The Near Infrared Camera (NIRCam)

**Field of View**

- **Module A**: coronaphraph masks
- **Module B**: 20°

**Coronagraphy**

- Occulting Masks and Target Acquisition squares
- Round masks and Bar masks

**Imaging**

- Filter
- Sensitivity (Point source)
- Saturation (G2V star 60% full well)

<table>
<thead>
<tr>
<th>Filter</th>
<th>Sensitivity (nJy)</th>
<th>Point source</th>
<th>Saturation (G2V star 60%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F070W</td>
<td>22.5</td>
<td>K ~ 9.0 Vega</td>
<td>2 reads of 64 x 64 subarray</td>
</tr>
<tr>
<td>F115W</td>
<td>13.2</td>
<td>K ~ 9.6 Vega</td>
<td></td>
</tr>
<tr>
<td>F200W</td>
<td>9.1</td>
<td>K ~ 9.3 Vega</td>
<td></td>
</tr>
<tr>
<td>F210M</td>
<td>14.9</td>
<td>K ~ 8.4 Vega</td>
<td></td>
</tr>
<tr>
<td>F212N</td>
<td>129 nJy</td>
<td>K ~ 5.6 Vega</td>
<td></td>
</tr>
<tr>
<td>F277W</td>
<td>14.3</td>
<td>K ~ 9.6 Vega</td>
<td></td>
</tr>
<tr>
<td>F322W2</td>
<td>9.1</td>
<td>K ~ 10.0 Vega</td>
<td></td>
</tr>
<tr>
<td>F356W</td>
<td>12.1</td>
<td>K ~ 8.9 Vega</td>
<td></td>
</tr>
<tr>
<td>F444W</td>
<td>23.6</td>
<td>K ~ 8.0 Vega</td>
<td></td>
</tr>
</tbody>
</table>

**Grism Slitless Spectroscopy**

- Resolution: R = 1770 at 3.7 µm (blaze)
- Fiducial sensitivity (unresolved line): 5 × 10^{-16} erg/cm²/s
- Saturation limit: K ~ 4 (Vega mag) G2V star (2048 x 64 subarray)

**Telescope Wavefront Sensing**

- Coarse phasing: Dispersed Hartman Sensing
  - Align mirror segments in pairwise fashion
- Fine phasing: Weak lens defocused images
  - Sensing every two days
  - Adjustments every two weeks

**At a Glance**

- **Short Wavelength Channel**
  - Wavelength Range: 0.6 – 2.3 µm
  - Nyquist Wavelength: 2.0 µm
  - Fields of View: 2 × 2' × 2' (with 4-5'' gaps)
- **Long Wavelength Channel**
  - Wavelength Range: 2.4 – 5.0 µm
  - Nyquist Wavelength: 4.0 µm
  - Fields of View: 2 × 2' × 2'

**Detector Details**

- Teledec HgCdTe H2RG detectors
- Full frames are read out non-destructively every 10.74 seconds
- Smallest subarray 64×64 read out in 49 ms (shortest exposure time)
Grism Slitless Spectroscopy: Simulated Data

500 z~9 galaxies (idealized)

Exoplanet Spectrum

First-Order Wavelength (microns)

2.0 3.0 4.0 5.0

source position

F277W
F322W2
F356W
F410M
F444W

Grism + F444W

Exoplanet Transit Time Series

Warm Sub-Neptune Transmission (1 transit binned to R=70)

Absorption Depths, [A/H] (microns)

W, M, N filters have R ~ 4, 10, 100, respectively

WL: Weak Lens (defocus for alignment or bright star imaging)
PAPPA: Pupil Alignment Pinhole Projector Assembly
DHS: Dispersed Hartman Sensing (subaperture grisms)
IPR (Internal Phase Retrieval) Wedge to measure NIRCam wavefront errors using LEDs mounted on coronagraphs

Optical Layout

Module A (mirror image Module B not shown)

http://www.stsci.edu/jwst/instruments/nircam