

Observing Scenario (OS) 11

Polarization Datasets for the Wide-field-of-view Shaped Pupil Coronagraph

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Overview

To facilitate studies that rely on polarization, three datasets have been generated to complement John Krist's Observing Scenario (OS) 11 time series simulations for the wide-field-of-view shaped pupil coronagraph in band 4:

- An x-polarized time series dataset,
- A y-polarized time series dataset, and
- A corresponding unpolarized time series dataset.

These three datasets were generated using the public version of CGISim, with some modifications to extract the electric fields and incorporate jitter, and they include the following errors:

- Optic fabrication and alignment errors ('use_errors' : 1 in CGISim)
- Wavefront error changes from thermal drift
- Pupil shear
- Deformable mirror (DM) shear
- DM temperature drift
- SPAM (shaped pupil mask) shear
- LSAM (Lyot stop) shear
- Focus correction mechanism offset to compensate Z4
- Jitter



These errors are incorporated using information contained in `spc_wfov_os11_inputs.fits`.

The three polarization datasets do not include LOWFS corrections (except for Z4), detector noise, or model uncertainty factors (MUFs).

Files Provided for the Three Polarization Datasets

For each polarization case, the normalized intensity (NI) is provided for each of the 1830 time steps in the observing scenario, along with the intensity for each polarization component. The files ending in “no_FPM” are for simulations without the focal plane mask included; these files are used to determine the normalization for calculating the normalized intensity.

For the x-polarized case:

- Compiled_NI_OS11_xpolarized.fits
- Compiled_-45in_Xout_OS11_xpolarized.fits
- Compiled_45in_Xout_OS11_xpolarized.fits
- Compiled_-45in_Xout_OS11_xpolarized_noFPM.fits
- Compiled_45in_Xout_OS11_xpolarized_noFPM.fits

For the y-polarized case:

- Compiled_NI_OS11_ypolarized.fits
- Compiled_-45in_Yout_OS11_ypolarized.fits
- Compiled_45in_Yout_OS11_ypolarized.fits
- Compiled_-45in_Yout_OS11_ypolarized_noFPM.fits
- Compiled_45in_Yout_OS11_ypolarized_noFPM.fits

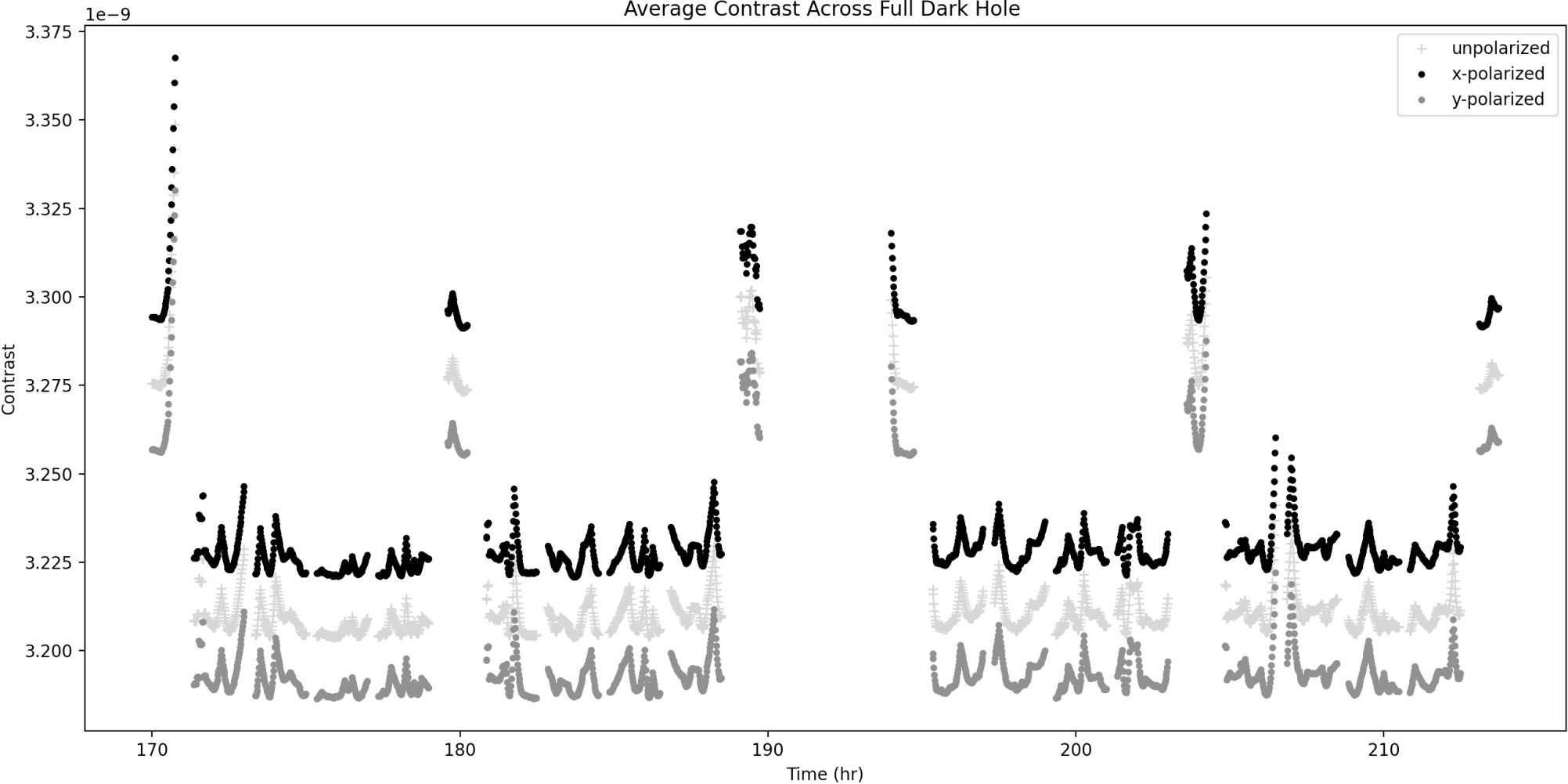
For the unpolarized case:

- Compiled_NI_OS11_unpolarized.fits
- Compiled_-45in_Yout_OS11_unpolarized.fits
- Compiled_-45in_Xout_OS11_unpolarized.fits
- Compiled_45in_Xout_OS11_unpolarized.fits
- Compiled_45in_Yout_OS11_unpolarized.fits
- Compiled_-45in_Yout_OS11_unpolarized_noFPM.fits
- Compiled_-45in_Xout_OS11_unpolarized_noFPM.fits
- Compiled_45in_Xout_OS11_unpolarized_noFPM.fits
- Compiled_45in_Yout_OS11_unpolarized_noFPM.fits

For these files, $dx = 0.303 \lambda_c / D$.

For band 4, $\lambda_c = 825$ nm.

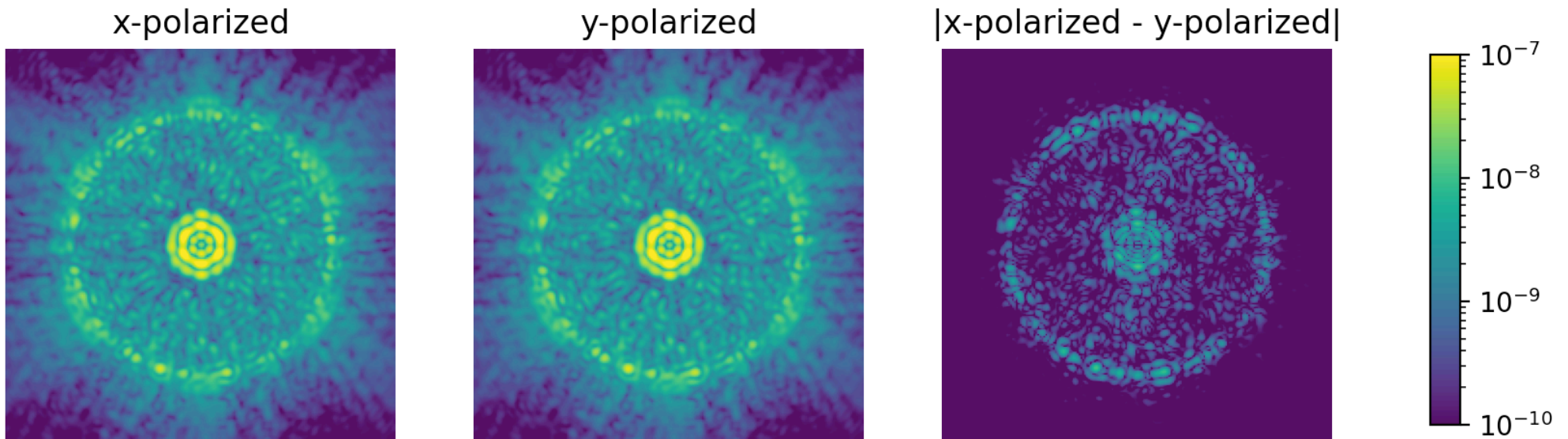
Average Contrast Across the Full Dark Hole



Average contrasts across the full dark hole over time:

unpolarized: 3.22×10^{-9}
x-polarized: 3.24×10^{-9}
y-polarized: 3.20×10^{-9}

Comparison of x-polarized and y-polarized Cases



The dark hole extends from 6 to 20 λ_c/D .