# WFIRST: Project Overview and Status

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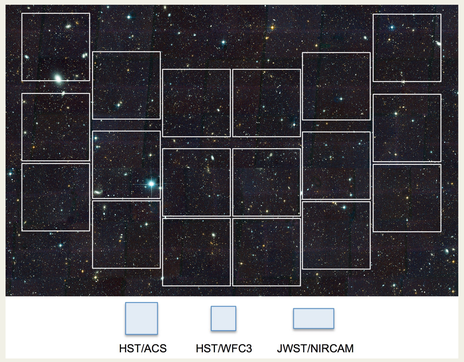
## The WFIRST Mission

WFIRST is NASA's next great observatory, designed to complement the capabilities of Hubble, Spitzer, and the James Webb Space Telescopes and LSST. The Wide-Field Instrument provides high throughput and high-resolution imaging over a wide field of view; an integral field channel for supernova and galaxy spectroscopy. A coronagraph instrument will demonstrate new technologies for active wavefront control and starlight suppression. Core programs include characterization of the expansion history and growth of structure in the Universe using weak lensing, a galaxy redshift survey, and type Ia SNe. Exoplanet demographics will be studied by gravitational microlensing. 25% of the Prime Mission and 100% of extended mission time is dedicated to a Guest Observer program. All data will be public and available for Archival Research programs.

## WFIRST Wide-Field Instrument

WFIRST offers sensitivity comparable to Hubble and 0.11" pixels over a 0.28 sq deg field of view that is 100x the field of Hubble's visible cameras.



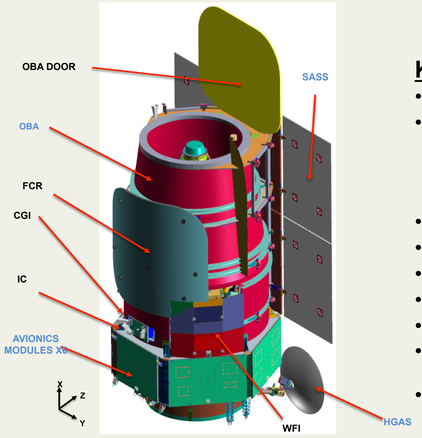

**WFIRST Imaging Capabilities**

| Filter | R062 | Z087 | Y106 | J129 | H158 | F184 | W146 |
|---|---|---|---|---|---|---|---|
| Wavelength (μm) | 0.48-0.76 | 0.76-0.98 | 0.93-1.19 | 1.13-1.45 | 1.38-1.77 | 1.68-2.0 | 0.93-2.0 |
| Sensitivity 5σ AB mag in 1hr | 28.50 | 28.02 | 27.95 | 27.87 | 27.81 | 27.32 | 28.33 |

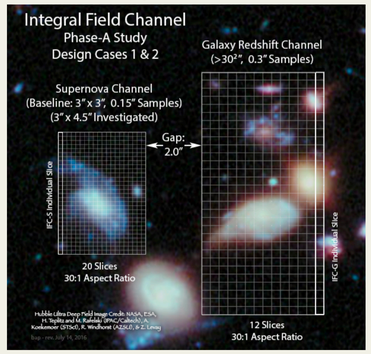
**WFIRST Spectroscopic Capabilities**

| | Field of View | Wavelength (μm) | Resolution | Sensitivity (10σ AB in 1000s) |
|---|---|---|---|---|
| Grism | 0.28 sq deg | 1.00 – 1.93 | 435-865 | 20.4 at 1.5 μm |
| Integral Field Channel | 3.00" x 3.15" 6.00" x 6.3" | 0.42 – 2.0 | 80-120 | 24.2 at 1.5 μm |

The WFIRST/WFI FOV is shown compared to the FOVs of other instruments on HST and JWST. Each of the 18 individual white boxes represents one 4K x 4K detector. The tables provide point source sensitivity in representative exposure times.




Integral Field Channel provides spatially-resolved low-dispersion spectroscopy.

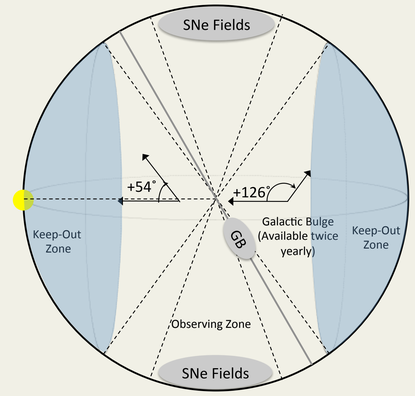



Illustrative layouts of the IFC images slicers are shown.

## Observatory

**Key Features**

- **Telescope**: 2.4m aperture
- **Instruments**
  - Wide Field Imager/Spectrometer & Integral Field Unit
  - Internal Coronagraph with Integral Field Spectrograph
- **Data Downlink Rate**: 275 Mbps
- **Data Volume**: 11 Tb/day
- **Orbit**: Sun-Earth L2
- **Launch Vehicle**: Falcon Heavy
- **Mission Duration**: 5 yr, 10yr goal
- **Serviceability**: Observatory designed to be robotically serviceable
- **Starshade**: S/C and coronagraph compatible with a future starshade mission




WFIRST Field of Regard. Earth & Moon avoidance is a minor sporadic constraint.

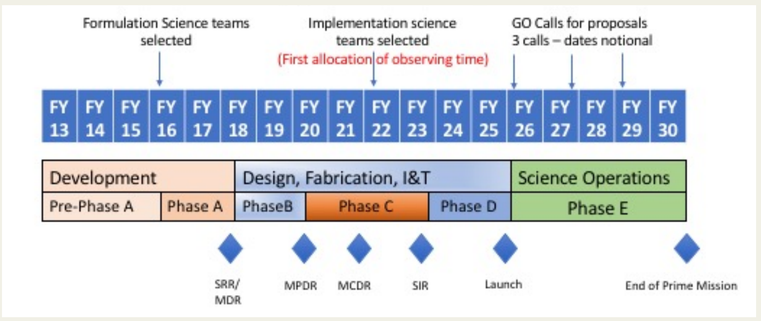
## WFIRST Project Status

WFIRST is presently near the end of Phase A.
Upcoming milestones leading to Phase B:

- System Requirements Review / Mission Definition Review
- Independent cost & schedule review
- NASA Center & HQ reviews leading to Phase B

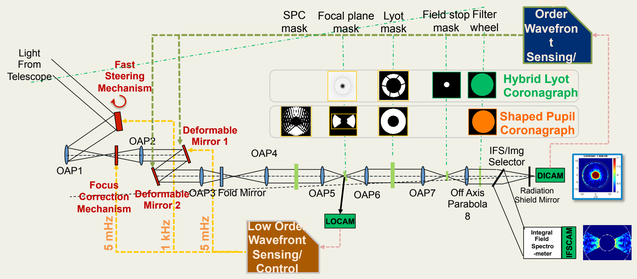
The final HQ review defines the baseline for Phase B
Present Science Investigation teams in place through CDR
Implementation science teams selected after CDR
first allocation of observing time
Guest Observer calls for proposals: 3 calls, timing TBD
25% of Prime Mission, 100% of extended mission
Archival research: TBD but annual calls likely

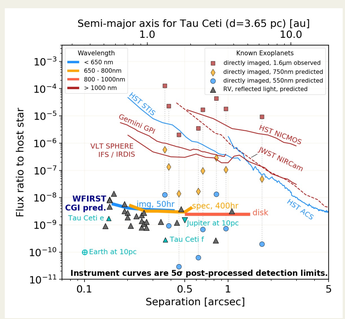
Launch: nominal launch date is September 2025
Prime mission: 5 years
Extended mission anticipated to be additional 5 years

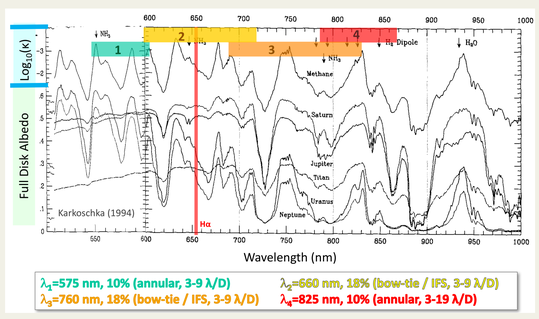



## WFIRST Coronagraph Instrument

The WFIRST coronagraph will demonstrate new technologies needed for future exoplanet direct imaging missions. These include autonomous active wavefront control, new mask designs & manufacturing, high actuator count deformable mirrors, low-noise detectors, and use of an integral field spectrograph as a wavefront sensor. If successful, science observations will be conducted through a participating scientist program.




Left panel: CGI instrument layout. Center: predicted CGI performance, Right: present filter complement. Additional filters, not shown, are available for use with a future starshade mission.

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