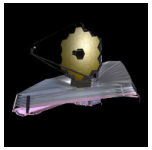

4567 - Winging the SMC: 3D Structure of the Interstellar Medium in the Tidally Distrupted Wing of the SMC

Cycle: 2, Proposal Category: GO

INVESTIGATORS

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Dr. Kristen B W McQuinn (CoI)	Space Telescope Science Institute
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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	2		NIRCam Imaging	(1) N83

ABSTRACT

We propose to use resolved stellar populations to constrain the dynamical state of the interstellar medium (ISM) in star-forming regions N83/N84 of the Small Magellanic Cloud (SMC). Our proposal will use 15 orbits and 12 hours of HST and JWST time to cover a 12.5'x7.5' area of the SMC in 6 broad-band filters from near ultra-violet (NUV) to the near-infrared (NIR). By fitting the spectral energy distributions (SED) of resolved stars with broad wavelength coverage, we can simultaneously probe distance and line-of-sight extinction, enabling us to constrain distances to diffuse gas structures. The broadband SEDs will provide stellar and dust extinction physical parameters to complement existing observations of molecular gas (ALMA), ionized gas (Spitzer-IRS), and atomic hydrogen (GASKAP) in the region. With these results, we can map the 3D gas distribution in the region to see whether gas flows are colliding or diverging. These results will help us understand how tidal interactions between interacting galaxies are capable of fostering bursts of star formation. We aim to achieve the following objectives: (1) measure the definitive distance to the ISM in the SMC wing, providing vital model constraints for understanding the collision history between the SMC and LMC; (2) determine the relative distance between molecular clouds to gain insight into the dynamical state of the ISM in the region; (3) investigate the correlation between extinction and various phases of the ISM in low-metallicity environments.

OBSERVING DESCRIPTION

We will obtain high-resolution UV-optical imaging using HST/ACS for F475W and F814W, and WFC3/UVIS for F336W and F275W. To complete the coverage in the IR, we will obtain F115W and F160W imaging from JWST/NIRCam, which are comparable to HST WFC3 F110W and F160W.

We design our pointings to cover a total area of 72 square arcmin. By using ACS and WFC3/UVIS in parallel, we can obtain NUV and optical imaging simultaneously. In a single orbit visit, ACS/WFC will obtain F475W and F814W data while WFC3/UVIS obtains F336W and F275W data in a parallel field. Effective exposure times are 720s in F275W, 700s in F336W, 679s in F475W, and 700s in F814W, including short guard exposures in F475W (5s) to avoid saturation of bright sources. Our dithering will include a half-pixel along the diagonal, allowing us to recover as much spatial resolution as possible.

To efficiently image the 6x12 arcmin region with NIRCam, we use a mosaic of 1x6 tiles with 10% overlap. Each tile uses the FULLBOX dither type

with 4TIGHT primary and subpixel dithers to provide approximately uniform depth covering the gaps between the two modules and the 4 short wavelength detectors. This results in at least 4 exposures over a large fraction of the mosaic, with some regions having more and a few regions with less exposures. For the detector setup, we use the BRIGHT2 readout pattern with NGROUPS=4. This results in an exposure time of 300s and using the JWST ETC this provides a S/N of over 50 in both F115W and F150W for a source that has 22 vegamag in WFC3/F160W. Setting this up in APT gives a total time of 12.09~hours after running smart accounting. While primary science is focused on the F115W and F150W filters, we simultaneously use the F330M and F300M filters in the long wavelength NIRCam channel to obtain measurements of the 3.3 micron emission.

Since this proposal uses both ACS and WFC3 wavelength coverage and relies upon 180-degree flips, we expect that Reduced-Gyro Mode will increase our number of required orbits by 50% to achieve similar observations.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	N83	RA: 01 14 19.9040 (18.5829333d) Dec: -73 17 11.62 (-73.28656d) Equinox: J2000	Proper Motion RA: 4.7658412576068334E-4 sec of time/yr Proper Motion Dec: -0.0032159999591385713 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=ISM
Description=[Nebulae]

Observation

Proposal 4567, Observation 2

Sat Jul 20 01:00:12 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Diagnostics

(Observation 2) Warning (Form): This observation is split across multiple visits using multiple filters. Not selecting the sequence option may result in execution of the visits in a non-numerical order and is not recommended.

(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:4) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:5) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:6) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:7) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:8) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:9) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:10) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:11) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:12) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:13) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:14) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:15) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:16) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:17) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:18) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:19) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:20) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:21) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:22) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:23) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:24) Warning (Form): Overheads are provisional until the Visit Planner has been run.

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Template

Module	Subarray	Target Placement
ALL	FULL	Module Gap

Mosaic

Rows	Columns	Row Overlap %	Column Overlap %	Row shift (deg)	Column shift (deg)	Tile Order
6	1	10.0	10.0	0.0	0.0	DEFAULT

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	FULLBOX	4TIGHT	STANDARD		2

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F115W	F335M	BRIGHT2	5	1	8	8	858.942	
2	F150W	F300M	BRIGHT2	5	1	8	8	858.942	

Special Requirements

Group Visits within 53.0 Days
Aperture PA Range 325 to 330 Degrees (V3 325.07457694 to 330.07457694)
Visits Same PA