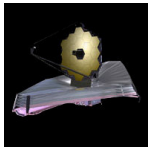

2079 - The Next Generation Deep Extragalactic Exploratory Public (NGDEEP) Survey: Feedback in Low-Mass Galaxies from Cosmic Dawn to Dusk

Cycle: 1, Proposal Category: GO

INVESTIGATORS

Name	*Institution*
Prof. Steven L. Finkelstein (PI)	**University of Texas at Austin**
Dr. Casey Papovich (CoI) (CoPI)	Texas A & M University
Dr. Norbert Pirzkal (CoI) (ESA Member) (CoPI)	Space Telescope Science Institute - ESA - JWST
Dr. Jennifer Lotz (CoI)	NOIRLab - (AZ)
Dr. Micaela Bagley (CoI)	University of Texas at Austin
Dr. Danielle Berg (CoI)	University of Texas at Austin
Dr. Marco Castellano (CoI) (ESA Member)	INAF, Osservatorio Astronomico di Roma
Oscar Antonio Chavez Ortiz (CoI)	University of Texas at Austin
Ms. Katherine Chworowsky (CoI)	University of Texas at Austin
Prof. Romeel Dave (CoI) (ESA Member)	University of Edinburgh, Institute for Astronomy
Dr. Mark Dickinson (CoI)	NOIRLab - (AZ)
Vicente Estrada-Carpenter (CoI) (CSA Member)	St. Mary's University
Dr. Harry C. Ferguson (CoI)	Space Telescope Science Institute
Dr. Adriano Fontana (CoI) (ESA Member)	INAF, Osservatorio Astronomico di Roma
Prof. Mauro Giavalisco (CoI)	University of Massachusetts - Amherst
Dr. Andrea Grazian (CoI) (ESA Member)	INAF - Osservatorio Astronomico di Padova
Dr. Norman Grogin (CoI)	Space Telescope Science Institute
Prof. Anne Jaskot (CoI)	Williams College
Dr. Intae Jung (CoI)	Space Telescope Science Institute
Dr. Jeyhan Kartaltepe (CoI)	Rochester Institute of Technology
Prof. Lisa Kewley (CoI)	Harvard University

Name	***Institution***
Dr. Allison Kirkpatrick (CoI)	University of Kansas Center for Research, Inc.
Prof. Dale D. Kocevski (CoI)	Colby College
Dr. Rebecca L. Larson (CoI)	Rochester Institute of Technology
Dr. Gene C K Leung (CoI)	University of Texas at Austin
Dr. Jasleen Matharu (CoI) (ESA Member)	University of Copenhagen, Niels Bohr Institute
Mr. Adam McCarron (CoI)	University of Texas at Austin
Prof. Priya Natarajan (CoI)	Yale University
Dr. Barry Rothberg (CoI)	George Mason University
Dr. Laura Pentericci (CoI) (ESA Member)	INAF, Osservatorio Astronomico di Roma
Dr. Swara Ravindranath (CoI)	Catholic University of America
Dr. Vicente Rodriguez-Gomez (CoI)	Universidad Nacional Autonoma de Mexico (UNAM)
Dr. Russell E. Ryan Jr. (CoI)	Space Telescope Science Institute
Dr. Raymond Simons (CoI)	University of Connecticut
Prof. Rachel S. Somerville (CoI)	Rutgers University
Dr. Greg Snyder (CoI)	Space Telescope Science Institute
Prof. Jonathan R Trump (CoI)	University of Connecticut
Dr. Stephen Matthew Wilkins (CoI) (ESA Member)	University of Sussex
Dr. L. Y. Aaron Yung (CoI)	NASA Goddard Space Flight Center
Dr. Daniel McIntosh (CoI)	University of Missouri - Kansas City
Dr. Kameswara Bharadwaj Mantha (CoI)	University of Minnesota - Twin Cities
Dr. Sandra M. Faber (CoI)	University of California - Santa Cruz
Prof. Pablo G. Perez-Gonzalez (CoI) (ESA Member)	Centro de Astrobiologia (CSIC/INTA) Inst. Nac. de Tec. Aero.

OBSERVATIONS

Folder	***Observation***	***Label***	***Observing Template***	***Science Target***
Centered on HUDF DEEP F160W				
	1	PA=67	NIRISS Wide Field Slitless Spectroscopy	(1) HUDF-DEEP-F160W
	4	PA=70	NIRISS Wide Field Slitless Spectroscopy	(1) HUDF-DEEP-F160W

ABSTRACT

We propose NGDEEP: The Webb Deep Extragalactic Exploratory Public Survey. NGDEEP leverages efficient parallel observations over 121.7 hr with NIRISS in the Hubble Ultra Deep Field (HUDF) and NIRCam in the HUDF-Par2 field to constrain the physical processes dominating feedback

in galaxies from z~1-12. Observing with JWST in the HUDFs leverages off the deepest optical imaging from Hubble and makes NGDEEP a premier legacy field for both missions.

NGDEEP observes deeply with NIRISS (60-190 ks) to detect faint emission lines (~ 10^-18 cgs) for >1000 mostly low-mass (log M/Msol = 7-9) galaxies. NGDEEP-NIRISS will enable robust constraints on the low-mass end of the mass-metallicity relation and constrain stochastic star-formation by probing H-alpha based star-formation rates to 0.1 Msol/yr in these low-mass galaxies. These measurements will limit chemical enrichment and feedback physical prescriptions in models, which are currently unconstrained at these masses.

In parallel, NGDEEP will obtain the deepest 6-band NIRCam imaging (m~30.6-30.9) on the HUDF-Par2 field. NGDEEP-NIRCam will probe z > 12, and constrain stellar feedback prescriptions in models by precisely measuring the shape of the faint-end of the UV luminosity function at z~10. These data will provide unprecedented morphological detail in galaxies at all redshifts, and reconnoiter the sites of first black hole formation.

Being public immediately, NGDEEP follows in the footsteps of the Hubble deep field programs, enabling the community to explore the power of Webb when pushed to its limits. As a treasury program, we are committed to the rapid reduction and release of high-quality reduced data products and catalogs.

OBSERVING DESCRIPTION

We will use NIRISS to obtain WFSS observations of the HUDF. These observations will be performed using the GRISM R and the GRISM C and three cross filters: F115W, F150W, and F200W. We will also split these observations so that data are acquired in both grisms at two different position angles (PA=67 and 70) which are 3 degrees apart and constrained by the NIRCAM parallels. We have confirmed that these position angles are observable. We will use the dither pattern 3-POINT-LARGE-NIRCam as it is a good match for our planned NIRCAM observations. Total integration times (190, 86, and 63 ks in the F115W, F150W, and F200W WFSS observations) were selected to ensure a uniform emission line sensitivity across all bands. These will be obtained using multiple integrations using the NIS readout pattern with 20 groups per integration. As required with WFSS observations, imaging data will also be obtained using the same filters, using the NIS readout pattern with 5 groups per integration with total integration times of 10.8, 3.6, and 3.6 ks in the F115W, F150W, and F200W filters). We add two extra dithers after each set of dithered grism observations to ensure that there is adequate direct imaging coverage over the maximum possible NIRISS FOV. The direct images were designed to be deep enough to identify the source of faint continuum contaminating sources.

We will observe with NIRCam in parallel, obtaining observations in F115W, F150W, F200W, F277W, F356W, and F444W. These observations

constrained to be in two roll angles V3PA=67 and 70, to maximize the NIRCam overlap with the deepest F814W imaging in the UDF Par2 field. Position angles outside of this range will significantly decrease our coverage of the Par2 field, and larger PA offsets (>3 degrees) will reduce the area we cover at a maximum NIRCam depth. The total NIRCam integration times are constrained by the NIRISS observation specifications, and we allocate this time to achieve approximately uniform sensitivity in all filters except F115W, where we increase the time to aid in detecting Lyman-alpha breaks at z>9. Exposures fall into two categories: those matched to NIRISS direct images and those matched to the longer NIRISS grism exposures. For the longer time slots, we use the DEEP8 readout pattern to reduce data volume, 3 integrations per exposure, and either 8 groups/integration (F115W, F444W, F200W, F356W) or 11 groups/integration (F150W and F277W). We pair SW and LW filters based on their sensitivities: F115W with F444W, F150W with F277W, and F200W with F356W. For the exposures tied to direct imaging, we use 4 groups and 1 integration with SHALLOW4, as this setup allows for multiple groups and better cosmic ray rejection in the short available time slots. In the LWC, we allocate all time during these shorter lots to F356W to increase the depth. Our final exposure times are 181 ks (F115W), 172 ks (F444W), and 60-84 ks (F150W, F200W, F277W and F356W).

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	HUDF-DEEP-F160W	RA: 03 32 38.6007 (53.1608363d) Dec: -27 46 59.83 (-27.78329d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Emission line galaxies, High-redshift galaxies, Lyman-alpha galaxies, Lyman-break galaxies]

Observation

Proposal 2079, Observation 1: PA=67

Mon Oct 16 19:00:49 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRISS Wide Field Slitless Spectroscopy

Coordinated Parallel Template(s): NIRCam Imaging

Diagnostics

(Visit 1:1) Warning (Form): Data Excess over middle threshold

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

(Visit 1:2) Warning (Form): Data Excess over middle threshold

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

(Visit 1:3) Warning (Form): Data Excess over lower threshold

(Visit 1:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	HUDF-DEEP-F160W	RA: 03 32 38.6007 (53.1608363d) Dec: -27 46 59.83 (-27.78329d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Emission line galaxies, High-redshift galaxies, Lyman-alpha galaxies, Lyman-break galaxies]

Template

NIRISS Wide Field Slitless Spectroscopy	NIRCam Imaging
	Module: ALL
	Subarray: FULL
	Target Placement: Module Gap

Dithers

#	Image Dithers	Pattern Size
1	3-POINT-LARGE-NIRCam	LARGE

Direct Image

NIRISS Wide Field Slitless Spectroscopy	Exposure Type	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Two Extra Dithers	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	DIRECT	F115W		NIS	5	1	YES	1	1	225.472	
2	DIRECT	F115W		NIS	5	1	YES	4	4	901.889	
3	DIRECT	F115W		NIS	5	1	YES	3	3	676.417	
4	DIRECT	F115W		NIS	5	1	YES	1	1	225.472	
5	DIRECT	F115W		NIS	5	1	YES	4	4	901.889	
6	DIRECT	F115W		NIS	5	1	YES	3	3	676.417	
7	DIRECT	F115W		NIS	5	1	YES	1	1	225.472	
8	DIRECT	F115W		NIS	5	1	YES	4	4	901.889	
9	DIRECT	F115W		NIS	5	1	YES	3	3	676.417	
10	DIRECT	F150W		NIS	5	1	YES	1	1	225.472	
11	DIRECT	F150W		NIS	5	1	YES	4	4	901.889	
12	DIRECT	F150W		NIS	5	1	YES	3	3	676.417	
13	DIRECT	F200W		NIS	5	1	YES	1	1	225.472	
14	DIRECT	F200W		NIS	5	1	YES	4	4	901.889	
15	DIRECT	F200W		NIS	5	1	YES	3	3	676.417	

Spectral Elements

NIRISS Wide Field Slitless Spectroscopy	Exposure Type	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	GRISM	F115W	GR150R	NIS	20	6	3	18	15654.211	
2	GRISM	F115W	GR150C	NIS	20	6	3	18	15654.211	
3	GRISM	F115W	GR150R	NIS	20	6	3	18	15654.211	
4	GRISM	F115W	GR150C	NIS	20	6	3	18	15654.211	
5	GRISM	F115W	GR150R	NIS	20	6	3	18	15654.211	
6	GRISM	F115W	GR150C	NIS	20	6	3	18	15654.211	
7	GRISM	F150W	GR150R	NIS	20	8	3	24	20872.281	
8	GRISM	F150W	GR150C	NIS	20	8	3	24	20872.281	
9	GRISM	F200W	GR150R	NIS	20	6	3	18	15654.211	
10	GRISM	F200W	GR150C	NIS	20	6	3	18	15654.211	

Spectral Elements

NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F115W	F356W	SHALLOW4	4	1	1	1	203.999	
2	F115W	F444W	MEDIUM8	7	7	21	3	15525.369	
3	F115W	F356W	SHALLOW4	4	1	4	4	815.995	
4	F115W	F444W	MEDIUM8	7	7	21	3	15525.369	
5	F115W	F356W	SHALLOW4	4	1	3	3	611.996	
6	F115W	F356W	SHALLOW4	4	1	1	1	203.999	
7	F115W	F444W	MEDIUM8	7	7	21	3	15525.369	
8	F115W	F356W	SHALLOW4	4	1	4	4	815.995	
9	F115W	F444W	MEDIUM8	7	7	21	3	15525.369	
10	F115W	F356W	SHALLOW4	4	1	3	3	611.996	
11	F115W	F356W	SHALLOW4	4	1	1	1	203.999	
12	F115W	F444W	MEDIUM8	7	7	21	3	15525.369	
13	F115W	F356W	SHALLOW4	4	1	4	4	815.995	
14	F115W	F444W	MEDIUM8	7	7	21	3	15525.369	
15	F115W	F356W	SHALLOW4	4	1	3	3	611.996	
16	F150W	F356W	SHALLOW4	4	1	1	1	203.999	
17	F150W	F277W	MEDIUM8	9	7	21	3	20034.813	
18	F150W	F356W	SHALLOW4	4	1	4	4	815.995	
19	F150W	F277W	MEDIUM8	9	7	21	3	20034.813	
20	F150W	F356W	SHALLOW4	4	1	3	3	611.996	
21	F200W	F356W	SHALLOW4	4	1	1	1	203.999	
22	F200W	F356W	MEDIUM8	7	7	21	3	15525.369	
23	F200W	F356W	SHALLOW4	4	1	4	4	815.995	
24	F200W	F356W	MEDIUM8	7	7	21	3	15525.369	
25	F200W	F356W	SHALLOW4	4	1	3	3	611.996	

Special Requirements	Group Visits within 53.0 Days Aperture PA Range 67.56126717 to 67.56126717 Degrees (V3 67.0 to 67.0) Visits Same PA No Parallel Attachments

Observation

Proposal 2079, Observation 4: PA=70 Mon Oct 16 19:00:49 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRISS Wide Field Slitless Spectroscopy

Coordinated Parallel Template(s): NIRCam Imaging

Diagnostics

(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

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

(Visit 4:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	HUDF-DEEP-F160W	RA: 03 32 38.6007 (53.1608363d) Dec: -27 46 59.83 (-27.78329d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[Emission line galaxies, High-redshift galaxies, Lyman-alpha galaxies, Lyman-break galaxies]

Template

NIRISS Wide Field Slitless Spectroscopy	NIRCam Imaging
	Module: ALL
	Subarray: FULL
	Target Placement: Module Gap

Dithers

#	Image Dithers	Pattern Size
1	3-POINT-LARGE-NIRCam	LARGE

Direct Image

NIRISS Wide Field Slitless Spectroscopy	Exposure Type	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Two Extra Dithers	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	DIRECT	F115W		NIS	5	1	YES	1	1	225.472	
2	DIRECT	F115W		NIS	5	1	YES	4	4	901.889	
3	DIRECT	F115W		NIS	5	1	YES	3	3	676.417	
4	DIRECT	F115W		NIS	5	1	YES	1	1	225.472	
5	DIRECT	F115W		NIS	5	1	YES	4	4	901.889	
6	DIRECT	F115W		NIS	5	1	YES	3	3	676.417	
7	DIRECT	F115W		NIS	5	1	YES	1	1	225.472	
8	DIRECT	F115W		NIS	5	1	YES	4	4	901.889	
9	DIRECT	F115W		NIS	5	1	YES	3	3	676.417	
10	DIRECT	F150W		NIS	5	1	YES	1	1	225.472	
11	DIRECT	F150W		NIS	5	1	YES	4	4	901.889	
12	DIRECT	F150W		NIS	5	1	YES	3	3	676.417	
13	DIRECT	F200W		NIS	5	1	YES	1	1	225.472	
14	DIRECT	F200W		NIS	5	1	YES	4	4	901.889	
15	DIRECT	F200W		NIS	5	1	YES	3	3	676.417	

Spectral Elements

NIRISS Wide Field Slitless Spectroscopy	Exposure Type	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	GRISM	F115W	GR150R	NIS	20	6	3	18	15654.211	
2	GRISM	F115W	GR150C	NIS	20	6	3	18	15654.211	
3	GRISM	F115W	GR150R	NIS	20	6	3	18	15654.211	
4	GRISM	F115W	GR150C	NIS	20	6	3	18	15654.211	
5	GRISM	F115W	GR150R	NIS	20	6	3	18	15654.211	
6	GRISM	F115W	GR150C	NIS	20	6	3	18	15654.211	
7	GRISM	F150W	GR150R	NIS	20	8	3	24	20872.281	
8	GRISM	F150W	GR150C	NIS	20	8	3	24	20872.281	
9	GRISM	F200W	GR150R	NIS	20	6	3	18	15654.211	
10	GRISM	F200W	GR150C	NIS	20	6	3	18	15654.211	

Spectral Elements

NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F115W	F356W	SHALLOW4	3	1	1	1	150.315	
2	F115W	F444W	DEEP8	4	7	21	3	15525.369	
3	F115W	F356W	SHALLOW4	3	1	4	4	601.259	
4	F115W	F444W	DEEP8	4	7	21	3	15525.369	
5	F115W	F356W	SHALLOW4	3	1	3	3	450.944	
6	F115W	F356W	SHALLOW4	3	1	1	1	150.315	
7	F115W	F444W	DEEP8	4	7	21	3	15525.369	
8	F115W	F356W	SHALLOW4	3	1	4	4	601.259	
9	F115W	F444W	DEEP8	4	7	21	3	15525.369	
10	F115W	F356W	SHALLOW4	3	1	3	3	450.944	
11	F115W	F356W	SHALLOW4	3	1	1	1	150.315	
12	F115W	F444W	DEEP8	4	7	21	3	15525.369	
13	F115W	F356W	SHALLOW4	3	1	4	4	601.259	
14	F115W	F444W	DEEP8	4	7	21	3	15525.369	
15	F115W	F356W	SHALLOW4	3	1	3	3	450.944	
16	F150W	F356W	SHALLOW4	3	1	1	1	150.315	
17	F150W	F277W	DEEP8	5	7	21	3	20034.813	
18	F150W	F356W	SHALLOW4	3	1	4	4	601.259	
19	F150W	F277W	DEEP8	5	7	21	3	20034.813	
20	F150W	F356W	SHALLOW4	3	1	3	3	450.944	
21	F200W	F356W	SHALLOW4	3	1	1	1	150.315	
22	F200W	F356W	DEEP8	4	7	21	3	15525.369	
23	F200W	F356W	SHALLOW4	3	1	4	4	601.259	
24	F200W	F356W	DEEP8	4	7	21	3	15525.369	
25	F200W	F356W	SHALLOW4	3	1	3	3	450.944	

Special Requirements	
	Group Visits within 53.0 Days Aperture PA Range 70.56126717 to 70.56126717 Degrees (V3 70.0 to 70.0) Visits Same PA No Parallel Attachments