A Brief Summary of Extragalactic Observing Programs with JWST

EURECA Meeting

10/3/25

The Organizers

Miscellaneous Information

This summary of extragalactic observing programs was largely compiled from the full list of approved programs for JWST (link). The summary includes all of the programs whose primary science goals and/or observing targets are galaxies or quasars at z > 2-3. For the most part, we only included observing programs that are longer than 40-50 hours.

In the subsequent slides, we have tried to include all of the relevant information for a given observing program. When listing all of the observation modes associated with that program, we will underline the primary observing mode. We will also distinguish the pure parallel programs from the primary programs.

DAWN JWST Archive (DJA)

- "Science-ready public JWST data products"
- "The Cosmic Dawn Center is involved in a number of James Webb Space Telescope (JWST) surveys, but the public data can also be thought of as one comprehensive survey. The DAWN JWST Archive (DJA) is a repository of public JWST galaxy data, reduced with *grizli* and *msaexp* , and released for use by anyone."
- Website: https://dawn-cph.github.io/dja/
- FitsMaps: https://dawn-cph.github.io/dja/general/mapview/

Guaranteed Time Observation (GTO) Programs

Guaranteed Time Observation (GTO) Programs

- JWST Advanced Deep Extragalactic Survey (JADES)
  - PI: Daniel Eisenstein and Nora Luetzgendorf
  - PID: 1180, 1181, 1210, 1286, and 1287
  - Survey Description Paper: Eisenstein et al. 2023a
  - Data Release #1 Paper: Rieke et al. 2023
  - Data Release #2 Paper: Eisenstein et al. 2023b
  - Data Release #3 Paper: D'Eugenio et al. 2024
  - Roughly 770 hours of Cycle 1 time allocations
    - Largely from the NIRCam and NIRSpec instrument teams
  - Targeting GOODS-N (HDF) and GOODS-S (HUDF) with MIRI/Imaging, NIRCam/Imaging, and NIRSpec/MOS observations (and future NIRCam/WFSS observations)
  - Website: https://jades-survey.github.io/
  - Viewer: https://jades-survey.github.io/viewer/
  - GOODS-S FitsMap: https://jades.idies.jhu.edu/public/
  - GOODS-N FitsMap: https://jades.idies.jhu.edu/goods-n/
  - MAST: https://archive.stsci.edu/hlsp/jades

Guaranteed Time Observation (GTO) Programs

- Systematic Mid-infrared Instrument Legacy Extragalactic Survey (SMILES)
  - PI: George Rieke
  - PID: 1207 and 4549
  - Relevant Papers: Rieke et al. 2024 and Alberts et al. 2024
  - Roughly 110 hours of Cycle 1 and Cycle 3 time allocations
    - Largely from the MIRI instrument team
  - GOODS-S (HUDF) with MIRI/Imaging and NIRSpec/MOS observations (and future NIRCam/WFSS observations)
  - MAST: https://archive.stsci.edu/hlsp/smiles

- CAnadian NIRISS Unbiased Cluster Survey (CANUCS)
  - PI: Chris Willott
  - PID: 1208, 2779, and 4527
  - Roughly 229 hours of Cycles 1, Cycle 2, and Cycle 3 time allocations
  - Five lensing clusters (Abell 370, MACS J0416, MACS J0417, MACS J1149, and MACS J1423) with NIRCam/Imaging, NIRCam/WFSS, NIRISS/WFSS, and NIRSpec/MOS observations
  - Website: https://niriss.github.io/

Guaranteed Time Observation (GTO) Programs

- The Physics of Galaxy Assembly: WIDE MOS Survey
  - PI: Kate Isaak and Nora Luetzgendorf
  - PID: 1211, 1212, 1213, 1214, and 1215
  - Roughly 106 hours of Cycle 1 time allocations
    - Largely from the NIRSpec instrument team
  - All five CANDELS fields with NIRSpec/IFU and NIRSpec/MOS observations
  - Website: cosmos.esa.int/web/jwst-nirspec-gto/wide-mos-survey
  - MAST: https://archive.stsci.edu/hlsp/wide

- The Physics of Galaxy Assembly: Spatially Resolved IFS Observations of High-Redshift Galaxies (GA-NIFS)
  - PI: Kate Isaak, Nora Luetzgendorf, Luis Colina Robledo, and Chris Willott
  - PID: 1215, 1216, 1217, 1218, 1219, 1220, 1222, 1262, 1263, 1264, 4528, and 4530
  - Roughly 321 hours of Cycle 1 and Cycle 3 time allocations
    - Largely from the NIRSpec instrument team
  - Three of the CANDELS fields and high-redshift targets with MIRI/Imaging, MIRI/MRS, NIRSpec/FSS, NIRSpec/IFU, and NIRSpec/MOS observations
  - Website: https://ga-nifs.github.io/

Guaranteed Time Observation (GTO) Programs

- Emission-line galaxies and Intergalactic Gas in the Epoch of Reionization (EIGER)
  - PI: Simon Lilly
  - PID: 1243
  - Roughly 127 hours of Cycle 1 time allocations
  - Around six luminous high-redshift quasars at z > 6 with NIRCam/Imaging and NIRCam/WFSS observations
  - Website: https://eiger-jwst.github.io/project.html

- The MIRI HUDF Deep Imaging Survey (MIDIS)
  - PI: Goeran Oestlin
  - PID 1283
  - Roughly 64 hours of Cycle 1 time allocations
  - GOODS-S (HUDF) with MIRI/Imaging, NIRCam/Imaging, and NIRISS/WFSS observations

Early Release Science (ERS) Programs

Early Release Science (ERS) Programs

- Through the Looking GLASS: A JWST Exploration of Galaxy Formation and Evolution from Cosmic Dawn to Present Day
  - PI: Tommaso Treu
  - PID: 1324
  - Roughly 36 hours of Cycle 1 time allocations
  - Abell 2744 lensing cluster with NIRCam/Imaging, NIRISS/WFSS, and NIRSpec/MOS observations
  - Website: https://glass.astro.ucla.edu/ers/
  - MAST: https://archive.stsci.edu/hlsp/glass-jwst

- The Cosmic Evolution Early Release Science (CEERS) Survey
  - PI: Steven Finkelstein
  - PID: 1345
  - Roughly 77 hours of Cycle 1 time allocations
  - EGS legacy field with MIRI/Imaging, NIRCam/Imaging, NIRCam/WFSS, and NIRSpec/MOS observations
  - Website: https://ceers.github.io/
  - MAST: https://archive.stsci.edu/hlsp/ceers

Early Release Science (ERS) Programs

- Targeting Extremely Magnified Panchromatic Lensed Arcs and Their Extended Star Formation (TEMPLATES)
  - PI: Jane Rigby
  - PID: 1355
  - Roughly 59 hours of Cycle 1 time allocations
  - Four gravitationally lensed galaxies at z = 1-4 (high redshift???) with MIRI/Imaging, MIRI/MRS, NIRCam/Imaging, and NIRSpec/IFU observations
  - Website: https://sites.google.com/view/jwst-templates/
  - MAST: https://archive.stsci.edu/hlsp/templates

General Observer (GO) Programs (Cycle 1)

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- Parallel Application of Slitless Spectroscopy to Analyze Galaxy Evolution (PASSAGE)
  - PI: Matthew Malkan
  - PID: 1571
  - Roughly 591 hours of Cycle 1 time allocations
  - **Pure parallels** with NIRISS/WFSS observations

- COSMOS-Web: The JWST Cosmic Origins Survey
  - PI: Jeyhan Kartaltepe
  - PID: 1727
  - Roughly 270 hours of Cycle 1 time allocations
  - COSMOS field with MIRI/Imaging and NIRCam/Imaging observations
  - Website: https://cosmos.astro.caltech.edu/page/cosmosweb

General Observer (GO) Programs (Cycle 1)

- A Comprehensive JWST View of the Most Distant Quasars Deep Into the Epoch of Reionization
  - PI: Xiaohui Fan
  - PID: 1764
  - Roughly 59 hours of Cycle 1 time allocations
  - Around six luminous high-redshift quasars at z > 7.5 with MIRI/Imaging, MIRI/MRS, NIRCam/Imaging, NIRISS/Imaging, NIRSpec/FSS, and NIRSpec/MOS observations

- Public Release IMaging for Extragalactic Research (PRIMER)
  - PI: James Dunlop
  - PID: 1837
  - Roughly 199 hours of Cycle 1 time allocations
  - Two of the CANDELS fields (COSMOS and UDS) with MIRI/Imaging and NIRCam/Imaging observations
  - Website: https://primer-jwst.github.io/

General Observer (GO) Programs (Cycle 1)

- First Reionization Epoch Spectroscopically Complete Observations (FRESCO)
  - PI: Pascal Oesch
  - PID: 1895
  - Roughly 54 hours of Cycle 1 time allocations
  - GOODS-N (HDF) and GOODS-S (HUDF) with NIRCam/Imaging and NIRCam/WFSS observations
  - Website: https://jwst-fresco.astro.unige.ch/
  - MAST: https://archive.stsci.edu/hlsp/fresco

- A Complete Census of Supermassive Black Holes and Host Galaxies at z = 6
  - PI: Masafusa Onoue
  - PID: 1967
  - Roughly 49 hours of Cycle 1 time allocations
  - Around 12 low-luminosity high-redshift quasars at z = 6 with NIRCam/Imaging and NIRSpec/FSS observations

General Observer (GO) Programs (Cycle 1)

- A SPectroscopic survey of bIased halos in the Reionization Era (ASPIRE)
  - PI: Feige Wang
  - PID: 2078
  - Roughly 66 hours of Cycle 1 time
  - Website: https://aspire-quasar.github.io
  - **25 z>6.5 quasar sightlines**: 240 sq. arcmin + NIRISS parallels
    - NIRCam/WFSS observations (F356W)
    - NIRCam imaging observations (F115W, F200W, F356W)

- The Next Generation Deep Extragalactic Exploratory Public (NGDEEP) Survey
  - PI: Steven Finkelstein
  - PID: 2079
  - Roughly 123 hours of Cycle 1 time allocations
  - GOODS-S (HUDF) with NIRCam/Imaging and NIRISS/WFSS observations

General Observer (GO) Programs (Cycle 1)

- A Pathfinder for JWST Spectroscopy: Deep High Spectral Resolution Maps of Galaxies over 1 < z < 6 (GARDENS)
  - PI: Susan Kassin
  - PID: 2123
  - Roughly 75 hours of Cycle 1 time allocations
  - GOODS-S (HUDF) with NIRSpec/MOS observations (“slitlet stepping”)

- The Parallel wide-Area Nircam Observations to Reveal And Measure the Invisible Cosmos (PANORAMIC) Survey
  - PI: Christina Williams
  - PID: 2514
  - Roughly 150 hours of Cycle 1 time allocations
  - **Pure parallels** with NIRCam/Imaging observations
  - Website: https://panoramic-jwst.github.io/

General Observer (GO) Programs (Cycle 1)

- Ultra-deep NIRCam and NIRSpec Observations Before the Epoch of Reionization (UNCOVER)
  - PI: Ivo Labbe
  - PID: 2561
  - Roughly 121 hours of Cycle 1 time allocations
  - Abell 2744 lensing cluster with NIRCam/Imaging, NIRISS/Imaging, and NIRSpec/MOS observations
  - Website: https://jwst-uncover.github.io/

General Observer (GO) Programs (Cycle 2)

General Observer (GO) Programs (Cycle 2)

- Medium-band Astrophysics with the Grism of NIRCam in Frontier Fields (MAGNIF)
  - PI: Fengwu Sun
  - PID: 2883
  - Roughly 43 hours of Cycle 2 time allocations
  - Four lensing clusters (Abell 2744, Abell 370, MACS J0416, and MACS J1149) with NIRCam/Imaging, NIRCam/WFSS and NIRISS/Imaging observations

- The search for Population III stars in low-metallicity $7 < z < 9.5$ galaxies
  - PI: Hannah Uebler (with Roberto Maiolino)
  - PID: 2957
  - Roughly 46 hours of Cycle 2 time allocations
  - Seven high-redshift star-forming galaxies at $z = 7.0$-9.5 with NIRSpec/IFU observations

General Observer (GO) Programs (Cycle 2)

- Witnessing the Maturing of Teenage Galaxies at z = 4-6 with a Comprehensive UV/Optical/Sub-mm Benchmark Sample for the Community
  - PI: Andreas Faisst
  - PID: 3045
  - Roughly 57 hours of Cycle 2 time allocations
  - 18 representative main-sequence galaxies at z = 4.4-5.7 with NIRSpec/IFU observations

- Unveiling the Redshift Frontier with JWST (The JADES Origins Field; JOF)
  - PI: Daniel Eisenstein (with Roberto Maiolino)
  - PID: 3215
  - Roughly 136 hours of Cycle 2 time allocations
  - GOODS-S (HUDF) with NIRCam/Imaging and NIRSpec/MOS observations
  - Website: https://jades-survey.github.io/
  - MAST: https://archive.stsci.edu/hlsp/jades

General Observer (GO) Programs (Cycle 2)

- A complete spectroscopic census of the faintest galaxies and AGN at the dawn of galaxy formation
  - PI: Matthew Hayes (with Claudia Scarlata)
  - PID: 3290
  - Roughly 50 hours of Cycle 2 time allocations
  - GOODS-S (HUDF) with NIRSpec/MOS observations

- JWST's GLIMPSE: gravitational lensing & NIRCam imaging to probe early galaxy formation and sources of reionization
  - PI: Hakim Atek (with John Chisholm)
  - PID: 3293
  - Roughly 155 hours of Cycle 2 time allocations
  - Abell S1063 lensing cluster with NIRCam/Imaging observations

General Observer (GO) Programs (Cycle 2)

- Mapping the Most Extreme Protoclusters in the Epoch of Reionization
  - PI: Feige Wang (with Jinyi Yang)
  - PID: 3325
  - Roughly 48 hours of Cycle 2 time allocations
  - Around the two most extreme galaxy overdensities (anchored by luminous quasars at z = 6.6 from ASPIRE) with NIRCam/Imaging, NIRCam/WFSS, NIRISS/Imaging, NIRSpec/IFU, and NIRSpec/MOS observations

- JWST in Technicolor: Finding and Mapping the Most Extreme Star Forming Galaxies in the Epoch of Reionization with Medium and Narrow Bands
  - PI: Adam Muzzin
  - PID: 3362
  - Roughly 44 hours of Cycle 2 time allocations
  - Three lensing clusters (Abell 370, MACS J0416, and MACS J1149) with NIRCam/Imaging and NIRISS/WFSS observations

General Observer (GO) Programs (Cycle 2)

- JWST Wide Area 3D Parallel Survey
  - PI: Karl Glazebrook (with Gabriel Brammer)
  - PID: 3383 and 4681
  - Roughly 600 hours of Cycle 2 time allocations
  - **Pure parallels** with NIRISS/Imaging and NIRISS/WFSS observations

- All the Little Things (ALT): Pop III Signatures & the Ionizing Photon Budget of Dwarf Galaxies in the Epoch of Reionization
  - PI: Jorryt Matthee (with Rohan Naidu)
  - PID: 3516
  - Roughly 48 hours of Cycle 2 time allocations
  - Abell 2744 lensing cluster with NIRCam/Imaging, NIRCam/WFSS, and NIRISS/Imaging observations

General Observer (GO) Programs (Cycle 2)

- Unveiling the properties of high-redshift low/intermediate-mass galaxies in Lensing fields with NIRCam Wide Field Slitless Spectroscopy
  - PI: Edoardo Iani
  - PID: 3538
  - Roughly 65 hours of Cycle 2 time allocations
  - Three lensing clusters (Abell 2744, Abell 370, and MACS J0416) with NIRCam/Imaging and NIRCam/WFSS observations

- EXCELS: The Early eXtragalactic Continuum and Emission Line Survey
  - PI: Adam Carnall (with Fergus Cullen)
  - PID: 3543
  - Roughly 72 hours of Cycle 2 time allocations
  - Primarily targeting the highest-redshift massive quiescent galaxies at z = 2-5 with NIRSpec/MOS observations

General Observer (GO) Programs (Cycle 2)

- A deep dive into the physics of the first massive quiescent galaxies in the Universe
  - PI: Francesco Valentino
  - PID: 3567
  - Roughly 48 hours of Cycle 2 time allocations
  - Around 11 of the highest-redshift massive quiescent galaxies at z = 3-4 (high redshift???) with NIRCam/Imaging and NIRSpec/MOS observations

- You (Don't?) Spin Me Round: Resolving Disk Formation in High-Redshift Dusty Starburst Galaxies
  - PI: Justin Spilker
  - PID: 3743
  - Roughly 48 hours of Cycle 2 time allocations
  - Around five high-redshift dust star-forming galaxies at z = 4-5 with MIRI/Imaging, NIRCam/Imaging, and NIRSpec/IFU observations

General Observer (GO) Programs (Cycle 2)

- MEGA Mass Assembly at Cosmic Noon: MIRI EGS Galaxy and AGN (MEGA) Survey
  - PI: Allison Kirkpatrick
  - PID: 3794
  - Roughly 68 hours of Cycle 2 time allocations
  - EGS legacy field with MIRI/Imaging observations

- A NIRCam Pure-Parallel Imaging Survey of Galaxies Across the Universe
  - PI: Takahiro Morishita (with Charlotte Mason, Tommaso Treu, and Michele Trenti)
  - PID: 3990
  - Roughly 600 hours of Cycle 2 time allocations
  - **Pure parallels** with NIRCam/Imaging observations

General Observer (GO) Programs (Cycle 2)

- Medium bands, Mega Science: spatially-resolved R ~ 15 spectrophotometry of 50,000 sources at z = 0.3-12
  - PI: Katherine Suess
  - PID: 4111
  - Roughly 50 hours of Cycle 2 time allocations
  - Abell 2744 lensing cluster with NIRCam/Imaging and NIRISS/Imaging observations
  - Website: https://jwst-uncover.github.io/megascience/

- Red Unknowns: Bright Infrared Extragalactic Survey (RUBIES)
  - PI: Anna de Graaff (with Gabriel Brammer)
  - PID: 4233
  - Roughly 60 hours of Cycle 2 time allocations
  - EGS and COSMOS legacy fields (i.e., CEERS and PRIMER) with NIRSpec/MOS observations

General Observer (GO) Programs (Cycle 3)

General Observer (GO) Programs (Cycle 3)

- Unveiling the Primordial Universe: A < 1000 Msun Stellar Cluster at z = 6.6
  - PI: Kimihiko Nakajima
  - PID: 4750
  - Roughly 63 hours of Cycle 3 time allocations
  - MACS J0416 lensing cluster with NIRSpec/MOS observations

- Unveiling the nature and impact of the first population of black holes: an extensive NIRSpec-IFU survey in the first billion years
  - PI: Hannah Uebler (with Roberto Maiolino)
  - PID: 5015
  - Roughly 138 hours of Cycle 3 time allocations
  - Around 30 high-redshift broad-line AGN at z > 5 with NIRSpec/IFU observations

General Observer (GO) Programs (Cycle 3)

- Confirming Population III or a Direct Collapse Black Hole in the halo of GN-z11 at z = 10.6
  - PI: Roberto Maiolino
  - PID: 5086
  - Roughly 48 hours of Cycle 3 time allocations
  - Around the luminous galaxy GN-z11 at z = 10.6 with NIRSpec/IFU observations

- The North ecliptic pole EXtragalactic Unified Survey (NEXUS)
  - PI: Yue Shen (with Mingyang Zhuang)
  - PID: 5105
  - Roughly 135 treasury hours of Cycle 3, 4, 5 time allocations
  - North Ecliptic Pole (NEP) with MIRI/Imaging, NIRCam/Imaging, NIRCam/WFSS, and NIRSpec/MOS observations

General Observer (GO) Programs (Cycle 3)

- The Public Observation Pure Parallel Infrared Emission-Line Survey (POPPIES)
  - PI: Jeyhan Kartaltepe (with Marc Rafelski)
  - PID: 5398
  - Roughly 400 hours of Cycle 3 time allocations
  - **Pure parallels** with NIRCam/Imaging and NIRCam/WFSS observations

- The MIRI Early Obscured-AGN Wide Survey (MEOW)
  - PI: Gene Leung (with Ryan Endsley and Steven Finkelstein)
  - PID: 5407
  - Roughly 74 hours of Cycle 3 time allocations
  - GOODS-N (HDF) and GOODS-S (HUDF) with MIRI/Imaging observations

General Observer (GO) Programs (Cycle 3)

- The MIRI deep imaging survey of the lensing clusters Abell 2744 and MACS 0416
  - PI: Edoardo Iani (with Pierluigi Rinaldi)
  - PID: 5578
  - Roughly 75 hours of Cycle 3 time allocations
  - Abell 2744 and MACS 0416 lensing clusters with MIRI/Imaging observations

- Dissecting Little Red Dots: the connection between early SMBH growth and cosmic reionization
  - PI: Jorryt Matthee
  - PID: 5664
  - Roughly 45 hours of Cycle 3 time allocations
  - Around five high-redshift low-luminosity AGNs (LRDs) at z = 5.1-5.5 with NIRSpec/IFU observations

General Observer (GO) Programs (Cycle 3)

- The JWST Ultimate Medium-band Photometric Survey (JUMPS)
  - PI: Cassandra Withers (with Adam Muzzin)
  - PID: 5890
  - Roughly 42 hours of Cycle 3 time allocations
  - Three lensing clusters (Abell 370, MACS J0416, and MACS J1149) with NIRCam/Imaging and NIRISS/Imaging observations

- COSMOS-3D: A Spectroscopic/Imaging Legacy Survey of the Early Universe
  - PI: Koki Kakiichi (+ Eiichi Egami, Xiaohui Fan, Jianwei Lyu, Feige Wang...)
  - PID: 5893
  - Roughly 266 hours of Cycle 3 time
  - COSMOS field
    - NIRCam/WFSS in F444W over 0.33 sq. deg
    - NIRCam imaging in F115W, F200W, F356W over 0.33 sq. deg
    - MIRI parallel imaging in F1000W, F2100W over 482 sq. arcmin

General Observer (GO) Programs (Cycle 3)

- What really are the Physical Properties of Galaxies in the Epoch of Reionization?
  - PI: Casey Papovich (with Weida Hu and Taylor Hutchison)
  - PID: 5943
  - Roughly 63 hours of Cycle 3 time allocations
  - EGS legacy field (I think, the public PDF for the proposal does not specify) with NIRSpec/MOS observations

- ORigin of the [C II] Halos In Distant Systems (ORCHIDS)
  - PI: Manuel Aravena (with Jorge Gonzalez Lopez)
  - PID: 5974
  - Roughly 43 hours of Cycle 3 time allocations
  - Around eight massive high-redshift star-forming galaxies at z = 5-6 with NIRSpec/IFU observations (along with Keck KCRM/IFU observations)

General Observer (GO) Programs (Cycle 3)

- Observing All phases of StochastIc Star formation (OASIS)
  - PI: Tobias Looser (with Francesco D'Eugenio)
  - PID: 5997
  - Roughly 74 hours of Cycle 3 time allocations
  - GOODS-S (HUDF) with NIRCam/Imaging and NIRSpec/MOS observations

- The CANDELS-Area Prism Epoch of Reionization Survey (CAPERS)
  - PI: Mark Dickinson
  - PID: 6368
  - Roughly 202 hours of Cycle 3 time allocations
  - UDS, EGS, and COSMOS legacy fields (i.e., CEERS and PRIMER) with NIRCam/Imaging and NIRSpec/MOS observations

General Observer (GO) Programs (Cycle 3)

- Slitless Areal Pure-Parallel High-Redshift Emission Survey (SAPPHIRES)
  - PI: Eiichi Egami (with Xiaohui Fan, Fengwu Sun, Feige Wang, and Jinyi Yang)
  - PID: 6434
  - Roughly 600 hours of Cycle 3 time allocations
  - **Pure parallels** with NIRCam/Imaging and NIRCam/WFSS observations

- Revealing the Lifecycle and Environment of Massive z = 7 Galaxies
  - PI: Sander Schouws
  - PID: 6480
  - Roughly 47 hours of Cycle 3 time allocations
  - Around 25 massive high-redshift star-forming galaxies at z = 7 with NIRCam/Imaging and NIRCam/WFSS observations

General Observer (GO) Programs (Cycle 3)

- Galaxy mass buildup in the early universe - ultra deep imaging of the Hubble Ultra Deep Field to 10 microns (MIDIS-Red)
  - PI: Goeran Oestlin
  - PID: 6511
  - Roughly 116 hours of Cycle 3 time allocations
  - GOODS-S (HUDF) with MIRI/Imaging and NIRCam/Imaging observations

Summary of All Observing Programs Discussed Here

Pure parallel programs seem incredibly powerful at accounting for cosmic variance and discovering the most extreme high-redshift sources. There are lots of existing pure parallel programs using observations from...

- NIRCam/Imaging
  - PID: 2514 (PANORAMIC)
  - PID: 3990
- NIRCam/WFSS
  - PID: 5398 (POPPIES)
  - PID: 6434 (SAPPHIRES)
- NIRISS/WFSS
  - PID: 1571 (PASSAGE)
  - PID: 3383 and 4681

Cycle 3 was the first time that pure parallel programs with NIRCam/WFSS were allowed. You will notice that there are zero existing pure parallel programs using observations from either MIRI/Imaging or NIRISS/Imaging, likely since these observations are less useful in the absence of existing optical and/or near-infrared ancillary data. Spectroscopic observations with MIRI and NIRSpec in parallel are not allowed, they must be the primary instruments.

Summary of All Observing Programs Discussed Here

Despite all of the existing pure parallel programs with JWST, there have been relatively few publications using these data. This is likely caused by difficulties in reducing and analyzing the data, since these programs typically “take what they can get.”

As expected, legacy fields with lots of existing ancillary data have been the primary focus of existing extragalactic observing programs. This includes (but is not limited to): several lensing clusters (Abell 370, Abell 2744, MACS J0416, MACS J0417, MACS J1149, and MACS J1423; most of these are HFF clusters) and the five CANDELS fields (GOODS-N, GOODS-S, UDS, EGS, and COSMOS).

Summary of All Observing Programs Discussed Here

- The power of new imaging: we are sampling the rest-UV/optical SED ever more finely by adding medium NIRCam bands, F070W/F090W, and MIRI photometry to some of the more famous fields (UNCOVER lensing fields, COSMOS, etc)

- The power of NIRSpec IFU: several programs accepted for investigating quasars, little red dots and unusual massive galaxies with IFU surveys

- The power of slitless spectroscopy: several pure-parallels and dedicated treasury programs gathering F322W2, F356W, and F444W over ~0.5 deg scales

General Observer (GO) Programs (Cycle 4)

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Prior Discussion on Cycle 4 Right After the Results:

https://docs.google.com/presentation/d/18jJh2pw7A257rwofBLTWZY9Utyu8aOS_xGS-WxXDD5g/edit?slide=id.g34a10a41701_3_5#slide=id.g34a10a41701_3_5

The following is only t>40 hour programs (or surveys)

General Observer (GO) Programs (Cycle 4)

Category: High-Redshift Galaxies and the Distant Universe

- Spectroscopic Verification of Robust z>15 Galaxy Candidates Selected with Multiple Medium-Band Datasets 6793
  - PI: Yuichi Harikane
  - Roughly 81 hours NIRSpec/MOS
  - 10 F200W-dropout galaxies

- Resolving Multi-phase Outflow/Inflow via Gas Dynamics and Chemical Abundance Distribution in a Sub-L* Dwarf Galaxy at z=6.1 6796
  - PI: Seiji Fujimoto (with John Chisholm)
  - Roughly 60 hours NIRCam/Imaging + NIRSpec/MOS
  - Hi-res spectroscopy around bright multi-imaged z=6.1 galaxy

General Observer (GO) Programs (Cycle 4)

- Vast Exploration for Nascent, Unexplored Sources (VENUS) 6882 – **Treasury**
  - PI: Seiji Fujimoto (with Dan Coe)
  - Roughly 243 hours (**+103 parallel**)
  - 10 filter NIRCam imaging of 60 clusters + NIRSpec MSA followup of 10 clusters

- Searching for Population III stars around massive interacting galaxies in the reionization epoch 7014
  - PI: Antonello Calabro
  - Roughly 63 hours NIRSpec/IFU
  - 9 massive interactive galaxies at $7<z<9.5$

General Observer (GO) Programs (Cycle 4)

- A Unique Opportunity to Probe Lensing-Magnified Star Clusters in a Low-Mass Galaxy at z_spec=8.3 with JWST 7049
  - PI: Lamiya Mowla (with Kartheik Iyer)
  - 50 hours NIRSPec/IFU
  - Highly magnified galaxy at z=8.3 to get individual star clusters

- THRIFTY: The High-RedshIft FronTier surveY 7208 - **SURVEY**
  - PI: Romain Meyer
  - 2 hour observations with NIRSpec/IFU
  - Sample of 123 z>9-12 luminous galaxy candidates

General Observer (GO) Programs (Cycle 4)

- How I wonder what you are -- do JWST's Little Red Dots twinkle? Testing broad-line and continuum variability on week, month, and six-month timescales 7404
  - PI: Rohan Naidu (with John Chisholm and Jorryt Matthee)
  - Roughly 49 hours NIRCam/WFSS
  - 3 epochs of LRDs from cycle 1

- Brightest & Farthest: Confirming intrinsically luminous z~10-12 Galaxies in COSMOS 7417
  - PI: Caitlin Casey (with Hollis Akins and Maximilien Franco)
  - Roughly 48 hours NIRCam/Imaging and NIRSpec/MOS
  - 30 luminous z~10-12 galaxy candidates (+2700 fillers)

General Observer (GO) Programs (Cycle 4)

- How do dark matter halos connect with supermassive black holes and their host galaxies? 7519
  - PI: Junya Arita
  - Roughly 47 hours NIRCam/WFSS
  - 12 *faint* z~6 quasars

- Unveiling Early Cosmic Enrichment: Direct Metallicities in z>6 Galaxies from Deep JWST Spectroscopy 7729
  - PI: Guido Roberts-Borsani
  - Roughly 67 hours NIRSpec/MOS
  - Confirmed sample of (75?) z>6 galaxies in GOODS fields

General Observer (GO) Programs (Cycle 4)

- MINERVA: Unlocking the Hidden Gems of the Distant Universe and Completing HST and JWST's Imaging Legacy with Medium Bands – **Treasury** 7814
  - PI: Adam Muzzin (with Danilo Marchesini and Katherine Suess)
  - Roughly 260 hours (**+127 parallel**) MIRI/Imaging and NIRCam/Imaging
  - 8 filter medium band (2 MIRI parallels) in PRIMER-UDS/COSMOS, CEERS/AEGIS, and JADES-GOODS-N

- MIRI Spectroscopic survey at z~10: Insights into the Nature of Primordial Galaxies 8051
  - PI: Javier Alvarez-Marquez (with Luis Colina Robledo)
  - Roughly 129 hours MIRI/**LRS**
  - 10 z~10 galaxies (2 xray agn candidates) to get [OIII]+Hb with miri

General Observer (GO) Programs (Cycle 4)

- A Census of Galaxy Kinematics and Outflows to z ~ 7 8410 - Immediately Available
  - PI: Raymond Simons
  - Roughly 65 hours (**+45 parallel**) NIRCam/Imaging + NIRSpec/MOS
  - 275 galaxies at 1<z<10 in CEERS - EGS - spectral+spatial resolution

- Rest-Frame Optical Nebular Emission Lines at Cosmic Dawn: MIRI/LRS Follow-Up for JADES-GS-z14-0 8544
  - PI: Jakob Helton (!)
  - Roughly 63 hours MIRI/**LRS**
  - JADES-GS-z14-0

General Observer (GO) Programs (Cycle 4)

- SPAM: Star-formation from Photometry through the Addition of Medium-bands 8559
  - PI: Kelcy Davis (with Rebecca Larson)
  - Roughly 63 hours NIRCam/Imaging
  - 10 filter addition to CEERS-ERS dataset - nonproprietary

- Unlocking the massive stars behind the most spectacular fireworks displays in the early Universe 8792
  - PI: Peter Senchyna
  - Roughly 82 hours NIRSpec/MOS
  - N-rich multi-image lensed burst in reionization era

General Observer (GO) Programs (Cycle 4)

- Galaxy Formation at The Redshift Frontier: Ultra-Deep NIRSpec Observations of z>13 galaxies 9016
  - PI: Daniel Stark
  - Roughly 56 hours NIRSpec/MOS
  - GS-z14-0 at z=14.2 (luminous without features)

- Does Bursty Star Formation Explain the Astonishing Abundance of Bright z>10 Galaxies? 9165
  - PI: Ryan Endsley (with Daniel Stark)
  - Roughly 57 hours MIRI/Imaging + MIRI/LRS
  - 8 brightest confirmed z=10-14 galaxies

General Observer (GO) Programs (Cycle 4)

- Ushering in the JWST Era of Precision Constraints on Reionization: A Survey of Faint Quasar IGM Damping Wings at 6.5 < z < 7.4 9180
  - PI: Joseph Hennawi (with Timo Kist and Daming Yang)
  - Roughly 94 hours NIRSpec/**FS**
  - 27 faint quasars at z>6.5 (final sample of 68)

- Unlocking the nature of the first galaxies with ultra-deep rest-UV spectroscopy (SPUDS) 9214
  - PI: Charlotte Mason (with Daniel Stark)
  - Roughly 180 hours NIRSpec/MOS
  - > 150 z~5-14 galaxies

General Observer (GO) Programs (Cycle 4)

Category: Stars and Stellar Populations

- JWST Multi-Cycle Deep Transient Survey in GOODS-S 8060 (ToO)
  - PI: Eiichi Egami (with Roberto Maiolino and Armin Rest)
  - Roughly 43 hours NIRCam/Imaging and NIRSpec/MOS
  - 3 cycle + 3 epoch (~90 SNe with ~45 at z>2)

Category: Supermassive Black Holes and Active Galaxies

- From Dawn till Noon: Chronicling the Cosmic History of Black Hole Growth 6827
  - PI: Christina Eilers
  - Roughly 111 hours MIRI/Imaging and NIRCam/WFSS
  - 5 quasar fields -> >80(>200)unobscured (obscured) AGN

General Observer (GO) Programs (Cycle 4)

- A comprehensive population study of Little Red Dots: Connecting early BH and galaxy growth 7076
  - PI: Hollis Akins
  - Roughly 86 hours NIRSpec/MOS
  - ~100 brightest, highest-z LRDs

- On the search for a primeval black hole in a spectroscopically-confirmed galaxy at z=12.3 7078
  - PI: Ikki Mitsuhashi
  - Roughly 49 hours MIRI/MRS
  - Possible AGN in GHZ2 at z=12.35

General Observer (GO) Programs (Cycle 4)

- Probing hidden active SMBHs in the epoch of reionization: the missing link between classical quasars and faint JWST AGNs 7491
  - PI: Yoshiki Matsuoka (with Masafusa Onoue)
  - Roughly 48 hours NIRSpec/**FS**
  - 30 UV luminous galaxies at 5.7 < z < 6.7 from Subaru
- CACTUS: Comprehensive Analysis of Compton-Thick AGN in the early UniverSe 7503
  - PI: Eleonora Parlanti
  - Roughly 50 hours NIRSpec/IFU
  - 15 Xray-detected Compton Thick AGN at z<2.5
- Efficient Measurement of the Emergence Rate of AGN in Legacy Deep Field 7935
  - PI: Fengwu Sun (with Xiaojing Lin)
  - Roughly 36 hours NIRSpec/MOS
  - 842 galaxies in GOODS-N

Cycle 4 Takeaways

- No Pure Parallel Programs! (but many still ongoing, like SAPPHIRES, POPPIES)

- Moving into the era of spectroscopic follow-up of legacy fields now
  - Moving away from “blind” WFSS/Imaging surveys?
  - Seeing a lot more fixed slit and MOS

- Main topics: bursty star formation, confirming z>10 candidates (+LF), spectroscopic LRD followup (+searching for more), BH growth, galaxy kinematics/outflows etc

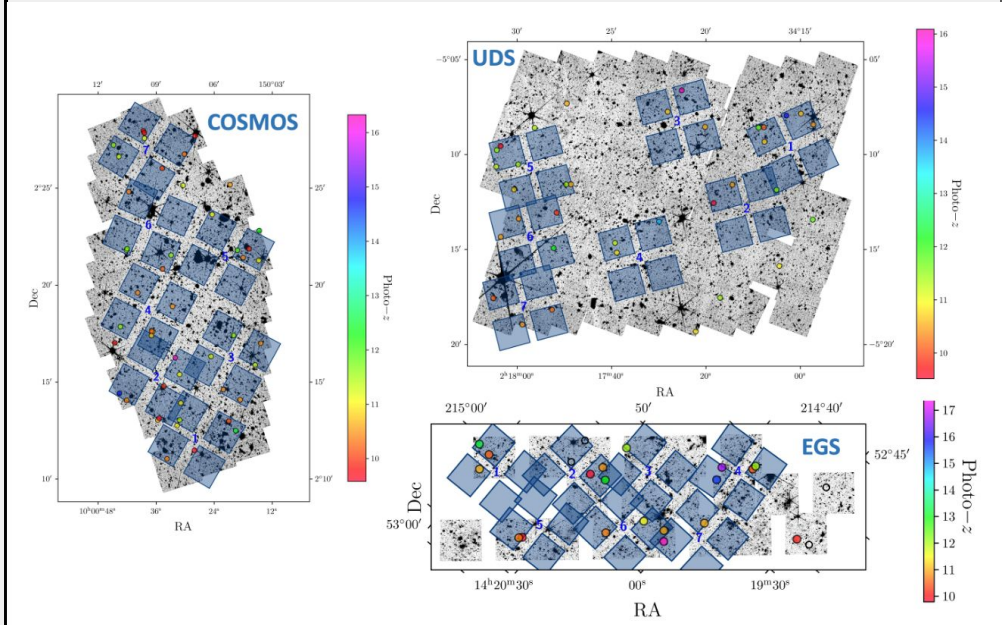
Programs to be Aware of (Cycles 3/4)

- Those with existing data:
  - CAPERS
  - SAPPHIRES
  - COSMOS-3D
  - MINERVA (UDS)

- Not in time for Cycle 5 but upcoming:
  - MINERVA (3 other CANDELS fields)
  - VENUS

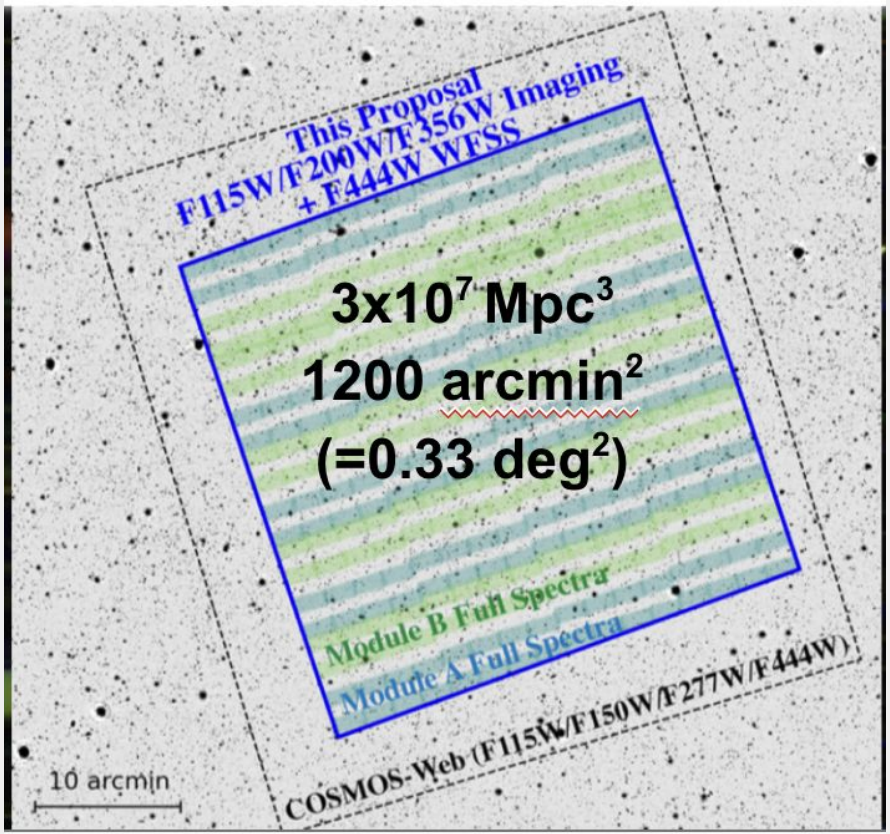
CANDELS-Area Prism Epoch of Reionization Survey (CAPERS)

- 199 hours NIRSpec PRISM program (GO 6368, PI: M. Dickison) over 21 pointings in UDS, COSMOS, EGS
- Goal: obtain spec-zs for ~100 galaxies at z>9
- Many filler targets (~10,000 total)
- Currently EGS + COSMOS complete
- UDS will finish in Jan 2026



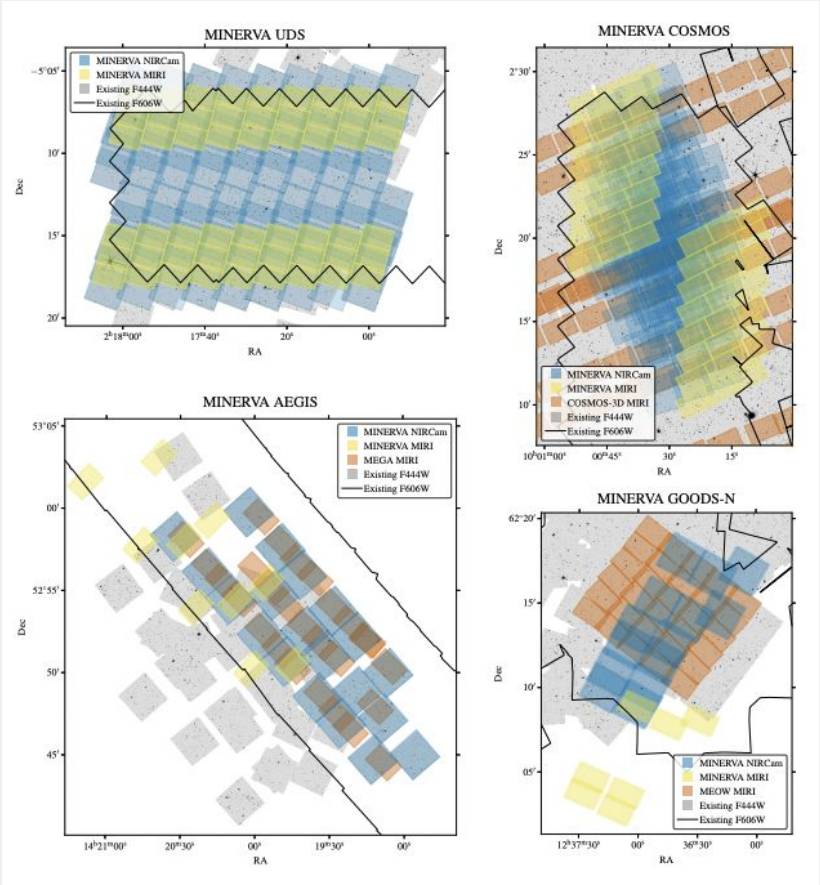
COSMOS-3D

- 263 hours;
  - 0.33 deg^2 of NIRCam WFSS F444W in COSMOS field
  - 482 arcmin^2 of parallel MIRI imaging (F1000W+F2100W)
- Goal: obtain grism redshifts for [OIII], Halpha, Pa-series etc for thousands of galaxies at 1<z<9, legacy MIR imaging in COSMOS
- Search for LSS, most massive galaxies, LRDs, IGM tomography
- 18/20 pointings complete, last of the data will be taken in Dec 2025



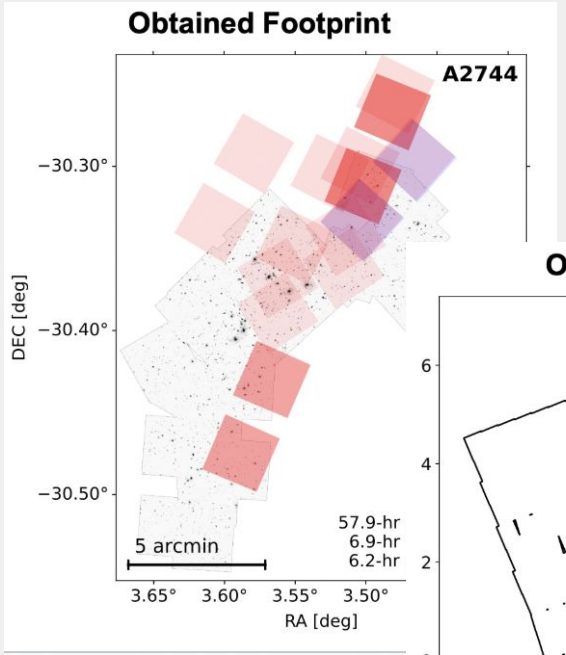
MINERVA (“Mediumband Imaging with NIRCam to Explore ReVolutionary Astrophysics”

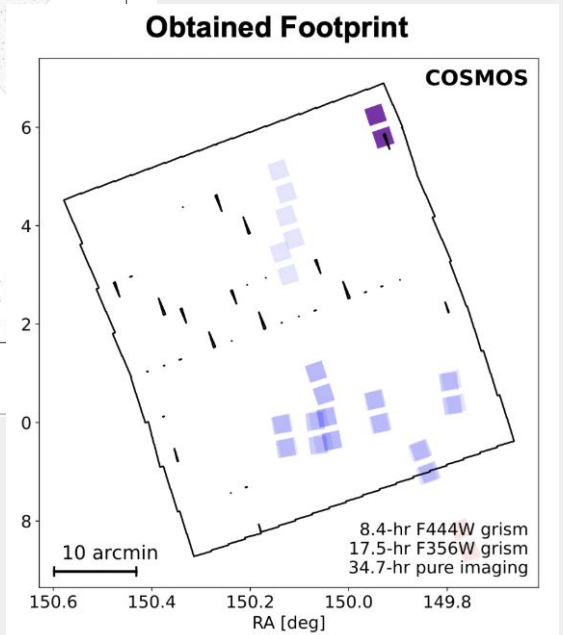
- 260 hr (prime) + 127 hr (parallel) covering most of the CANDELS fields (~600 arcmin^2)
- Cover in all 8 NIRCam MBs (F140M, F162M, F182M, F210M, F250M, F300M, F360M, F460M) + MIRI (F1280W, F1500W)
- Improve photo-z’s, find highest-redshift galaxies, find quiescent galaxies, build up SMFs and SFRDs across cosmic time, general legacy value
- UDS data began in August 2025, rest of fields scheduled between now and June 2026



SAPPHIRES
(Slitless Areal Pure-Parallel HIgh-Redshift Emission Survey)

- 652-hour pure parallel NIRCam WFSS in F356W/F444W + direct imaging in F070W through F444W (varies in different fields)
- Covering COSMOS / UDS / GOODS / lensing clusters / quasar fields etc. (>120 arcmin^2), data of 53 hours remains to be taken (hopefully during this year)
- Main science goals: high-redshift emission line galaxies; kinematics; massive galaxies and AGN
- Interesting preliminary results:
  - Early data release (Sun+2503.15587)
  - Extreme galaxy overdensity at z=8.47 (Fudamoto+2503.15597)
  - Extremely metal-poor galaxies at z~5-7 (Hsiao+2505.03873)
  - Quasar radiative feedback on intergalactic scales (Zhu+2509.00153)





Summary of All Observing Programs Discussed Here

- Main Science Goals for the extragalactic programs seem to be:
  - Finding highest-redshift galaxy candidates
  - Characterizing ‘little red dots’/SMBH-galaxy co-evolution
  - Mapping reionization
  - Searching for protoclusters/large scale structure
  - ISM properties (e.g. MZR as a function of time)
  - What else?

- Where do we go from here? More imaging in more fields? Lensing? MIRI WFSS?

- What are your plans? :)

Discussion

- What is the best path forward for identifying/characterizing more high-z galaxy candidates with JWST imaging?
  - Wider or Deeper?
  - Medium bands?
  - More lensing fields?
  - Looking beyond our favorite/classic fields (e.g. HFF clusters, CANDELS)?
  - Time domain special initiative
  - Roman special initiative

- What is the best path forward for characterizing high-z galaxies with spectroscopy?
  - Wider wavelength coverage (prism)
  - Higher spectral resolution
  - Slitless vs. MSA?
  - Value of the IFU?
  - MIRI?
  - Multi-epoch imaging for transients?

- What is the best path forward for interacting with large survey teams/using public data?