14496 - Resolving the Stellar Populations, Structure, and Kinematics of the NIR-Brightest Lensed Galaxy at z=2

Cycle: 23, 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) MACSJ0138.0-2155	WFC3/IR	2	09-Apr-2016 21:18:02.0	yes
02	(1) MACSJ0138.0-2155	ACS/WFC	2	09-Apr-2016 21:18:04.0	yes

4 Total Orbits Used

ABSTRACT

We have recently discovered and spectroscopically confirmed a remarkably bright galaxy at z=1.95, dubbed RG2M0138, that is strongly lensed by the cluster MACSJ0138.0-2155. At near-infrared wavelengths, our target appears to be the brightest distant lensed galaxy known by almost an order of magnitude. Furthermore, whereas the majority of lensed galaxies are lower-mass star-forming systems, RG2M0138 is instead a rare example of a lensed compact quiescent galaxy. The high magnification of this exciting source will enable unique insights into the spatially-resolved stellar populations and kinematics of a compact quiescent galaxy. Such galaxies comprise about half of the massive (>10^11 Msol) galaxy population at z~2, but without lensing can only be marginally resolved even with HST. The proposed observations will address several key questions concerning

the formation of early quiescent galaxies using high-resolution imaging from ACS and WFC3-IR, resolved rest-optical spectroscopy from Keck, and IRAC imaging recently approved via a DDT request. With these data, we will: (1) Resolve the central stellar density of RG2M0138 to ~1/10 of its effective radius, thereby stringently testing the hypothesized "inside out" growth paradigm; (2) Constrain the formation history of RG2M0138 by probing the homogeneity of its stellar population, breaking parameter degeneracies using our unique resolved data spanning rest-UV to NIR wavelengths; and (3) Create an accurate lens model and source plane reconstruction, which in concert with our existing Keck spectroscopy are needed to quantify rotation and measure a robust Jeans-based dynamical mass.

OBSERVING DESCRIPTION

Two orbits of WFC3-IR imaging are divided amongst F160W and F105W exposures, each executed with a 4 point dither pattern enlarged to maintain sub-pixel sampling while dithering over areas of poor flat fielding. The brightest cluster galaxy (BCG) placed at the detector center.

Two orbits of ACS imaging are devoted to F555W imaging with 4 exposures. The 4-point dither pattern includes a large step to cover the chip gap coupled with a small step for redundancy and sub-pixel sampling. The BCG is placed at the center of WFC1.

Visit

Proposal 14496, WFC3-IR (01) Sun Apr 10 01:18:05 GMT 2016

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=5.148 Line Spacing=3.285	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=true		(1), (2)

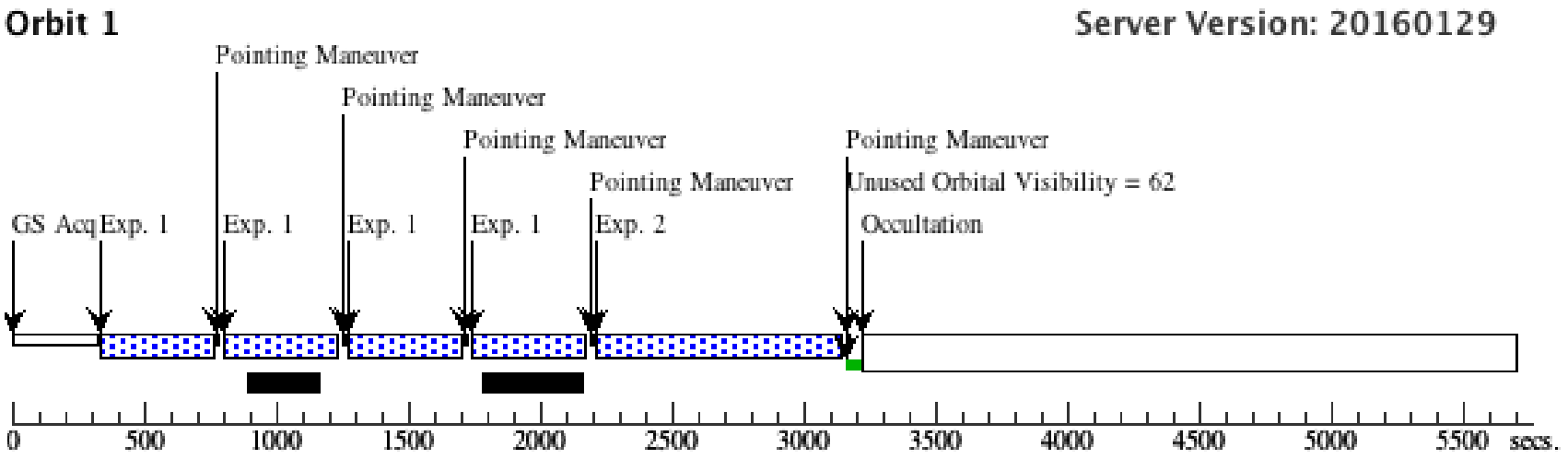
Fixed Targets

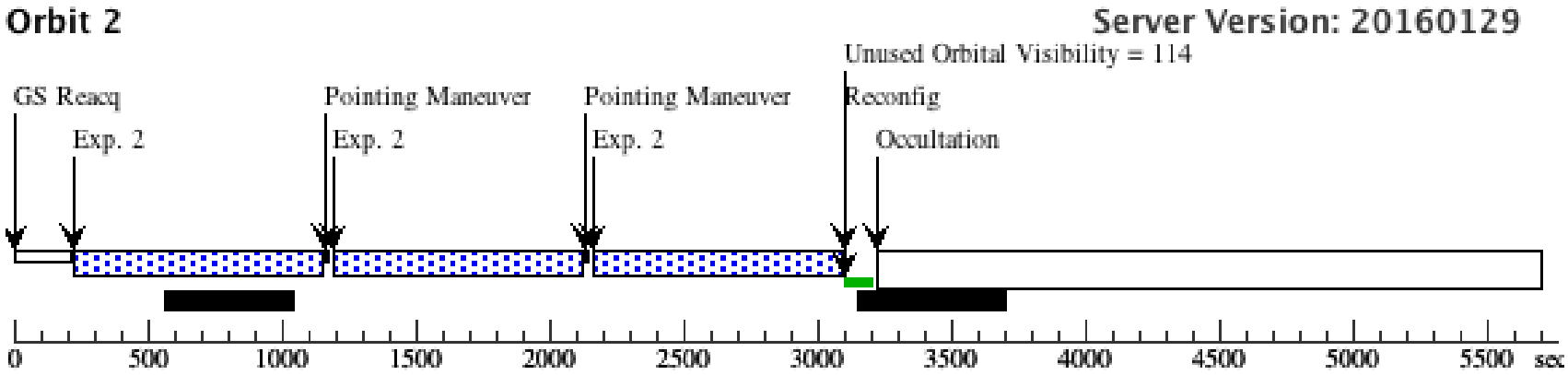
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	MACSJ0138.0-2155	RA: 01 38 3.7600 (24.5156667d) Dec: -21 55 31.50 (-21.92542d) Equinox: J2000		V=20	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) MACSJ0138.0-2155	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=9; SAMP-SEQ=SPARS50		Pattern 1, Exps 1-1 in WFC3-IR (01) (1)	402.935899 Secs (1611.744 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(1) MACSJ0138.0-2155	WFC3/IR, MULTIACCUM, IR-FIX	F105W	SAMP-SEQ=SPARS100; NSAMP=10		Pattern 1, Exps 2-2 in WFC3-IR (01) (1)	902.935198 Secs (3611.741 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)] *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***

Orbit Structure





Visit

Proposal 14496, ACS (02) Sun Apr 10 01:18:05 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=true	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.149 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=34.25 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	MACSJ0138.0-2155	RA: 01 38 3.7600 (24.5156667d) Dec: -21 55 31.50 (-21.92542d) Equinox: J2000		V=20	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) MACSJ0138.0-2155	ACS/WFC, ACCUM, WFC1-FIX	F555W			Pattern 2, Exps 1-1 in ACS (02) (2)	1100 Secs (5214 Secs)	
								[==>1255.0 Secs (Pattern 1,1)] *[==>1255.0 Secs (Pattern 1,2)]*	***[1]***
								[==>1352.0 Secs (Pattern 2,1)] *[==>1352.0 Secs (Pattern 2,2)]*	***[2]***

Orbit Structure