

# NIRCam Subpixel Dithers

JWST [NIRCam](#) subpixel dithers are small pointing offsets between exposures that mitigate an undersampled PSF and bad detector pixels.

## Overview of NIRCam subpixel dithers

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NIRCam subpixel dithers are small pointing offsets performed between exposures in [imaging](#), [coronagraphy](#), and [wide field slitless spectroscopy](#) observations. They include subpixel offsets designed to mitigate undersampled PSFs. The available subpixel dither patterns serve different purposes for different observing modes:

- [NIRCam standard subpixel dithers](#), for imaging observations, are small telescope pointing maneuvers (0.2"–2") designed to optimally sample the PSF and improve the spatial resolution of stacked images.
- [NIRCam small grid dithers](#), for imaging and coronagraphy, are very small pointing shifts (<0.06") performed quickly and precisely with the fine steering mirror:
  - Imaging small grid dithers perform the same optimal pixel subsampling as standard subpixel dithers, but with smaller shifts performed with more efficiency.
  - Coronagraphy small grid dithers are designed to optimize PSF subtraction of a reference star from the science target.
- [NIRCam WFSS subpixel dithers](#) (WFSS) are small telescope pointing maneuvers (~0.6") optimized to improve long wavelength grism observations and short wavelength simultaneously-obtained images.

## References

[Anderson, J. 2009, JWST-STScI-001738](#)

Dither Patterns for NIRCam Imaging

[Anderson, J. 2011, JWST-STScI-002199](#)

NIRCam Dithering Strategies I: A Least Squares Approach to Image Combination

[Anderson, J., 2014, JWST-STScI-002473](#)

NIRCam Dithering Strategies II: Primaries, Secondaries, and Sampling

[Coe, D. 2017, JWST-STScI-005798](#)

More Efficient NIRCam Dither Patterns

[Koekemoer, A. M. & Lindsay, K. 2005, JWST-STScI-000647](#)

An Investigation of Optimal Dither Strategies for JWST

[Lajoie, C-P et al., 2016, SPIE, 99045K](#)  
Small-grid dithers for the JWST coronagraphs