

WFIRST

Wide-Field Infrared Survey Telescope

The Mission

- Planned NASA mission with mid-2020s launch
- Top large space priority of ASTRO2010 Decadal Survey
- Science operations to be shared by GSFC, STScI, IPAC

Science

- *Dark Energy*: distinct equation of state measures
- *Exoplanets*: Microlensing discovery down to sub-Earth masses; Coronagraphic imaging and spectroscopy
- *Astrophysics*: Guest Observer programs and Guest Investigator archival analysis of wide-field surveys

Telescope

- Existing Hubble-size 2.4-m primary, 3-mirror anastigmat

Wide Field Instrument (WFI) [Imager + IFU]

- 0.7–2.0 microns, 0.27 degrees² (100× Hubble's FOV)
- Six broad-band filters + grism spectroscopy

Coronagraphic Instrument [Imager + IFU]

- 0.4–1.0 microns, 10⁻⁹ contrast goal

STScI Support

Space Telescope Science Institute

Science Center Activities

- Science operations studies and preparation
- Technical Reports on various mission topics:
<http://www.stsci.edu/wfirst/technicalreports>
- Community engagement and Science Team support
- Data simulation tools and data analysis algorithms
- Questions? Email help@stsci.edu

Software Tools for WFIRST/WFI

<http://www.stsci.edu/wfirst/software>

WebbPSF: Provides realistic field-dependent PSF simulations

Pandeia: Calculates simulated data, exposure times, and signal-to-noise ratios

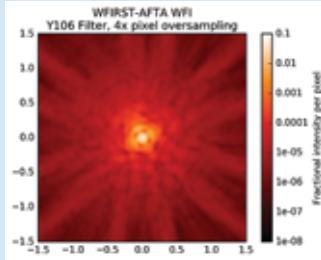
STIPS: Simulates complex astronomical scenes

Field-of-View (FOV) Overlay: Displays FOV footprint on top of DSS, SDSS, or GALEX images

WebbPSF

A customizable multi-mission interface to perform point-spread function (PSF) simulations and calculations

- Simulated PSFs are critical to predict the performance of the observatory and to simulate scenes
- WebbPSF accounts for pupil shapes, source spectral energy distributions, filter bandpasses, and field-dependent aberrations
- WebbPSF contains flexible Python tools for analysis or export of PSFs

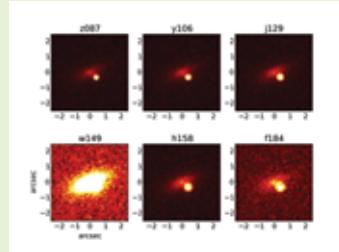


WebbPSF-simulated WFIRST/WFI PSF in the Y106 filter

Pandeia

A multi-mission 3D data cube simulator and signal-to-noise ratio/exposure time calculator (ETC)

- Accounts for the effects of wavelength-dependent PSFs and pixel-to-pixel correlations inherent to modern IR detectors
- Detailed scene creation for broad science cases (extra-galactic, galactic, etc.)
- Support for a wide range of instrument modes

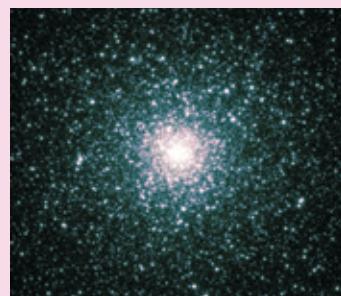


Pandeia-simulated high-z supernova and host galaxy in the six WFIRST/WFI filters

STIPS

A tool designed to produce full-scene pipeline-processed simulated data

- Generate complex astronomical scenes through user-specified inputs (e.g., star cluster structural and population characteristics)
- Possibility to include post-pipeline data reduction residuals
- Web-based interface and a Python API for scripting

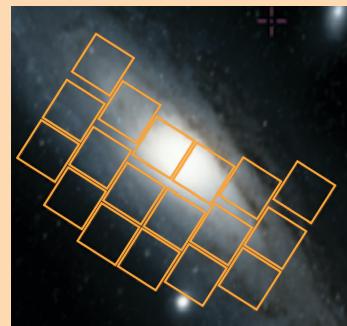


STIPS-simulated composite-color WFIRST/WFI globular cluster image

Field of View Overlay

Quickly and simply display the FOV outline of the WFIRST instruments over sky images

- Supports overlays on DSS, SDSS or GALEX images
- Object catalogs can be extracted and shown in a separate window
- Uses functionalities of the Mikulski Archive for Space Telescopes (MAST)
- As MAST Portal functionality expands, tool features will improve



MAST-FOV Overlay of the WFIRST/WFI field on the Andromeda Galaxy



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<http://www.stsci.edu/wfirst>

