15609 - Feedback in the Molecular Disk of the Radio-Loud Seyfert Galaxy IC 5063

Cycle: 26, 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) IC-5063	WFC3/UVIS	1	11-Dec-2018 14:01:00.0	yes
02	(1) IC-5063	WFC3/UVIS	1	11-Dec-2018 14:01:01.0	yes

2 Total Orbits Used

ABSTRACT

We propose a 250ks ACIS-S observation of IC 5063, a nearby type II Seyfert galaxy with strong 5 arcsec- long double-lobed radio emission interacting with a dense molecular disk to create a fast molecular outflow. The mechanism coupling the AGN to the molecular ISM is complex, and includes (1) photoionization, and (2) collisional ionization (shocks) from the interaction with small radio jets. (3) This process may also generate large-scale winds. There is no clear well-understood feedback picture. Hydro-dynamical simulations have shown that multiphase hot/cold interactions are important to understanding feedback. IC5063 is the optimal galaxy where we can image the details of that coupling directly with

Chandra at a scale compatible with the ALMA and HST data.

OBSERVING DESCRIPTION

We aim to measure H-alpha, H-beta, the [S II] 6717,6731 and red continuum of IC 5062 (z~0.011) to complement existing [O III] and blue continuum observations previously made using WFPC2. Ratios between continuum-subtracted line maps will be used to make "BPT maps" to diagnose the local ionization state. The blue "continuum" observations should include lines in the [O III] H-beta complex, but with our new Balmer observations we will be able to determine any such contamination to better precision than was previously possible.
The overall goals are similar to Program #15350 (PI: Maksym), as are the basic strategies. This program requires some changes with respect to specific filters, and it is a WFC3-only program (e.g. #15350 was a larger program that required ACS and the ramp filters for some targets).

We begin with the archival FR553N [O III] images from HST WFPC2 to locate the faintest useful [O III] regions. We then assume the nuclear spectrum from the 6dF survey for line/line/continuum ratios. There is no ETC option for WFPC2-based normalization, so based on inspection of the ACS F606W filter throughput curve, we assume that it is a reasonable approximation for WFPC2 F606W for the purposes of spectral normalization.

For the regions of interest, we infer S/N~3 within [1300,500,800]s for [FQ492N,F665N,F673N]. The 6dF spectrum does not cover the full F763M red continuum filter, so we assume the NGC 1068 Sy2 spectrum (200s). We will therefore obtain the optimal S/N with FQ492N and F763M packed in one orbit, and F665N, F673N packed in the other. For actual exposures, we expect S/N closer to ~5 per pixel in the fainter [O III] regions. Saturation does not appear to be an issue.

We use an "optimal" pre-set dither to sample the PSF in all cases. This pattern shift is small enough that it should not affect quad filter vignetting, particularly given the region of interest is r<5 arcsec in extent.

The exposure for FQ492N (H-beta) is most demanding, and based on its long exposure we use 3 pointings to eliminate cosmic rays. For all other filters, 2 exposures should be sufficient. We have packed exposures to ensure that buffer dumps can be read out in parallel to subsequent exposures.

The bright object tool shows two bright objects which may be mildly saturated. These are not of interest to the program, and are far enough from the aimpoint that they may not fall within the FOV.

From the ETC, saturation is not a danger. The BOT warns of 2 saturating stars that are not near the regions of interest. We use a 12e- pre-flash for all exposures.

Visit

Proposal 15609, IC 5063 H-beta, red continuum (01), implementation Tue Dec 11 19:01:01 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: Two short F763M exposures will sample the red continuum for lines observed in Visit 02, with a 2-point dither for cosmic rays and PSF sampling.

Three FQ492N exposures will sample H-beta, with a 3-point dither for cosmic rays and PSF sampling.

Diagnostics

(IC 5063 H-beta (01.002)) Warning (Form): POS TARG & PATTERN should be used carefully with WFC3 quad filters to avoid placing the target on the vignetted part of the field of view or moving it to another quadrant.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)
(3)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(2)

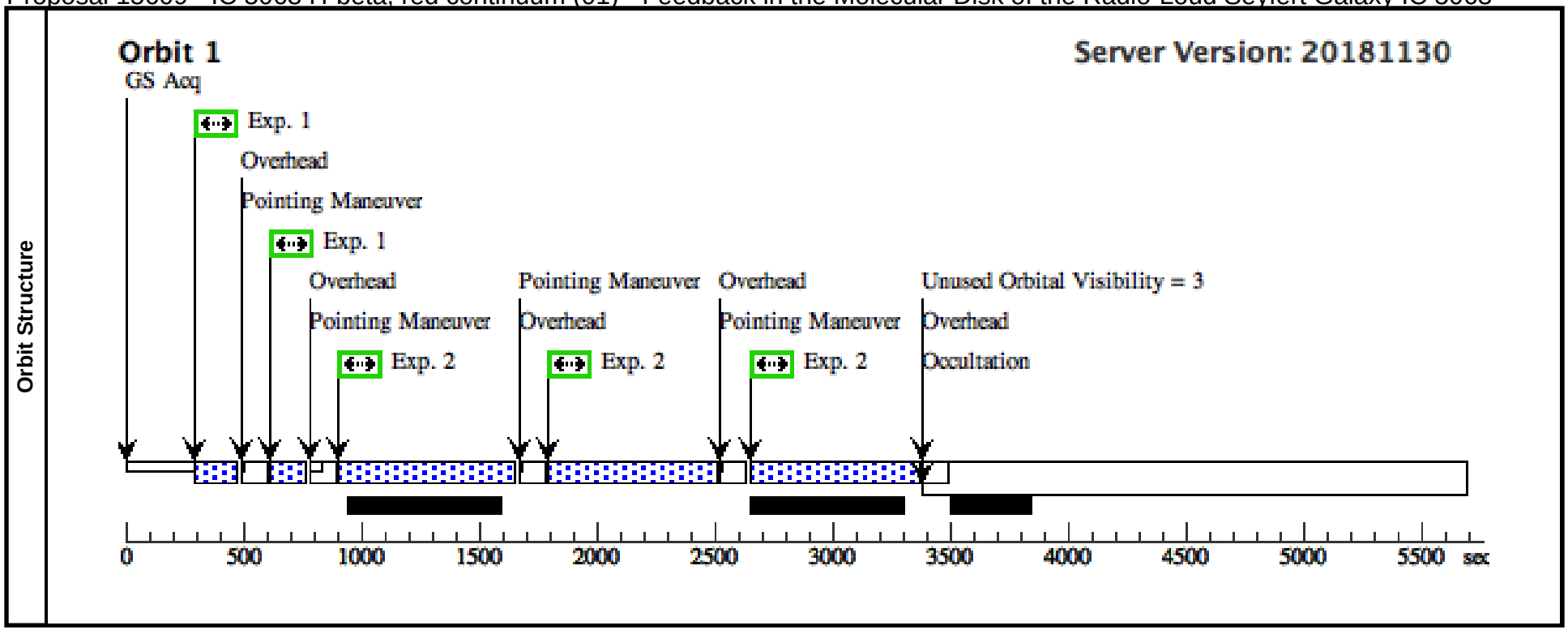
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	IC-5063	RA: 20 52 2.3290 (313.0097042d) Dec: -57 04 7.60 (-57.06878d) Equinox: J2000		V=13.6	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[NLR, NUCLEUS, SEYFERT]
Extended=YES

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	IC 5063 red continuum (WFC3UVIS.im.1285645)	(1) IC-5063	WFC3/UVIS, ACCUM, UVIS2	F763M	FLASH=12		Pattern 2, Exps 1-1 in IC 5063 H-beta, red continuum (01) (2)	100 Secs (304 Secs) *[==>152.0 Secs (Pattern 1)]* *[==>152.0 Secs (Pattern 2)]*	***[1]***
Comments: Two short F763M exposures will sample the red continuum for lines observed in Visit 02, with a 2-point dither for cosmic rays and PSF sampling.									
2	IC 5063 H-beta (WFC3UVIS.im.1285646)	(1) IC-5063	WFC3/UVIS, ACCUM, UVIS-QUAD	FQ492N	FLASH=12		Pattern 3, Exps 2-2 in IC 5063 H-beta, red continuum (01) (3)	670 Secs (2166 Secs) *[==>722.0 Secs (Pattern 1)]* *[==>722.0 Secs (Pattern 2)]* *[==>722.0 Secs (Pattern 3)]*	***[1]***
Comments: Three FQ492N exposures will sample H-beta, with a 3-point dither for cosmic rays and PSF sampling.									


Orbit Structure
Orbit 1
Server Version: 20181130
GS Acq
Exp. 1
Overhead
Pointing Maneuver
Exp. 1
Overhead
Pointing Maneuver
Exp. 2
Pointing Maneuver
Overhead
Exp. 2
Overhead
Pointing Maneuver
Exp. 2
Unused Orbital Visibility = 3
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15609, IC 5063 H-alpha, [S II] (02), implementation Tue Dec 11 19:01:01 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: Two F665N exposures will sample the H-alpha, with a 2-point dither for cosmic rays and PSF sampling.

Two F673N exposures will sample [S II], with a 2-point dither for cosmic rays and PSF sampling.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1), (2)

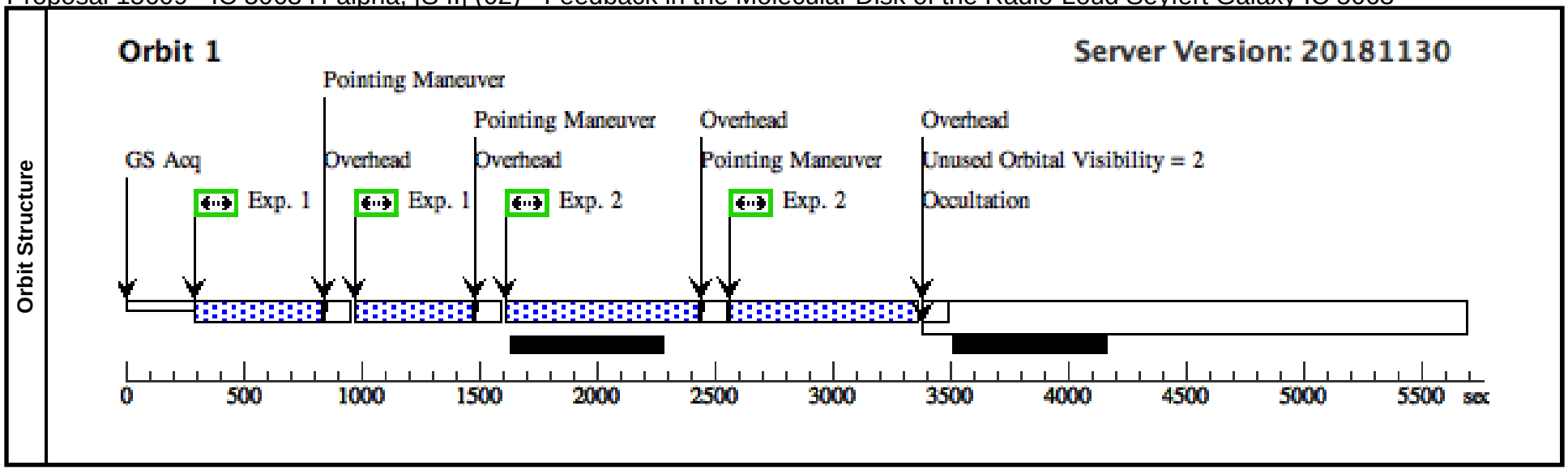
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	IC-5063	RA: 20 52 2.3290 (313.0097042d) Dec: -57 04 7.60 (-57.06878d) Equinox: J2000		V=13.6	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[NLR, NUCLEUS, SEYFERT]
Extended=YES

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	IC 5063 H-alpha (WFC3UVIS.im.1285647)	(1) IC-5063	WFC3/UVIS, ACCUM, UVIS2	F665N	FLASH=12		Pattern 2, Exps 1-1 in IC 5063 H-alpha, [S II] (02) (2)	400 Secs (1012 Secs) *[==>506.0 Secs (Pattern 1)]* *[==>506.0 Secs (Pattern 2)]*	***[1]***
Comments: Two F665N exposures will sample the H-alpha, with a 2-point dither for cosmic rays and PSF sampling.									
2	IC 5063 [S II] (WFC3UVIS.im.1285648)	(1) IC-5063	WFC3/UVIS, ACCUM, UVIS2	F673N	FLASH=12		Pattern 2, Exps 2-2 in IC 5063 H-alpha, [S II] (02) (2)	700 Secs (1612 Secs) *[==>806.0 Secs (Pattern 1)]* *[==>806.0 Secs (Pattern 2)]*	***[1]***
Comments: Two F673N exposures will sample [S II], with a 2-point dither for cosmic rays and PSF sampling.									


Orbit Structure
Orbit 1
Server Version: 20181130
Pointing Maneuver
Pointing Maneuver
Overhead
Overhead
GS Acq
Overhead
Overhead
Pointing Maneuver
Unused Orbital Visibility = 2
Exp. 1
Exp. 1
Exp. 2
Exp. 2
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec