACCUM, WFC1-CTE	F814W			Pattern 1, Exps 1-1 in Visit 06 (1)	556 Secs (2224 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure