

APLC Design Summary

Instrument	SCDA
nPup	500 x 500 pixels
Coronagraphic throughput (transmitted energy)	0.0459
Core throughput (encircled energy)	0.0579
Lytot stop inner diameter (% of inscribed circle)	0.12
Lytot stop outer diameter (% of inscribed circle)	0.982
Bandpass	10.0%
# wavelengths	3
FPM radius (grayscale)	3.5 λ /D
nFPM	150 pixels
IWA — OWA	3.4—12.0 λ /D
Contrast constraint	10^{-10}
Lytot Stop alignment tolerance	0 pixels

Input Files :

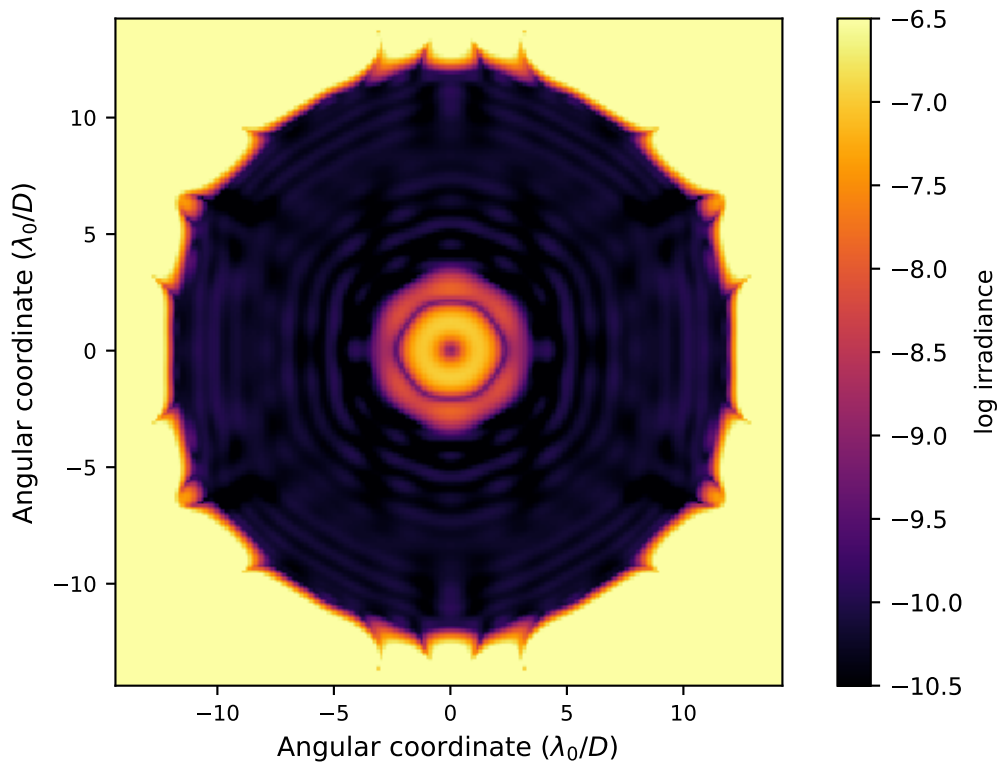
▷ Pupil file : SCDA/TelAp_SCDA_11-Hex_gy_gap_pad02_ovsamp03_N0500.fits

▷ Lyot stop file : SCDA/LS_SCDA_ID0120_OD0982_no_struts_gy_ovsamp3_N0500.fits

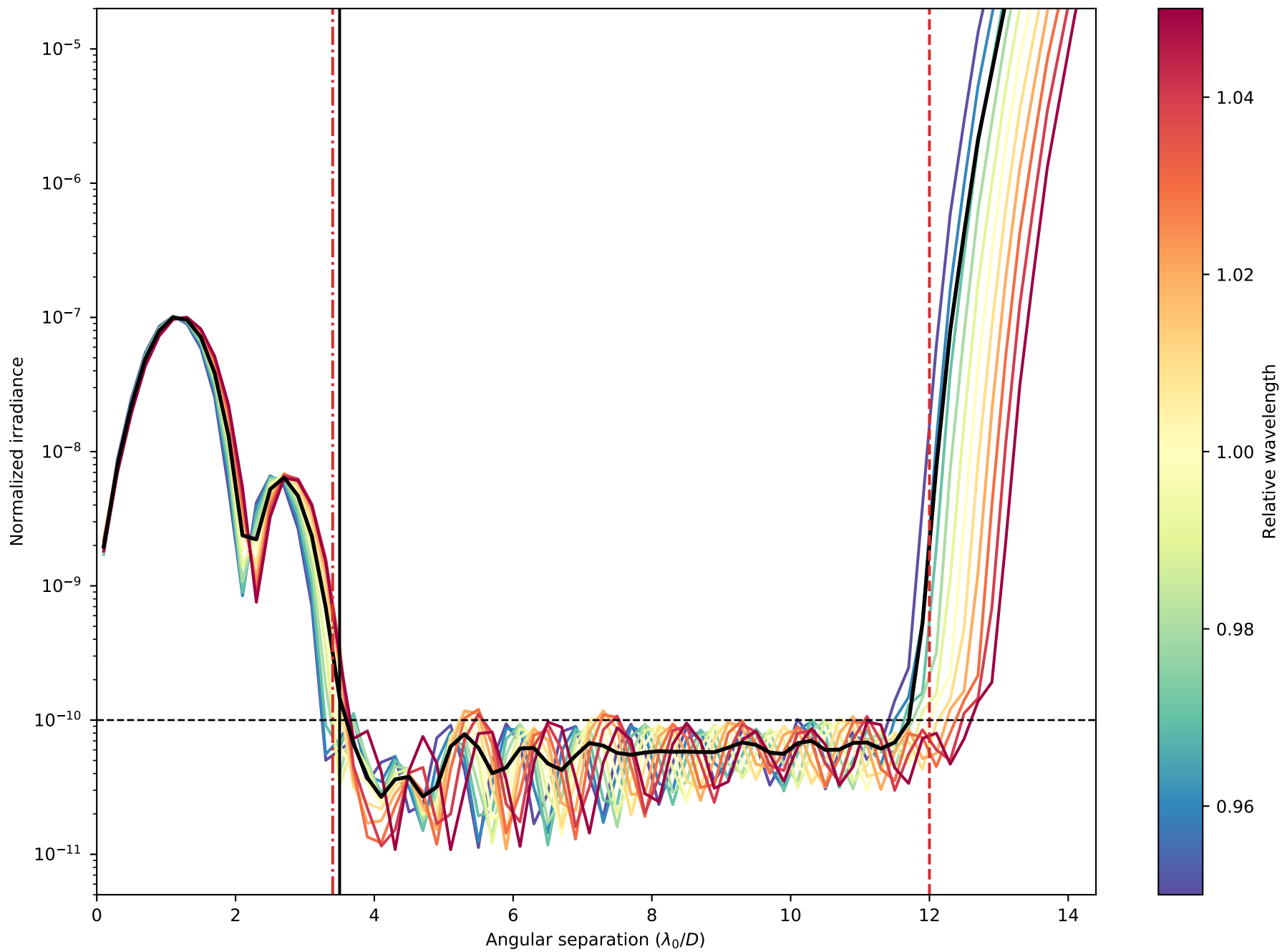
Solution File :

▷ 10_SCDA_N500_FPM350M0150_IWA0340_OWA01200_C10_BW10_NIam3_LS_ID0_OD0_OD_no_ls_truts_gy_ovs.fits

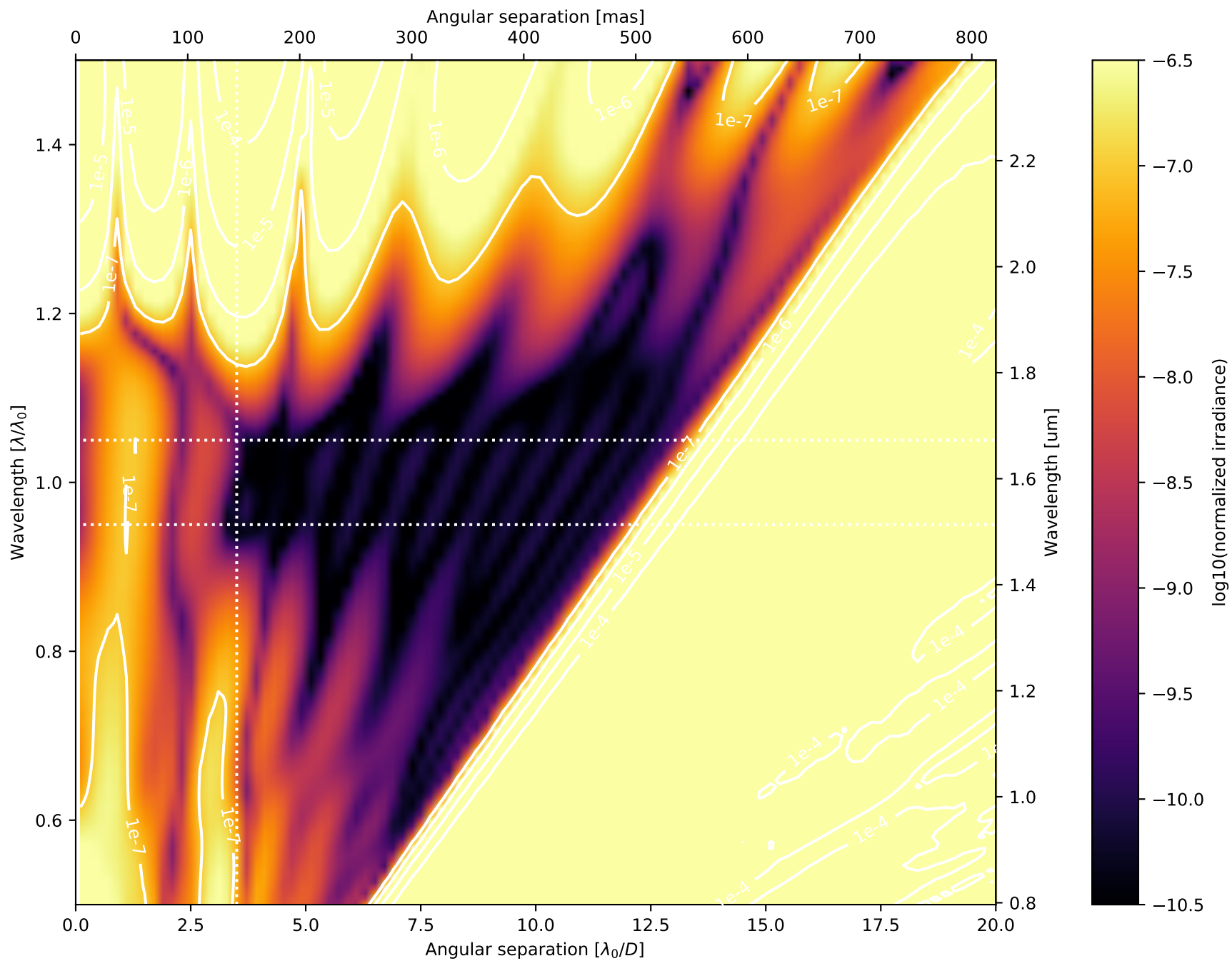
Wed Dec 8 22:34:50 2021

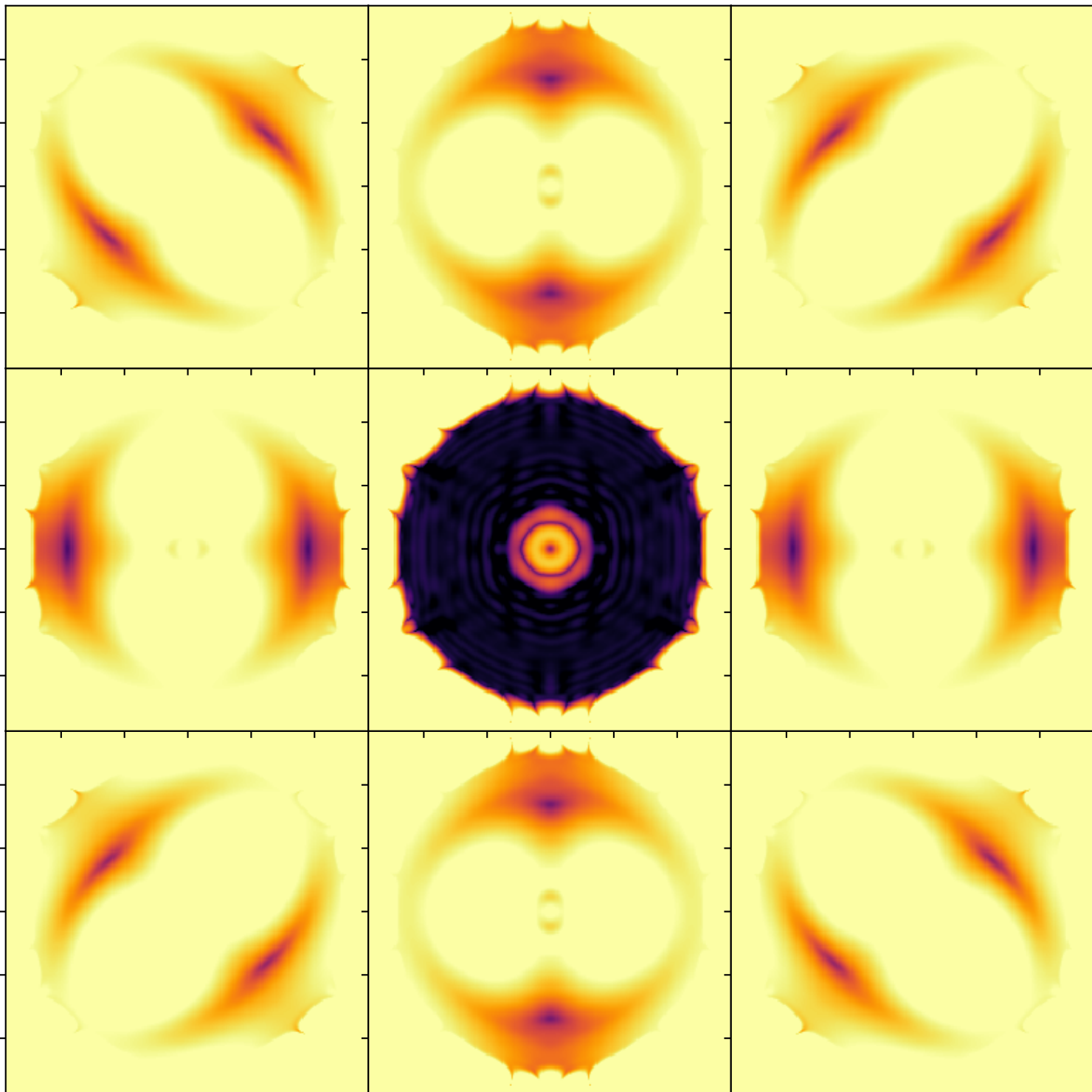


*On – axis PSF in log irradiance,
normalized to the peak irradiance value.*

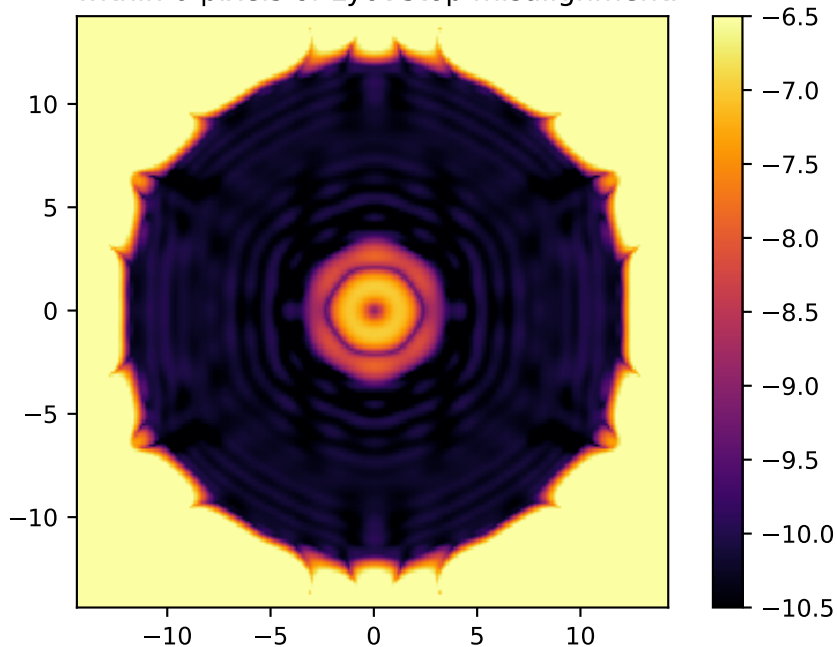


Radial intensity profile for the broadband APLC design at 11 simulated wavelengths centered around λ_0/D and equally spatially sampled over the 10.0% bandpass. The black curve shows the average intensity across the 11 wavelength samples. The dashed red vertical lines delimit the high-contrast dark zone (between 3.4 and $12.0 \lambda_0/D$). The blue dotted line delimits the FPM radius, set to $3.5 \lambda_0/D$.





Average broadband normalized irradiance
within 0 pixels of Lyot stop misalignment.



Analysis Summary

Apodizer &
Telescope Aperture

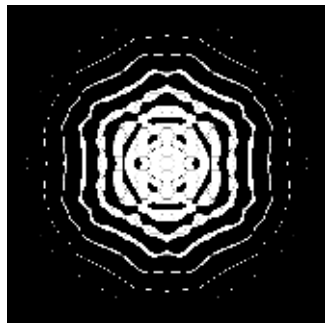


Image plane

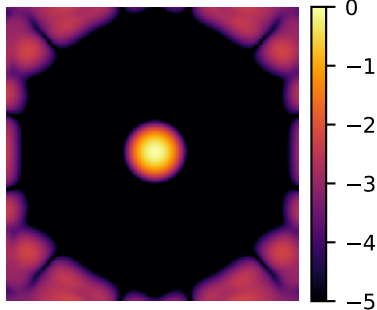
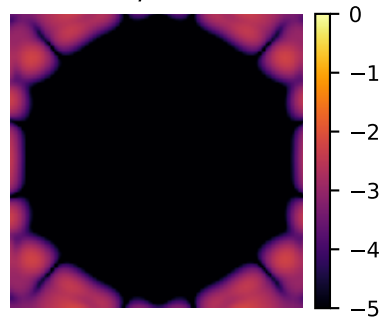
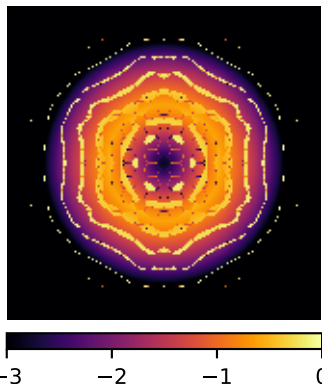


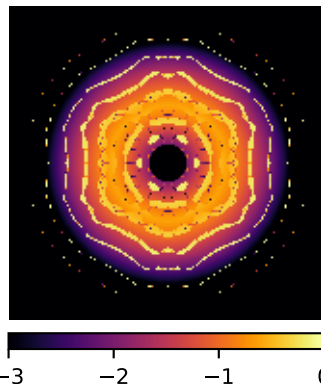
Image plane
w/FPM



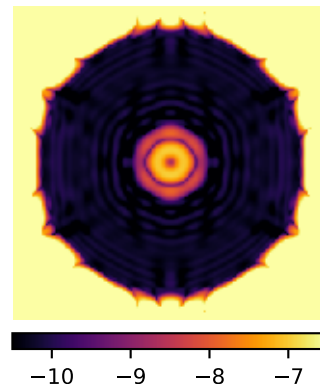
Lyot plane

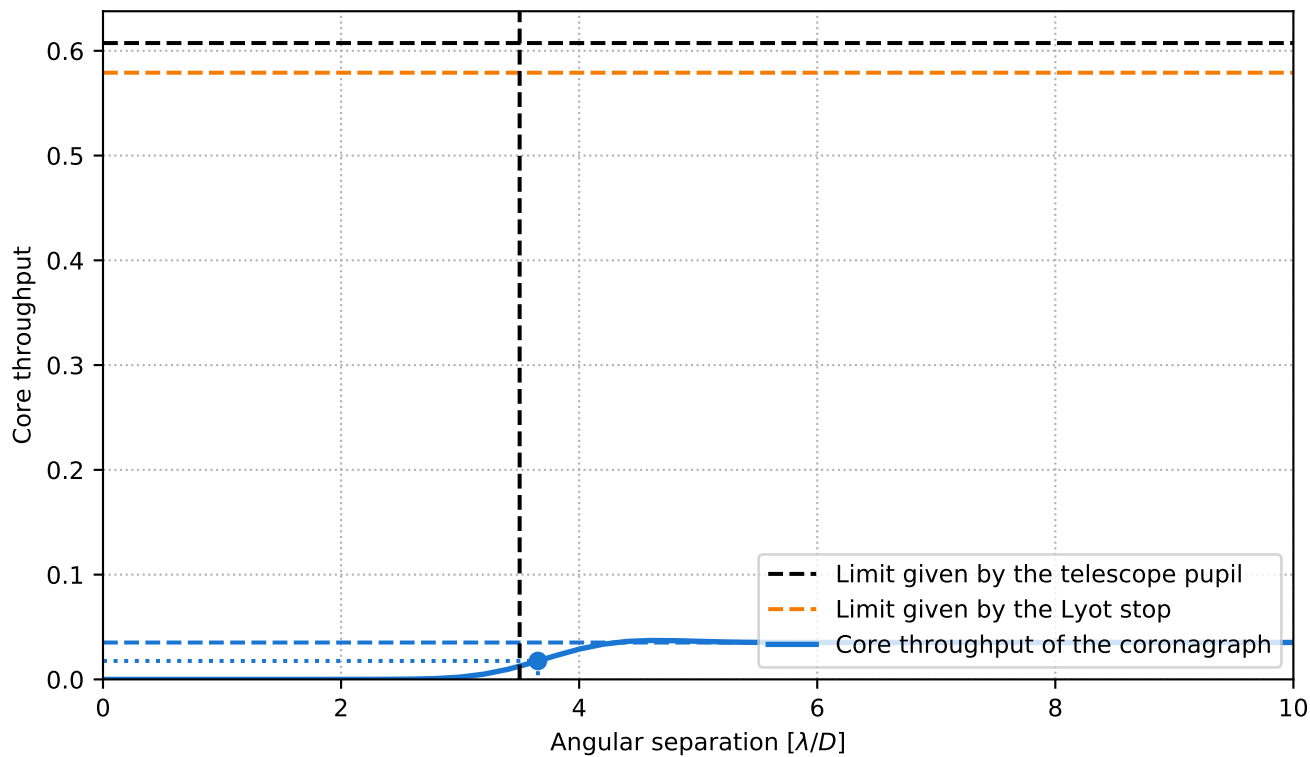


Lyot plane
w/lyot stop



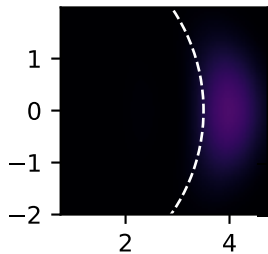
Final image plane



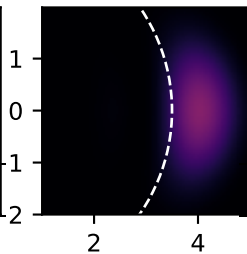


Pupil core throughput:	0.6073928314947323
Lyot stop core throughput:	0.5790810744196756
Maximum core throughput:	0.035191301187686
Maximum core throughput w.r.t. pupil core throughput:	0.057938288637822355
Maximum core throughput w.r.t. Lyot stop core throughput:	0.060770939929184975
Inner working angle:	3.653784174697345 λ_0/D

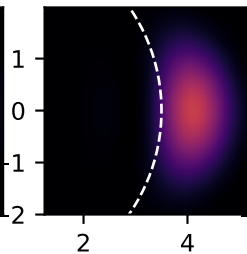
$2.75 \lambda_0/D$



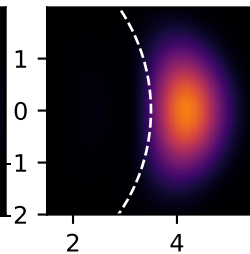
$3.00 \lambda_0/D$



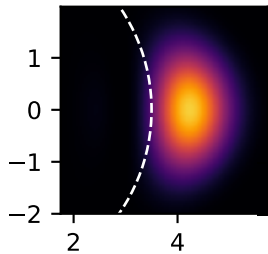
$3.25 \lambda_0/D$



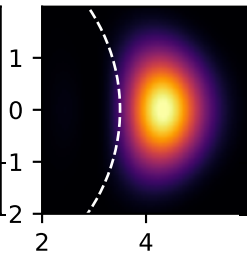
$3.50 \lambda_0/D$



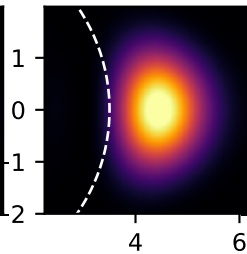
$3.75 \lambda_0/D$



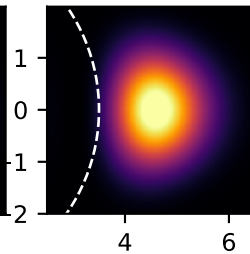
$4.00 \lambda_0/D$



$4.25 \lambda_0/D$

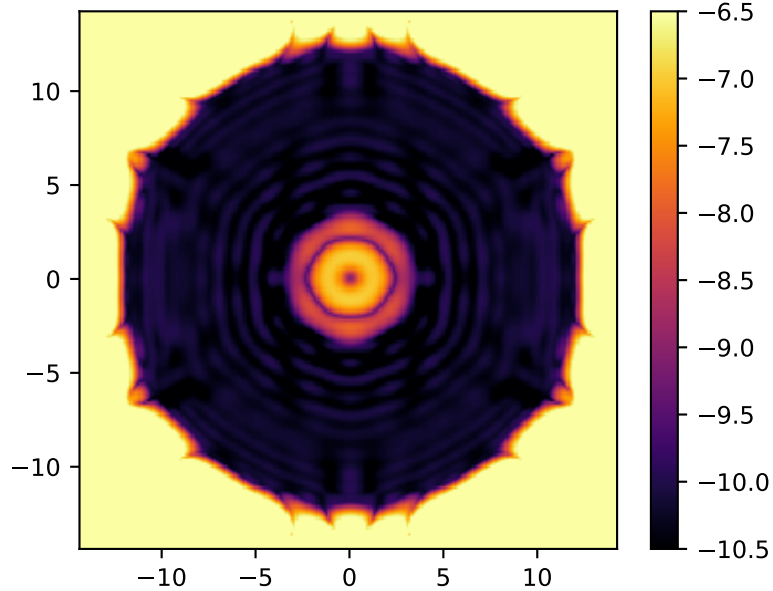


$4.50 \lambda_0/D$

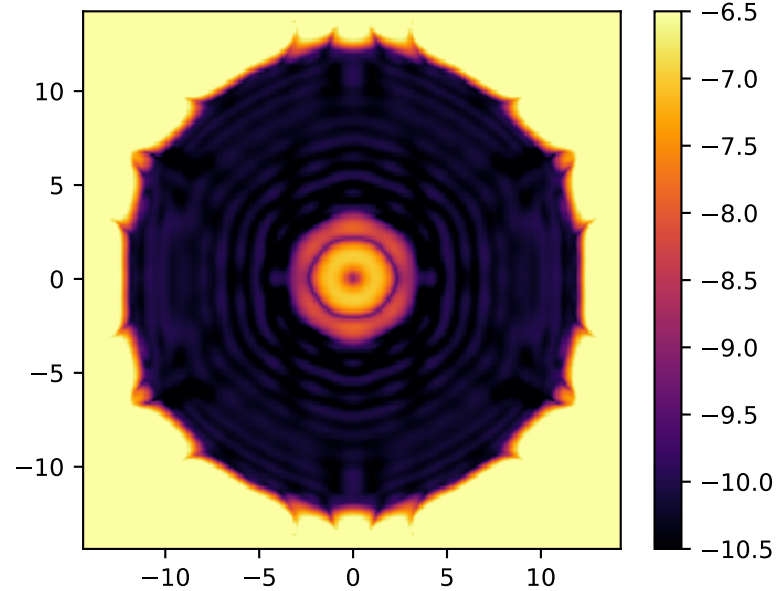


Broadband normalized irradiance for four representative levels of residual pointing jitter.

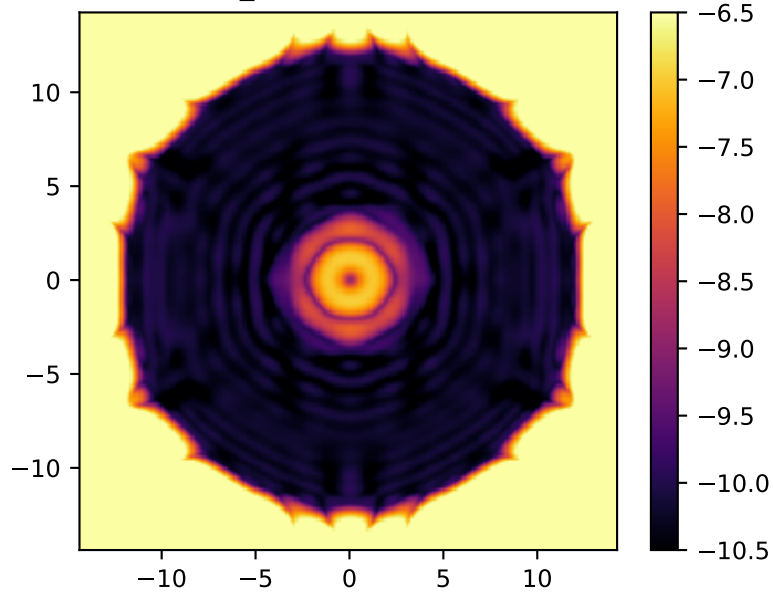
$\sigma_{\text{rms}} = 0.01 \lambda/D$



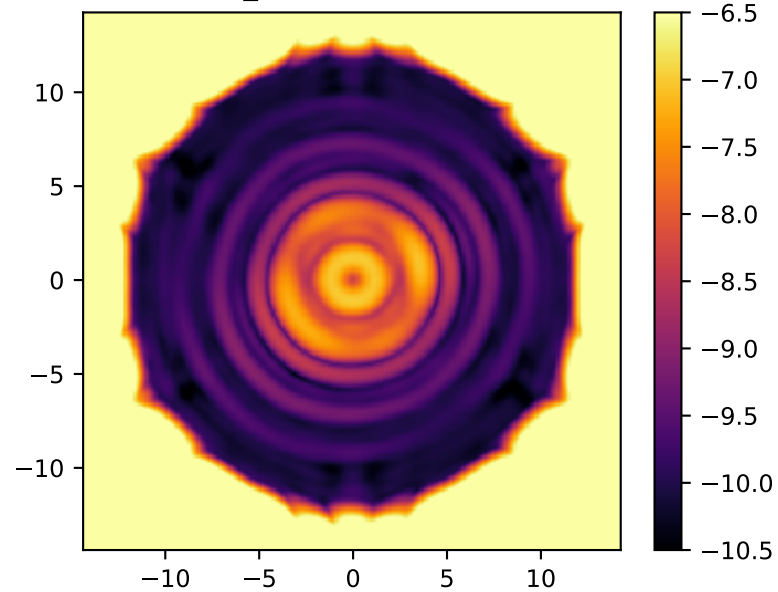
$\sigma_{\text{rms}} = 0.03 \lambda/D$

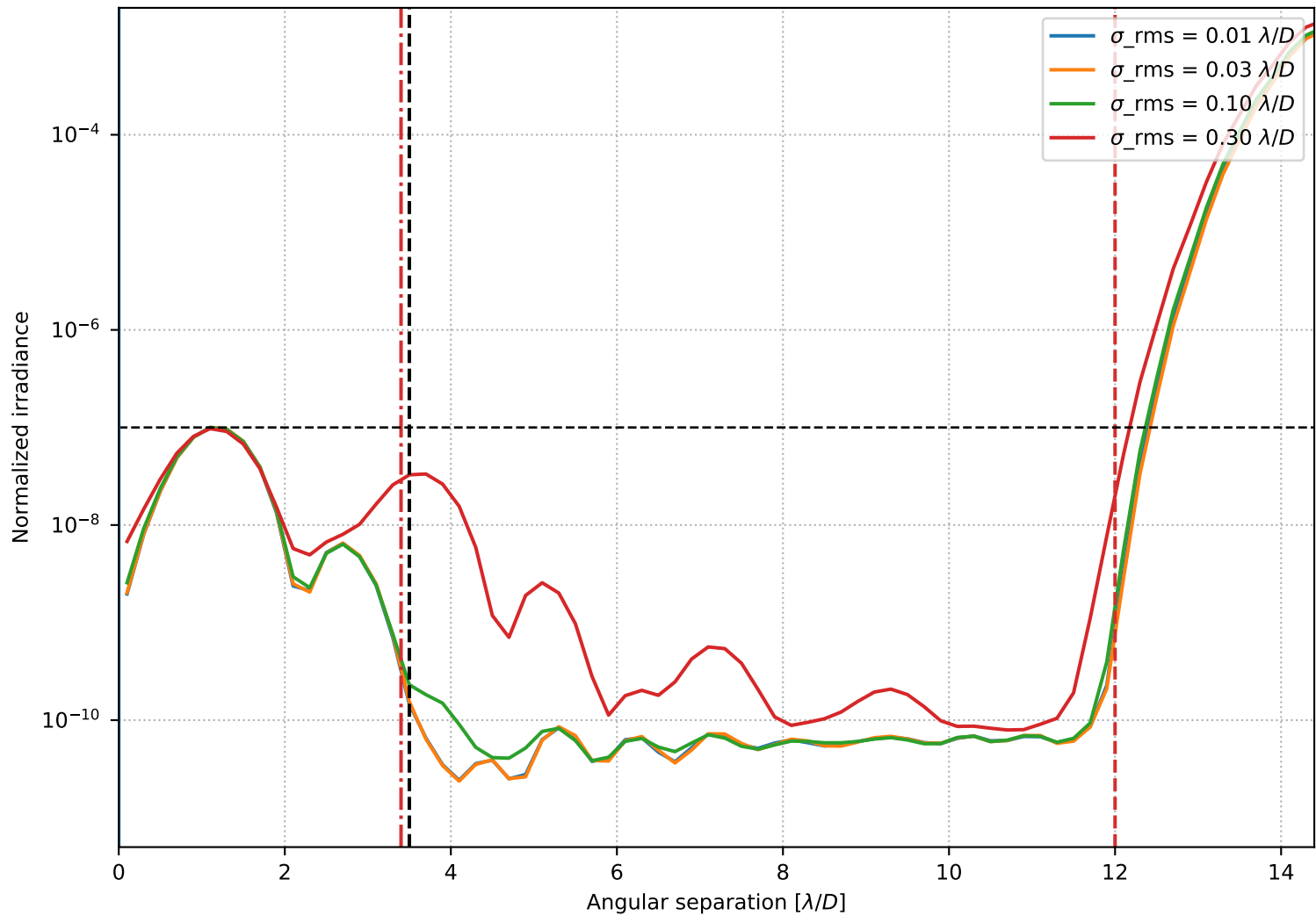


$\sigma_{\text{rms}} = 0.10 \lambda/D$



$\sigma_{\text{rms}} = 0.30 \lambda/D$





Azimuthally averaged raw contrast for four representative levels of rms residual pointing jitter.