15670 - Studying Six Galaxy Clusters to be Used as Gravitational Lense Telescopes

Cycle: 26, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Prof. Hans Boehringer (PI) (ESA Member) (Contact)	**University Observatory, Ludwig-Maximilians-University,Munich**	**hxb@mpe.mpg.de**
Gayoung Chon (CoI) (ESA Member)	Max-Planck-Institut fur extraterrestrische Physik	gchon@mpe.mpg.de
Prof. Richard S. Ellis (CoI) (ESA Member)	University College London	richard.ellis@ucl.ac.uk

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) RXCJ1310.9+2157	ACS/WFC WFC3/IR	2	08-Apr-2020 14:00:11.0	yes
51	(1) RXCJ1310.9+2157	ACS/WFC	1	08-Apr-2020 14:00:12.0	yes
02	(2) RXCJ1717.1+2931	ACS/WFC WFC3/IR	2	08-Apr-2020 14:00:13.0	yes

5 Total Orbits Used

ABSTRACT

The most massive galaxy clusters are extremely valuable study objects for a wide range of astrophysical and cosmological studies. In our completed all-sky X-ray cluster survey we found 6 rare, massive galaxy clusters (M500 greater than 6.4 x 10e14 Msun) in the redshift range z = 0.25 to 0.5 (sweet spot for gravitational lensing studies), which have not been observed in X-ray pointed observations so far (one has a short XMM exposure). We propose these objects for XMM-Newton and the two most interesting systems for HST observations, with a main goal to characterise their properties for lensing studies and their use as gravitational lensing telescopes. In addition these observations complete an important sample of

massive clusters to be used for a range of cosmological studies.

OBSERVING DESCRIPTION

This observation request is based on an XMM-Newton proposal with jointly allocted HST Time.

Massive galaxy clusters are important study objects for Astrophysics and Cosmology. Since they are also very rare objects, the discovery and study of them is very valuable. In our recently completed all-sky survey for X-ray luminous clusters of galaxies we found six massive clusters (estimated M > 6.4 10e14 Msun) among 119 such objects in the redshift range z = 0.25 to 0.5 which have not been known and studied before. Massive clusters in this redshift range are the best grvitational lense telescopes for the study of the distant Universe. Because of the importance of these objects, we have requested XMM-Newton observing time to study all six objects, to determine their properties, their masses and the mass distribution in the clusters. The latter will allow us to construct first gravitational lensing models of the clusters and evaluate their efficiency as gravitational lense telescopes.

For the two most prominent systems we have also requested HST observations to use them as gravitational lense telescopes for the detection of magnified high redshift galaxies. To be able to determine photometric redhsifts for the galaxies in the sky field of the clusters, we requested optical observations with ACS F814W and near infrared observations with WFC3 F110W and 160W. With the obtained data we will be able to detect magnified background galxies up to redshift z = 6 and beyond. The field-of-view of the observations will cover a cluster region of 0.8 to 1.2 Mpc for ACS and 500 - 800 Mpc for WFC3. This will easily provide a complete coverage of the strong lensing regions of the clusters.

Visit

Proposal 15670, RXCJ1310.9+2157 (01), failed Wed Apr 08 18:00:14 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=true		(1)
(2)	Pattern Type=WFC3-IR-DITHER-BLOB Purpose=DITHER Number Of Points=2 Point Spacing=5.183 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.859 Angle Between Sides= Center Pattern=true		(2), (3)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	RXCJ1310.9+2157 Alt Name1: ABELL1686	RA: 13 10 56.3000 (197.7345833d) Dec: +21 57 57.00 (21.96583d) Equinox: J2000		V=18.7	Reference Frame: ICRS

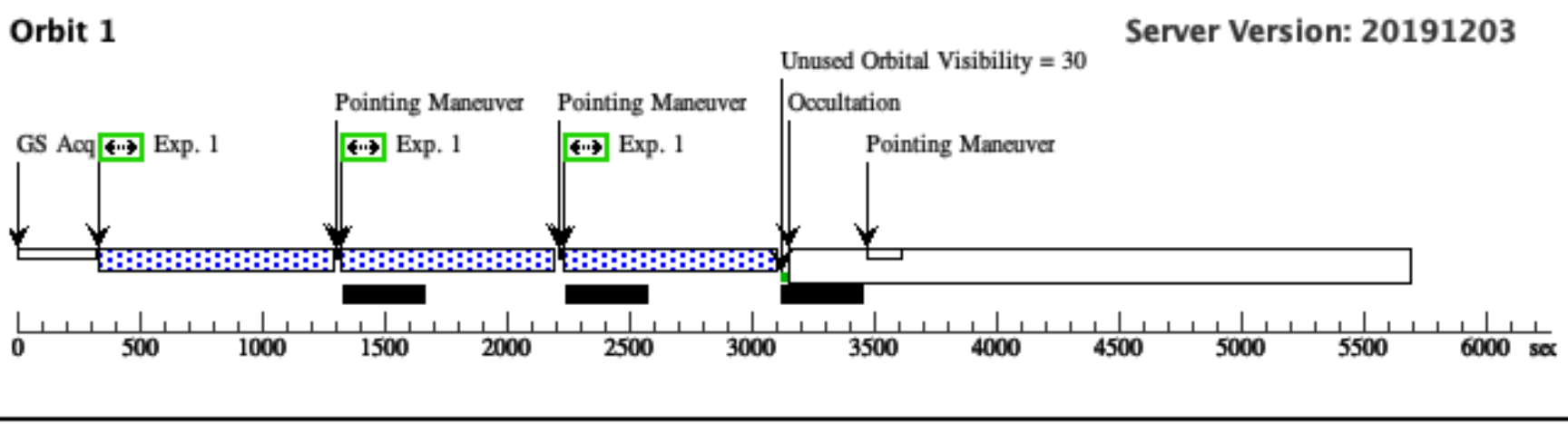
Comments:
Category=CLUSTER OF GALAXIES
Description=[GRAVITATIONAL LENS]

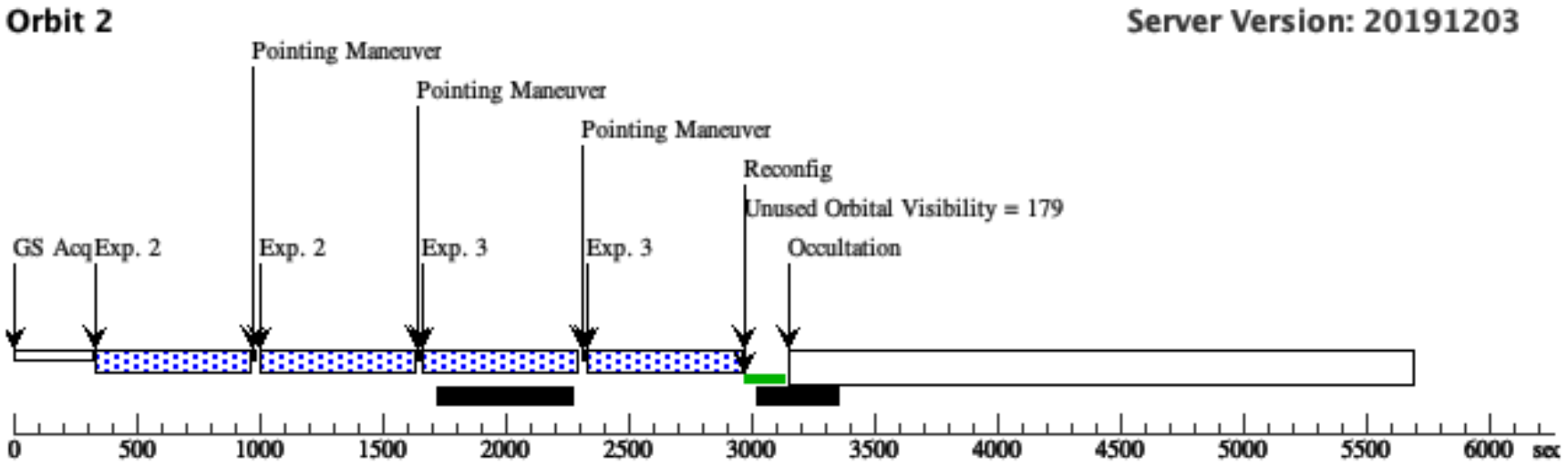
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	RXCJ1310.9+2157-F814	(1) RXCJ1310.9+2157	ACS/WFC, ACCUM, WFC	F814W		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in RXCJ1310.9+2157 (01) (1)	750 Secs (2250 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
2	RXCJ1310.9+2157-F110 (1305872)	(1) RXCJ1310.9+2157	WFC3/IR, MULTIACCUM, IR-FIX	F110W	NSAMP=10; SAMP-SEQ=STEP200	GS ACQ SCENARIO BASE1B3	Pattern 2, Exps 2-2 in RXCJ1310.9+2157 (01) (2)	599.231134 Secs (1198.462 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***
3	RXCJ1310.9+2157-F160 (1305877)	(1) RXCJ1310.9+2157	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=10; SAMP-SEQ=STEP200		Pattern 2, Exps 3-3 in RXCJ1310.9+2157 (01) (2)	599.231134 Secs (1198.462 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***

Comments: We invite the schedulers to rearrange the exposures within the visit as they wish to best fit the F110W's into the darker time of the orbit as anticipated from the specific geometry that the schedule implies. We discussed this specific point with Dr. Mc Cullough via email.

Orbit Structure





Visit

Proposal 15670, RXCJ1310.9+2157 (51), implementation Wed Apr 08 18:00:14 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: SAME ORIENT AS 01

Comments: Partial repeat of visit 01

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=true		(1)

Fixed Targets

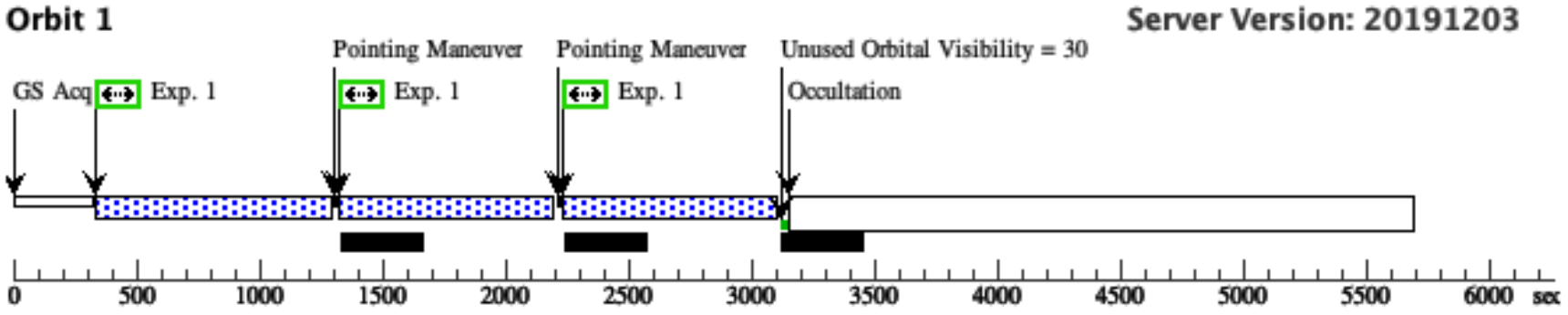
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	RXCJ1310.9+2157 Alt Name1: ABELL1686	RA: 13 10 56.3000 (197.7345833d) Dec: +21 57 57.00 (21.96583d) Equinox: J2000		V=18.7	Reference Frame: ICRS

Comments:
Category=CLUSTER OF GALAXIES
Description=[GRAVITATIONAL LENS]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	RXCJ1310.9+2157-F814	(1) RXCJ1310.9+2157	ACS/WFC, ACCUM, WFC	F814W		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in RXCJ1310.9+2157 (51) (1)	750 Secs (2250 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	*[1]*

Orbit Structure



Visit

Proposal 15670, RXCJ1717.1+2931 (02), scheduling Wed Apr 08 18:00:14 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=true		(1)
(2)	Pattern Type=WFC3-IR-DITHER-BLOB Purpose=DITHER Number Of Points=2 Point Spacing=5.183 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.859 Angle Between Sides= Center Pattern=true		(2), (3)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	RXCJ1717.1+2931	RA: 17 17 6.7000 (259.2779167d) Dec: +29 31 21.50 (29.52264d) Equinox: J2000		V=19.0	Reference Frame: ICRS

Comments:
Category=CLUSTER OF GALAXIES
Description=[GRAVITATIONAL LENS]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	RXCJ1717.1+2931-F814	(2) RXCJ1717.1+2931	ACS/WFC, ACCUM, WFC	F814W			Pattern 1, Exps 1-1 in RXCJ1717.1+2931 (02) (1)	750 Secs (2286 Secs) *[==>762.0 Secs (Pattern 1)]* *[==>762.0 Secs (Pattern 2)]* *[==>762.0 Secs (Pattern 3)]*	***[1]***
2	RXCJ1717.1+2931-F110 (1305879)	(2) RXCJ1717.1+2931	WFC3/IR, MULTIACCUM, IR-FIX	F110W	NSAMP=10; SAMP-SEQ=STEP200		Pattern 2, Exps 2-2 in RXCJ1717.1+2931 (02) (2)	599.231134 Secs (1198.462 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***
3	RXCJ1717.1+2931-F160 (1305878)	(2) RXCJ1717.1+2931	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=10; SAMP-SEQ=STEP200		Pattern 2, Exps 3-3 in RXCJ1717.1+2931 (02) (2)	599.231134 Secs (1198.462 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***

Comments: We invite the schedulers to rearrange the exposures within the visit as they wish to best fit the F110W's into the darker time of the orbit as anticipated from the specific geometry that the schedule implies. We discussed this specific point with Dr. Mc Cullough via email.

Orbit Structure