16201 - Testing the Origin of Vast Extended Molecular Gas Outside High-z Post-Starbursts

Cycle: 28, 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) J1448+1010	WFC3/IR	1	26-Jun-2020 15:00:31.0	yes
02	(2) J2258+2313	WFC3/IR	1	26-Jun-2020 15:00:32.0	yes

2 Total Orbits Used

ABSTRACT

We have discovered spectacular vast molecular gas reservoirs extending tens of kpc outside of two high-redshift post-starburst galaxies as part of an ongoing ALMA CO survey of such objects. While the host galaxies are only 3-5kpc in size, nearly half the total CO luminosity in each system

extends 25-45kpc from the hosts. This discovery was unexpected and both the scale and magnitude of the extended gas features are unprecedented at any redshift. The origin of the vast CO is unclear, but may be related to AGN outflows, tidal stripping, and/or environmental effects. We propose a low-cost, high-impact VLA+HST campaign to determine the origins of the remarkable gas features and their broader implications for galaxy evolution, including galactic feedback, the formation of extended stellar halos, and metal enrichment of the circumgalactic medium. The VLA data are designed to characterize the presence and effects of AGN - existing data cannot even rule out radio-loud AGN activity - while the HST data are needed to discover stellar tidal debris and/or close merging companions. Together these datasets can uniquely determine the origin of the incredible molecular gas features we have found and place this unexpected discovery in broader context.

OBSERVING DESCRIPTION

This observing program will acquire 1-orbit depth WFC3-IR / F110W imaging of two z~0.6 post-starburst galaxies. The goal is to spatially resolve the galaxies themselves and search for tidal stellar streams, nearby companions, and other faint / low surface brightness emission.

We will observe in four dither positions using the WFC3-IR-DITHER-BOX pattern in order to properly sample the PSF. We use a slighly larger dither pattern than the default, corresponding to pixel positions of (0,0), (10.0,3.5), (6.5,10.0), and (-3.5,6.5), because some bad pixels come in clumps. We do not attempt to dither over the IR blobs or the death star dead spot. To maximize our dynamic range, we will use STEP50 with NSAMP=15 at each dither position. We use a second exposure at a single dither position with NSAMP=14 to fill out the orbit.

Visit

Proposal 16201, SDSS_J1448+1010 (01) Fri Jun 26 19:00:33 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.42 Line Spacing=0.919	Coordinate Frame=POS-TARG Pattern Orientation=17.370 Angle Between Sides=76.301 Center Pattern=false		(1)

Fixed Targets

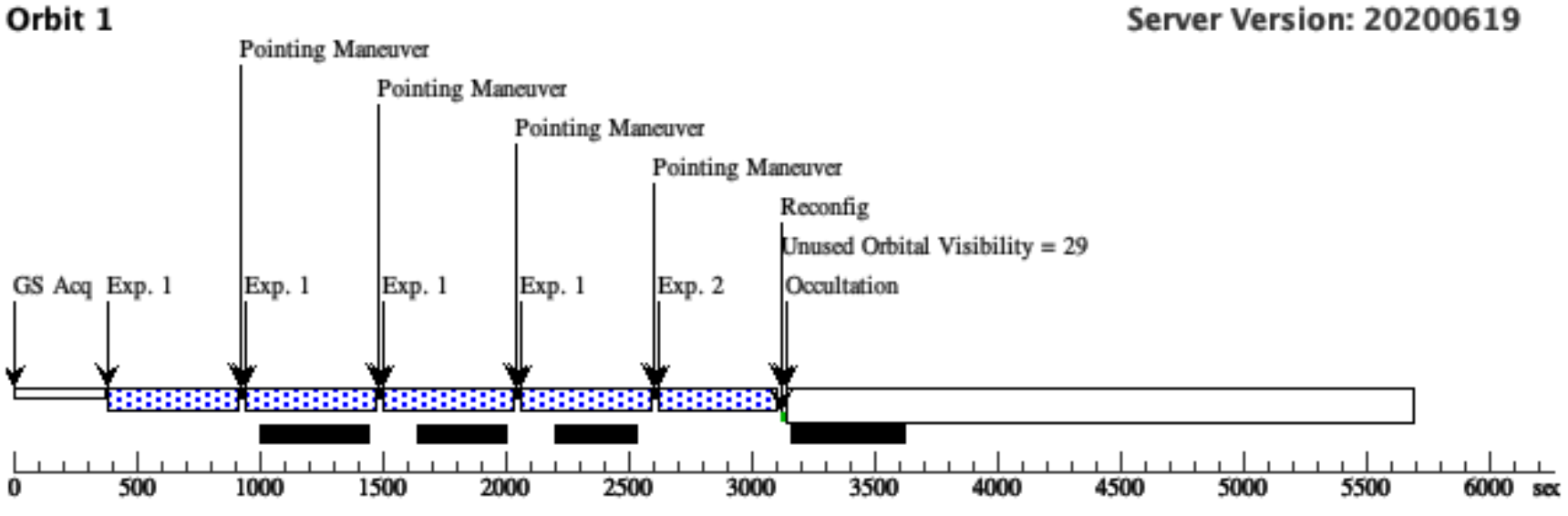
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	J1448+1010	RA: 14 48 45.9192 (222.1913300d) Dec: +10 10 10.55 (10.16960d) Equinox: J2000		V=20.0	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY, INTERACTING GALAXY, TIDAL TAIL]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) J1448+1010	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 2, Exps 1-1 in SDSS_J1448+1010 (01) (2)	499.234285 Secs (1996.937 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(1) J1448+1010	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=14; SAMP-SEQ=STEP50			449.233834 Secs (449.234 Secs) *[==>]*	***[1]***

Orbit Structure



Visit

Proposal 16201, SDSS_J2258+2313 (02) Fri Jun 26 19:00:33 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.42 Line Spacing=0.919	Coordinate Frame=POS-TARG Pattern Orientation=17.370 Angle Between Sides=76.301 Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	J2258+2313	RA: 22 58 5.6750 (344.5236458d) Dec: +23 13 16.12 (23.22114d) Equinox: J2000		V=20.5	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY, INTERACTING GALAXY, TIDAL TAIL]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) J2258+2313	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=15; SAMP-SEQ=STEP50		Pattern 2, Exps 1-1 in SDSS_J2258+2313 (02) (2)	499.234285 Secs (1996.937 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(2) J2258+2313	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=14; SAMP-SEQ=STEP50			449.233834 Secs (449.234 Secs) *[==>]*	***[1]***

Orbit Structure