



14938 - Impact of the most extreme AGN-driven molecular outflow on its host galaxy

Cycle: 25, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
04	(1) IRAS-03158+4227	ACS/WFC WFC3/IR WFC3/UVIS	2	25-Aug-2017 15:03:35.0	yes

2 Total Orbits Used

ABSTRACT

Using the VLA, we have found that the OH 1.667 GHz maser line (OHM) is a viable new avenue to identify molecular outflows and study AGN-feedback. We tentatively detect high-velocity wings in the OHM spectrum of IRAS 03158+4227, whose velocity profile matches with its OH 119 micron absorption line profile, but is limited by the modest SNR of our detection. This suggests a physical relation between the outflowing cold gas,

and compact circumcuclear molecular gas regions. We here request further observations of the OHM emission in IRAS 03158+4227, to confirm this correspondence, and establish the OHM feature as a reliable outflow diagnostic. We also request UV to near-infrared HST observations of IRAS 03158+4227 for the first time, so as to constrain the young and old stellar populations, study the tidal tails detected in CO(1-0), and detect the impact of kpc scale outflows on star formation in outflow hosts. We therefore propose for joint VLA- HST observations of IRAS 03158+4227 ($z = 0.13$), hosting the most extreme molecular outflow in the local Universe, in order to further develop our understanding of AGN feedback, its impact on its host galaxy at all spatial scales.

OBSERVING DESCRIPTION

We were allocated two orbits of HST imaging for IRAS 03158+4227 in the broadband filters WFC3-IR/F160W, ACS/F814W, and the WFC3-UVIS/F275W. Our target source hosts the most powerful molecular outflow in the local universe, as per our CO(1-0) observations. Since we have spatially resolved CO(1-0) observations of the molecular outflow in IRAS 03158+4227, it is the ideal target in which to study the impact of the $\sim$ kpc scale outflows on the star formation.

Imaging with WFC3-UVIS using F275W filter traces the rest-frame near-UV emission, and therefore the young stellar population formed in recent starburst activity. At a redshift of $z \sim 0.1344$, the H-alpha line redshifts into the F814W band, and thus displays the active star formation. Finally, imaging with the F160W image will allow us to correct for the extinction in the F275W/F814W filters. Together, these enable us to characterize the young and old stellar populations, and the near-IR dust extinction on small spatial scales $< \sim 0.13''$ (~ 300 pc at $z \sim 0.134$).

Additionally, IRAS 03158+4227 is a merger with a companion at ~ 42 kpc distance (~ 20 arcsec), and we have detected molecular gas tidal tails in the CO(1-0) emission. Our planned observations are sensitive to the low-surface brightness extended star formation and emission along the molecular 'bridge', which could not be detected at high significance with SDSS, and would be highly complementary to our CO(1-0) observations.

Observations in each band will be split into at least three dithered sub-exposures to allow cosmic ray subtraction and to remove hot pixels. We choose to center off-centre from the galaxy, so as to avoid placing the any of the extended galaxy structure on the gap between the CCDs. We plan to image in the ACS/F814W filter in one orbit, and image using the WFC3 UVIS/IR filters in the second orbit. Our exposure times were derived using previous SDSS imaging.

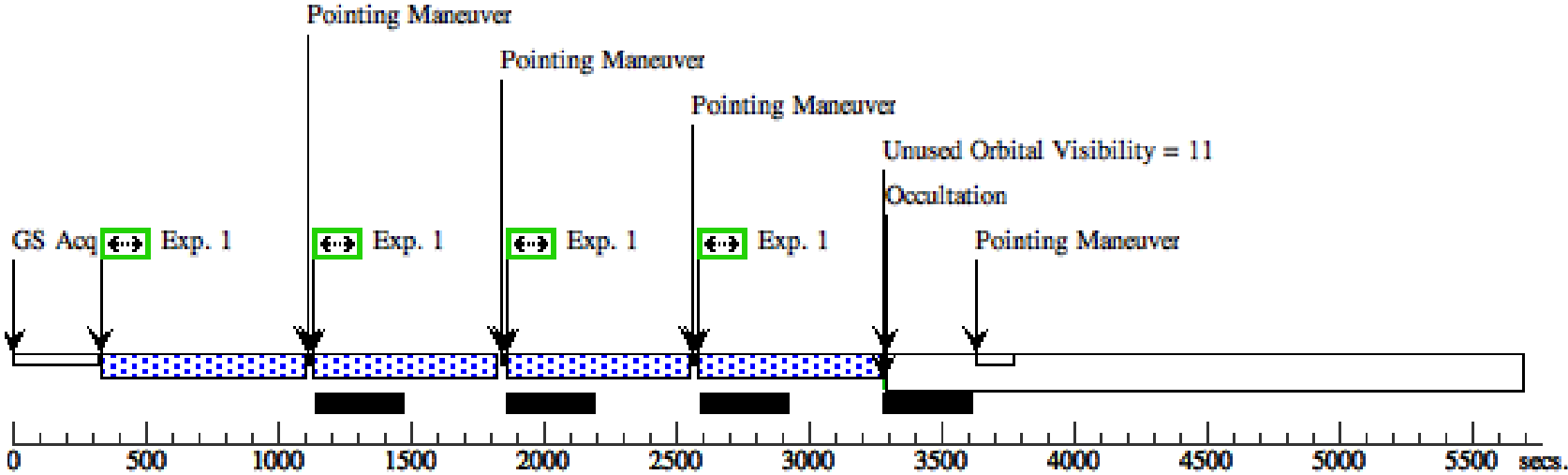
Proposal 14938 - IRAS 03158+4117 (04) - Impact of the most extreme AGN-driven molecular outflow on its host galaxy

Visit	Proposal 14938, IRAS 03158+4117 (04)										Fri Aug 25 19:03:36 GMT 2017			
	Diagnostic Status: No Diagnostics													
	Scientific Instruments: WFC3/IR, WFC3/UVIS, ACS/WFC													
	Special Requirements: ORIENT 175D TO 260 D													
Patterns	#	Primary Pattern					Secondary Pattern					Exposures		
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.262 Line Spacing=0.192			Coordinate Frame=POS-TARG Pattern Orientation=18.39 Angle Between Sides=68.14 Center Pattern=false								(1)	
	(2)	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								(3)	
	(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)	IRAS-03158+4227		RA: 03 19 11.9470 (49.7997792d) Dec: +42 38 25.47 (42.64041d) Equinox: J2000		Redshift: 0.1344		V=18.39+/-0.05		Reference Frame: SIMBAD				
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Extended=YES													
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit		
	1	ACS/F814W	(1) IRAS-03158+4227	ACS/WFC, ACCUM, WFC		F814W		POS TARG null,-55	Pattern 1, Exps 1-1 in IRAS 03158+4117 (04) (1)	565 Secs (2260 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]		[1]		
	2	WFC3/F275W	(1) IRAS-03158+4227	WFC3/UVIS, ACCUM, UVIS		F275W	FLASH=11	POS TARG 0,30	Pattern 3, Exps 2-2 in IRAS 03158+4117 (04) (3)	490 Secs (1470 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]		[2]		
	3	WFC3-IR/F160W	(1) IRAS-03158+4227	WFC3/IR, MULTIACCUM, IRSUB512		F160W	NSAMP=10; SAMP-SEQ=SPAR S25		Pattern 2, Exps 3-3 in IRAS 03158+4117 (04) (2)	207.144286 Secs (828.577 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]		[2]		

Orbit Structure

Orbit 1

Server Version: 20170613



Orbit 2

Server Version: 20170613

