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SCIENCE INSTITUTE

EXPANDING THE FRONTIERS OF SPACE ASTRONOMY

Near Infrared Camera (**NIRCam**)

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September 18, 2023



NIRCam Status

- NIRCam is performing well!
- No anomalies to report
- Newly Commissioned Dual-channel Coronagraphy mode
- Newly enabled Wide Field Slitless pure parallels
- Stability is within $\sim 0.7\%$ based on repeat observations of a standard star.
- Documentation updates
 - JDox: Pipeline tips & tricks documentation is coming soon based on frequent Helpdesk questions.
 - JDox: Working on recommendations for correcting $1/f$ noise
 - Planning two refereed papers detailing absolute flux for imaging and spectroscopic calibrations.



NIRCam Calibration Efforts

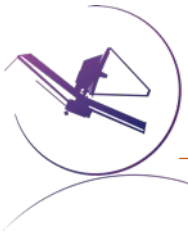
Imaging

- **Absolute Flux:** Sep 2023 delivery includes additional observations of standard stars and information on subarray-to-full frame flux variations.
- **Astrometry:** Next delivery expected in Winter 2024, derived from LMC observations.
- **Flat fields:** Longwave flats were updated Spring 2023, SW flats expected Sept 2023.
 - Flats are constructed using all appropriate science data in the archive.

Time Series Imaging (see Imaging above)

- Weak lenses were not included in the last absolute flux update. We are aiming for an update in Oct 2023 based on observations of standard stars.

(Calibration Accuracies are described in the Bonus Slides)



NIRCam Calibration Efforts

Coronagraphy

- **Absolute flux:** Delivery expected in Oct 2023 based on observations of standard stars placed just outside the masks.
 - The throughput for the bar occulters is currently a copy of the round occulter throughputs. The new delivery will fix this (throughput difference is ~2%).
- **Astrometry:** Delivery expected Winter 2024 based on LMC observations.

Grism (Wide Field Slitless and Time Series)

- **Absolute Flux & wavelength calibration:** Update Sep 2023 based on observations of standard stars and a planetary nebula in the LMC.

(Calibration Accuracies are described in the Bonus Slides)



NIRCam Pipeline Updates

Pipeline updates since previous JSTUC meeting

- Bug fixes for use of frame0 when ramps are affected by saturation (off by default)
- Snowball/shower correction code implemented, along with many fixes and enhancements (off by default)
- Tweakreg updates (user-supplied catalogs, more parameters, alignment of single images to reference catalog)
- Updates for suboptimal pixels (propagation of DO_NOT_USE flags and assignment of NaN to exclude those pixels from downstream calculations)
- Updates for dual-channel coronagraphy (associations, new subarrays, data products)
- WFSS improvements (spectral trace and dispersion calibration data use a more complex form of WCS transforms)



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Backup Slides



Calibration Accuracy

Imaging

- **Absolute Flux**
 - Uncertainties $<1\%$ for most filters (up to 2% for a handful).
 - Subarrays agree with the full-frame to about 1% .
- **Astrometry**
 - Current accuracy: SW $\sim 1-5$ mas, LW $\sim 1-2$ mas (depends on filter).
 - Upcoming update expected to be at or below 1 mas for all filters.
- **Flat fields**
 - LW: Pixel-level corrections $<1\%$. Drizzled RMS decreased upwards of $\sim 25\%$.



Calibration Accuracy

Coronagraphy

- **Absolute flux**
 - The throughput for the bar occulters is currently a copy of the round occulter throughputs. The new delivery will fix this (throughput difference is $\sim 2\%$).
- **Astrometry**
 - Currently 5-10 mas in the SW channel, >10 mas in the LW channel.

Grism (Wide Field Slitless and Time Series)

- **Absolute Flux & wavelength calibration**
 - Flux calibration has $\sim 2\%$ accuracy.
 - Wavelength calibration is within ~ 0.25 pixels.
 - 1st order trace is calibrated to within ~ 0.25 pixels over full field of view.
 - Grism subarrays have a flux offset from the full frame of $\sim 2\%$.