14148 - Near-IR Imaging of Three Spectacular Lensed Submillimeter Galaxies Discovered by the Herschel Lensing Survey

Cycle: 23, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Eiichi Egami (PI) (Contact)	**University of Arizona**	**eegami@as.arizona.edu**
Dr. Timothy Rawle (CoI) (ESA Member)	ESA-European Space Astronomy Centre	tim.rawle@sciops.esa.int
Gregory Walth (CoI)	University of Arizona	gwalth@as.arizona.edu
Dr. Wiphu Rujopakarn (CoI)	University of Arizona	wiphu@as.arizona.edu
Dr. Benjamin Clement (CoI) (ESA Member)	Centre de Recherche Astronomique de Lyon	benjamin.clement@univ-lyon1.fr
Prof. Pablo G. Perez-Gonzalez (CoI) (ESA Member)	Universidad Complutense de Madrid	pgperez@ucm.es
Dr. Johan Richard (CoI) (ESA Member)	Centre de Recherche Astronomique de Lyon	johan.richard@univ-lyon1.fr
Prof. Jean-Paul Kneib (CoI) (ESA Member)	Ecole Polytechnique Federale de Lausanne	jean-paul.kneib@epfl.ch
Dr. Harald Ebeling (CoI)	University of Hawaii	ebeling@ifa.hawaii.edu
Dr. Miroslava Dessauges-Zavadsky (CoI) (ESA Member)	Observatoire de Geneve	miroslava.dessauges@unige.ch
Prof. Daniel Schaerer (CoI) (ESA Member)	Observatoire de Geneve	daniel.schaerer@unige.ch
Dr. Michel Zamojski (CoI) (ESA Member)	Observatoire de Geneve	michel.zamojski@unige.ch
Prof. Andrew Blain (CoI) (ESA Member)	University of Leicester	ab520@star.le.ac.uk
Dr. Frederic Boone (CoI) (ESA Member)	Observatoire Midi-Pyrenees	frederic.boone@irap.omp.eu
Dr. Carrie Bridge (CoI)	California Institute of Technology	bridge@astro.caltech.edu
Dr. Alastair C. Edge (CoI) (ESA Member)	Durham Univ.	alastair.edge@durham.ac.uk
Dr. Ian R. Smail (CoI) (ESA Member)	Durham Univ.	ian.smail@durham.ac.uk
Dr. Mark Swinbank (CoI) (ESA Member)	Durham Univ.	a.m.swinbank@durham.ac.uk
Dr. Paul van der Werf (CoI) (ESA Member)	Universiteit Leiden	pvdwerf@strw.leidenuniv.nl

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) MACSJ0257.6-2209	WFC3/IR	2	25-Jul-2015 21:19:23.0	yes
02	(3) A773	WFC3/IR	2	25-Jul-2015 21:19:25.0	yes
03	(2) MACSJ2043.2-2144	WFC3/IR	1	25-Jul-2015 21:19:27.0	yes

5 Total Orbits Used

ABSTRACT

One of the most remarkable Herschel results is the discovery of exceptionally bright gravitationally lensed submillimeter galaxies (SMGs). The great sensitivity and mapping speed of SPIRE on Herschel have enabled us to find these rare (< 1 per square degree) extraordinary objects in large numbers. Here, we propose to conduct near-IR imaging of three spectacular lensed SMGs at z=2.04, 4.69, and 5.24 discovered by our Herschel Lensing Survey (HLS; PI: Egami), which has imaged a total of 581 massive galaxy cluster fields. High-resolution dust-continuum and CO/[CII] line maps we have obtained with SMA, PdBI, JVLA revealed complicated internal structures, allowing us to probe the properties of star-forming regions on the sub-kpc scale. What is missing, however, is the information on the underlying stellar population. We will fill this gap by obtaining WFC3/IR images and mapping out the spatial distribution of the underlying stellar population as well as the amount of dust extinction it suffers.

We will soon receive ALMA data for two of these SMGs with a spatial resolution of 0.2", and the third galaxy already has PdBI maps with a spatial resolution of 0.3" (this galaxy is too north for ALMA to observe). The ~0.15" resolution provided by WFC3/IR nicely matches these resolutions, and can produce a source-plane spatial resolution of <100 pc when the lensing magnification is taken into account. Such a combination of HST/WFC3 images and high-resolution submillimeter/millimeter maps will open up a new frontier in the study of vigorously star-forming dust-obscured galaxies at high redshift, allowing us to probe the physical properties of star-forming regions individually.

OBSERVING DESCRIPTION

We will conduct near-IR imaging of three spectacular lensed submillimeter galaxies at z=2.04, 4.69, and 5.24 using WFC3/IR with the F110W and F160W filters.

The z=2.04 galaxy is a gravitational arc extending over ~5". We will integrated for 0.5 orbit per filter.

The z=4.69 galaxy consists of four lensed images that roughly form a rectangle of ~10" on a side. We will integrate for 1 orbit per filter.

The z=5.24 galaxy is a gravitational ring with a radius of ~1" centered on a foreground lensing galaxy. We will integrate for one orbit per filter.

Visit

Proposal 14148, Visit 01, implementation Sun Jul 26 01:19:28 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(1), (2)

Fixed Targets

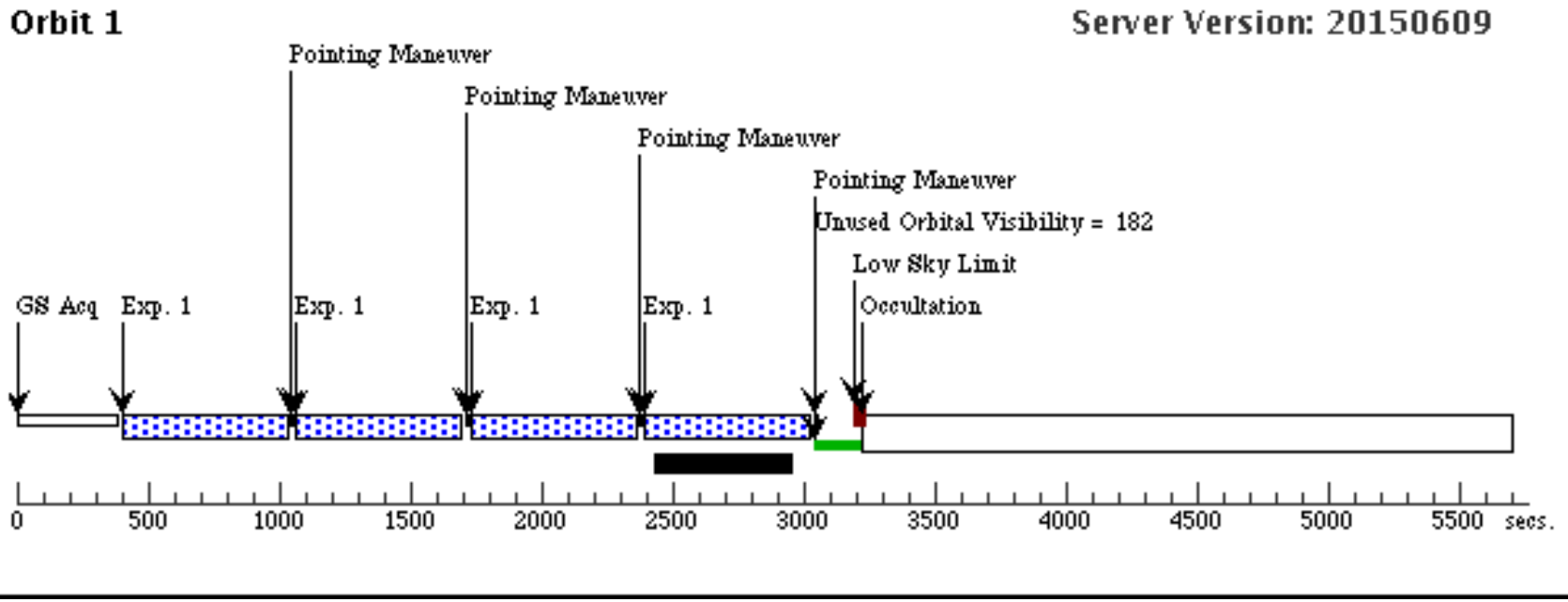
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	MACSJ0257.6-2209	RA: 02 57 41.0800 (44.4211667d) Dec: -22 09 17.80 (-22.15494d) Equinox: J2000	Redshift: 4.69	V=(?) J/H ~26-27 AB mag	Reference Frame: ICRS

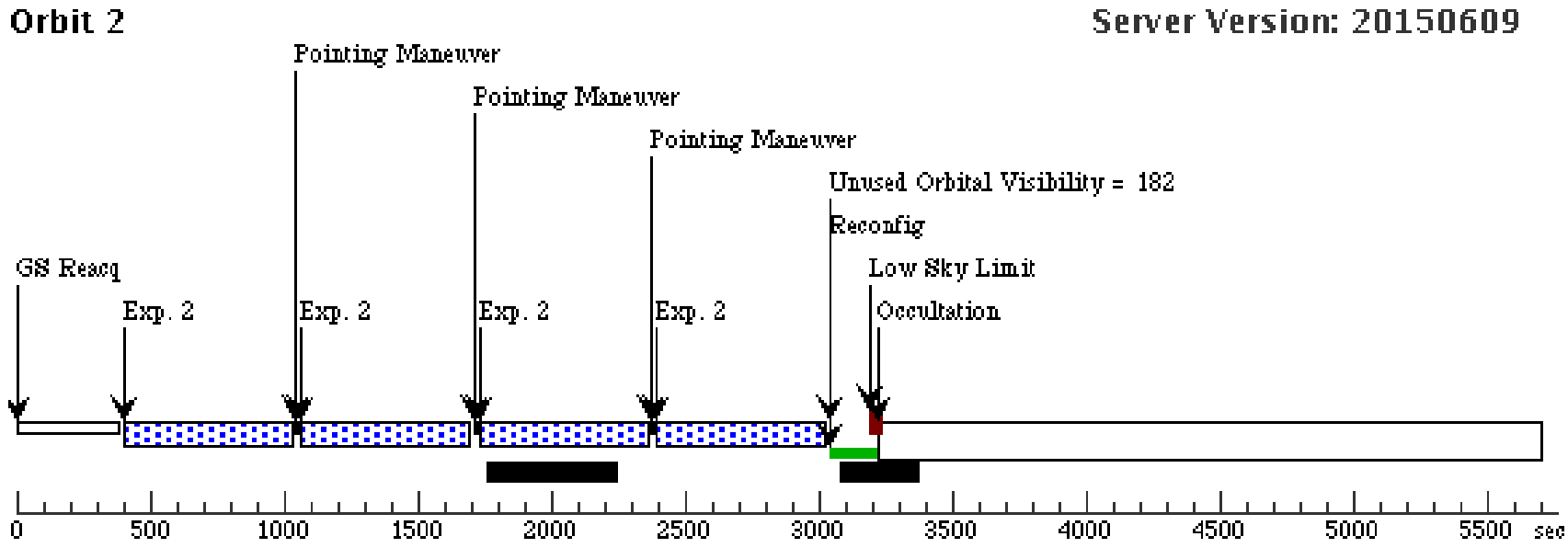
Comments: This z=4.69 galaxy consists of four lensed images that roughly form a rectangle of ~10" on a side.
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) MACSJ0257.6-2209	WFC3/IR, MULTIACCUM, IR-FIX	F110W	SAMP-SEQ=SPARS100; NSAMP=7	LOW-SKY	Pattern 1, Exps 1-1 in Visit 01 (1)	602.934229 Secs (2411.737 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(1) MACSJ0257.6-2209	WFC3/IR, MULTIACCUM, IR-FIX	F160W	SAMP-SEQ=SPARS100; NSAMP=7	LOW-SKY	Pattern 1, Exps 2-2 in Visit 01 (1)	602.934229 Secs (2411.737 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***

Orbit Structure





Visit

Proposal 14148, Visit 02, implementation Sun Jul 26 01:19:28 GMT 2015

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Diagnostics

(Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(1), (2)

Fixed Targets

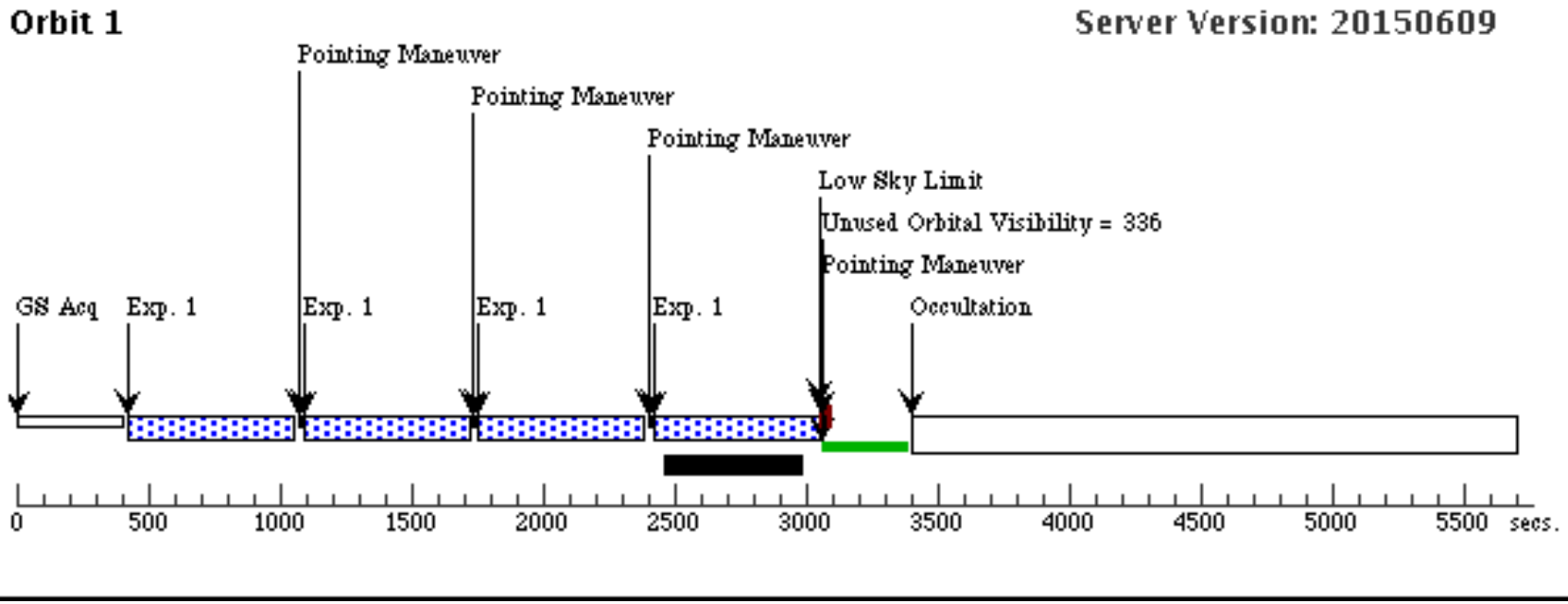
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	A773	RA: 09 18 28.6000 (139.6191667d) Dec: +51 42 23.00 (51.70639d) Equinox: J2000	Redshift: 5.24	V=(?) J/H ~ 26-27 AB mag	Reference Frame: ICRS

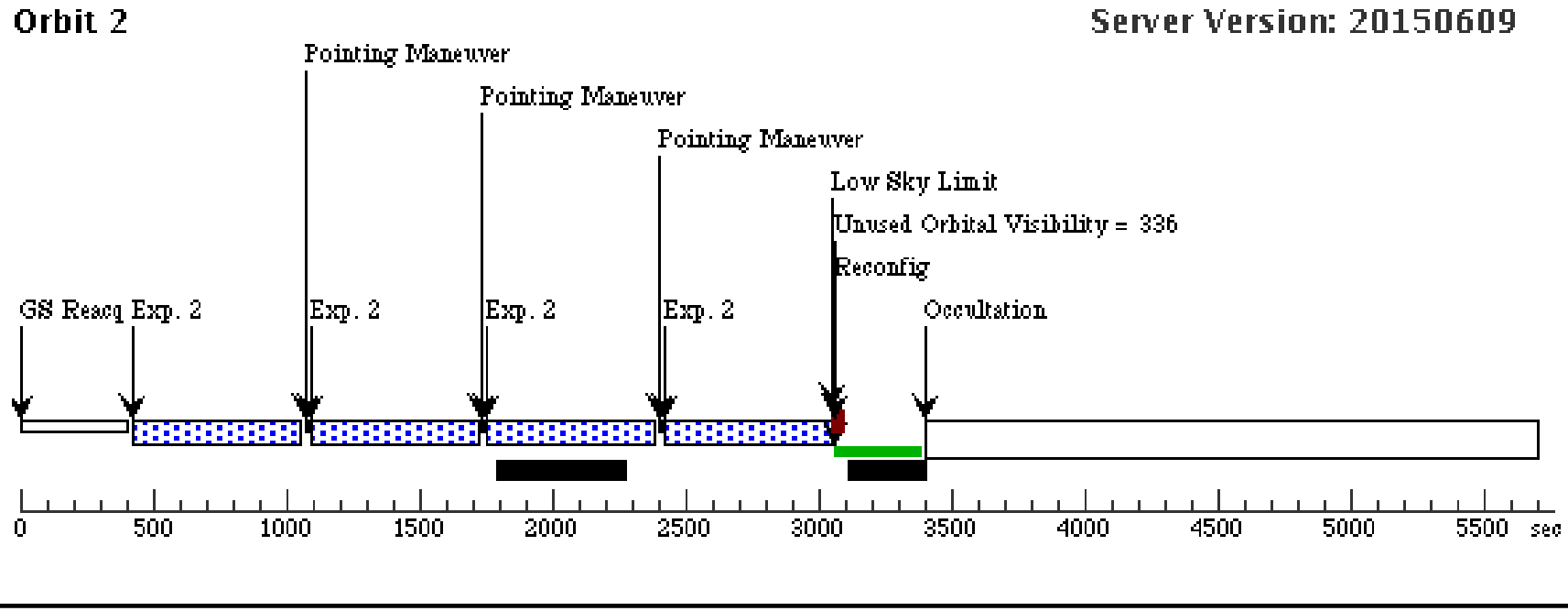
Comments: This z=5.24 galaxy is a gravitational ring with a radius of ~1" centered on a foreground lensing galaxy.
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) A773	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=SPARS100; NSAMP=7	LOW-SKY; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 02 (1)	602.934229 Secs (2411.737 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(3) A773	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS100; NSAMP=7	LOW-SKY	Pattern 1, Exps 2-2 in Visit 02 (1)	602.934229 Secs (2411.737 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***

Orbit Structure





Visit

Proposal 14148, Visit 03, implementation Sun Jul 26 01:19:28 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(1), (2)

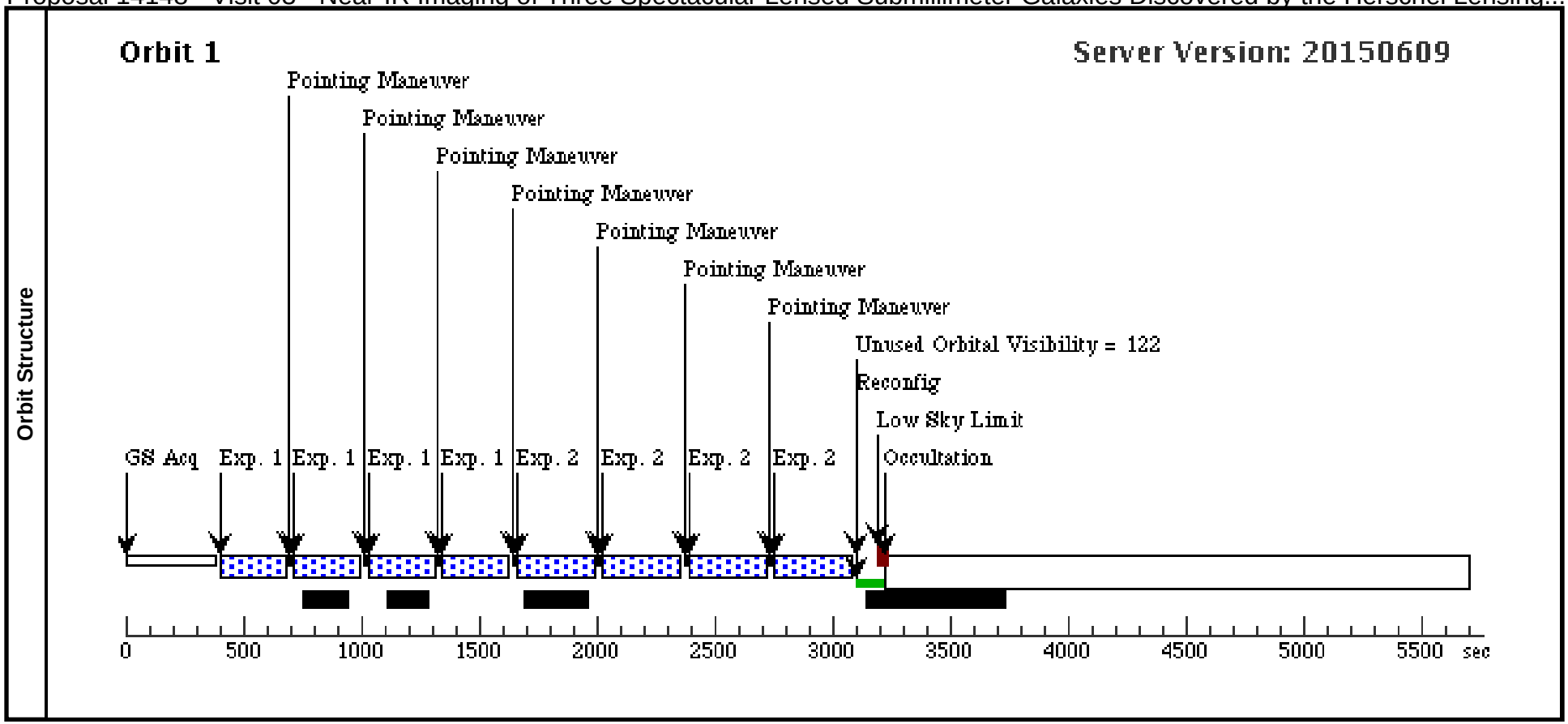
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	MACSJ2043.2-2144	RA: 20 43 14.6300 (310.8109583d) Dec: -21 44 33.60 (-21.74267d) Equinox: J2000	Redshift: 2.04	V=(?) J/H = 25-26 AB mag	Reference Frame: ICRS

Comments: This z=2.04 galaxy is a gravitational arc extending over ~5".
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) MACSJ2043.2-2144	WFC3/IR, MULTIACCUM, IR-FIX	F110W	SAMP-SEQ=SPARS50; NSAMP=6	LOW-SKY	Pattern 1, Exps 1-1 in Visit 03 (1)	252.934546 Secs (1011.738 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	 ***[1]***
2		(2) MACSJ2043.2-2144	WFC3/IR, MULTIACCUM, IR-FIX	F160W	SAMP-SEQ=SPARS50; NSAMP=7	LOW-SKY	Pattern 1, Exps 2-2 in Visit 03 (1)	302.934997 Secs (1211.74 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	 ***[1]***


Orbit Structure
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