

APLC Design Summary

Instrument	SCDA
nPup	512 x 512 pixels
Coronagraphic throughput (transmitted energy)	0.653
Core throughput (encircled energy)	0.3346
Liot stop inner diameter (% of inscribed circle)	0.001
Liot stop outer diameter (% of inscribed circle)	0.0
Bandpass	10.0%
# wavelengths	3
FPM radius (grayscale)	$3.5 \lambda/D$
nFPM	150 pixels
IWA — OWA	$3.4\text{--}12.0 \lambda/D$
Contrast constraint	10^{-10}
Liot Stop alignment tolerance	4 pixels

Input Files:

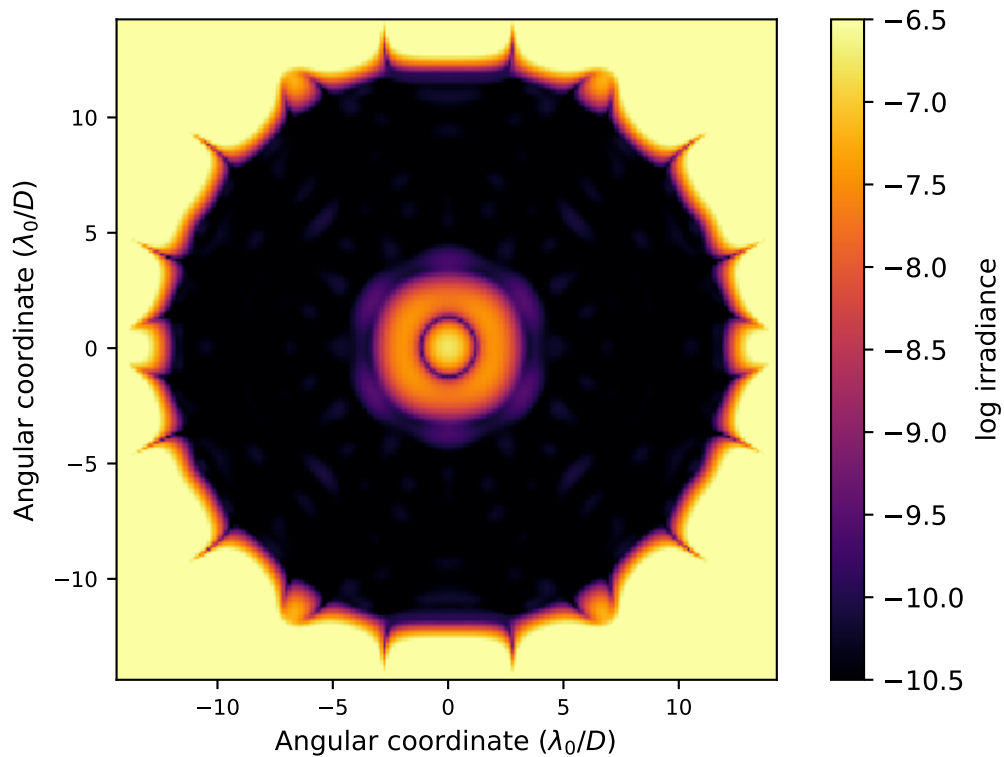
▷ Pupil file: SCDA/TelAp_LUVex_01-Hex_gy_ovsomp03_N0512.fits

▷ Lyot stop file: SCDA/LS_LUVex_01-Hex_ID0000_OD0982_no_struts_gy_ovsomp3_N0512.fits

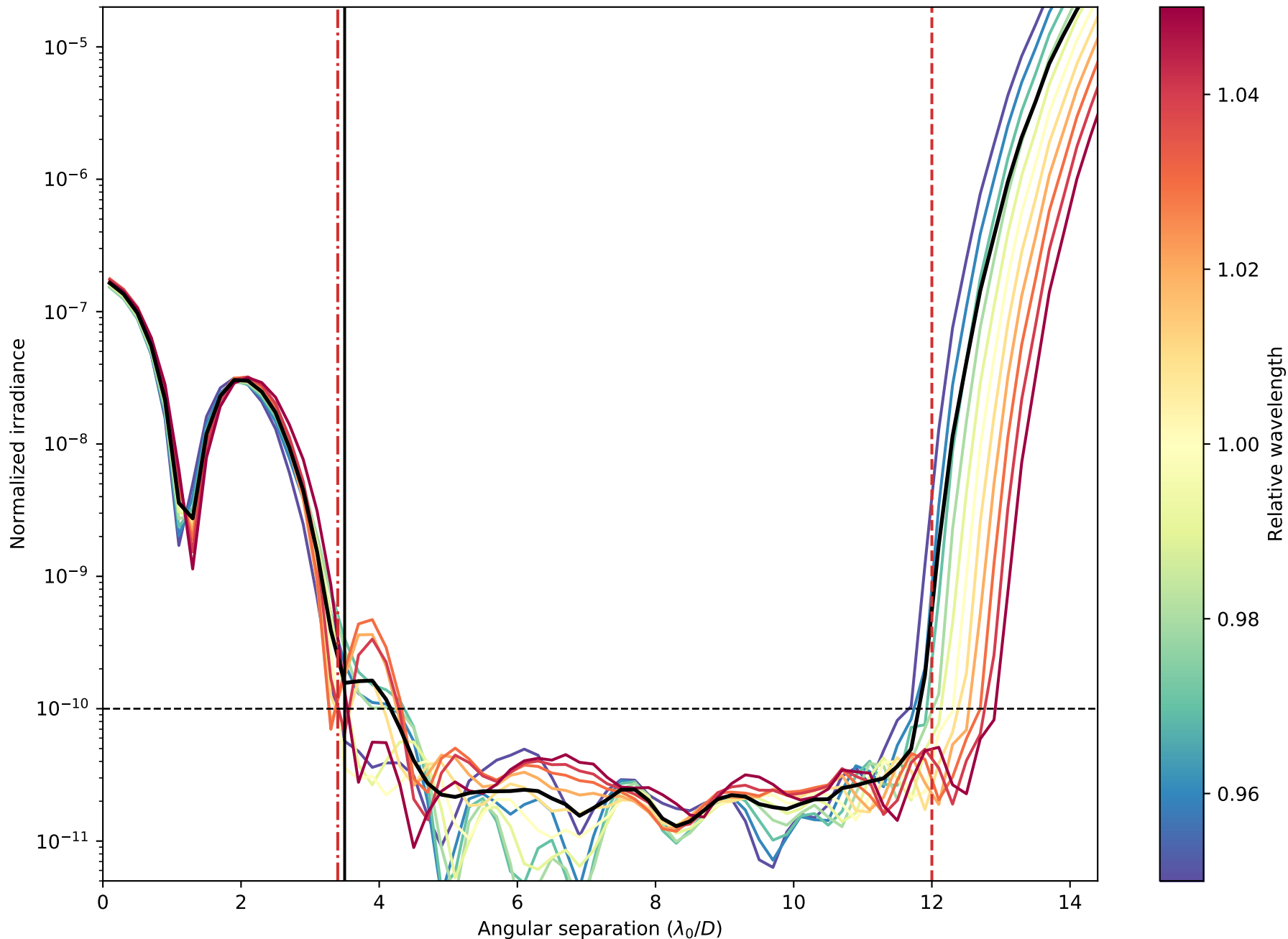
Solution File:

▷ 0_SCDA_N512_FPM350M0150_IWA0340_OWA01200_C10_BW10_Nlam3_LS_IDex_ID_OD0_OD_Is_982_no_strut.fits

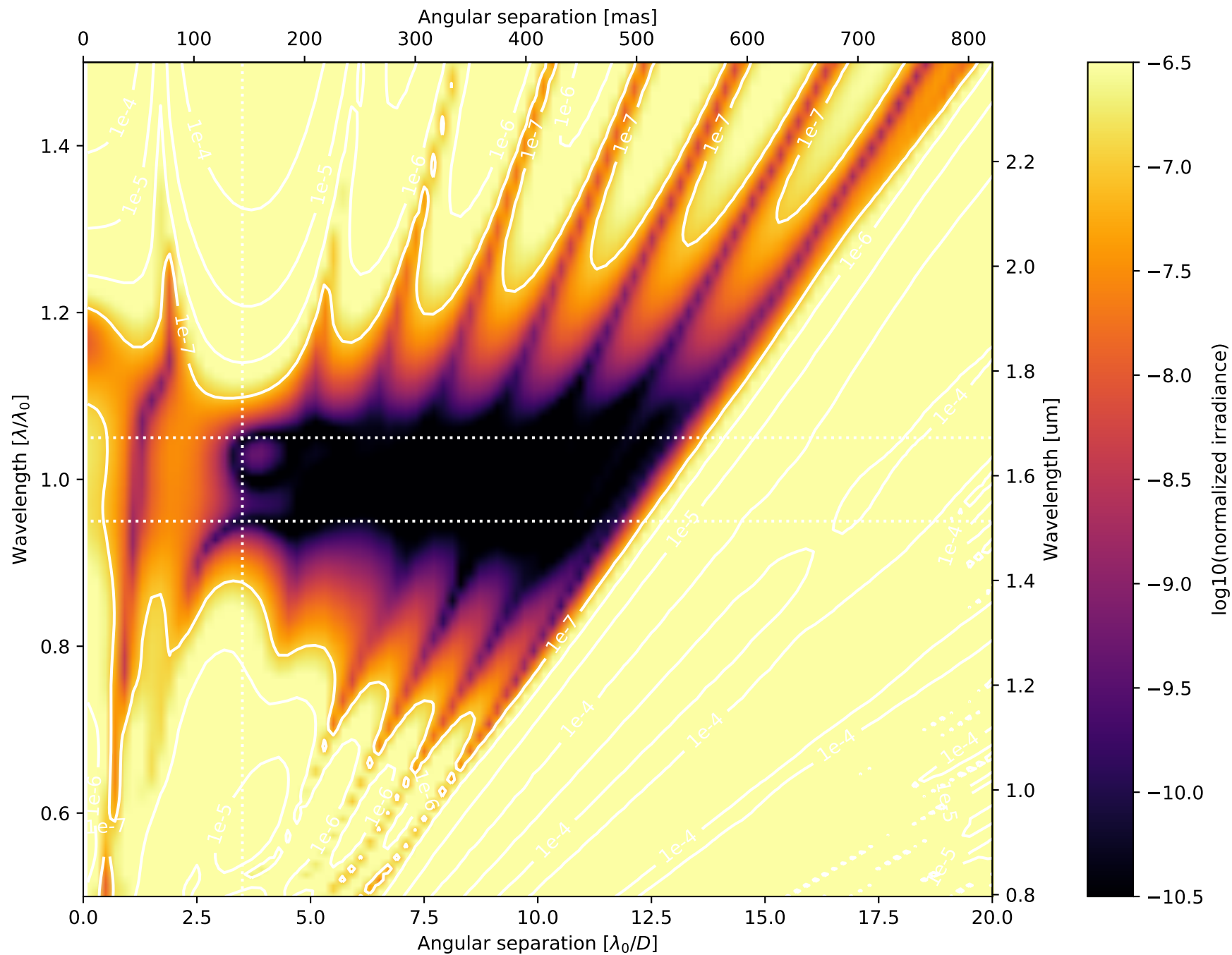
Tue Apr 5 07:07:19 2022

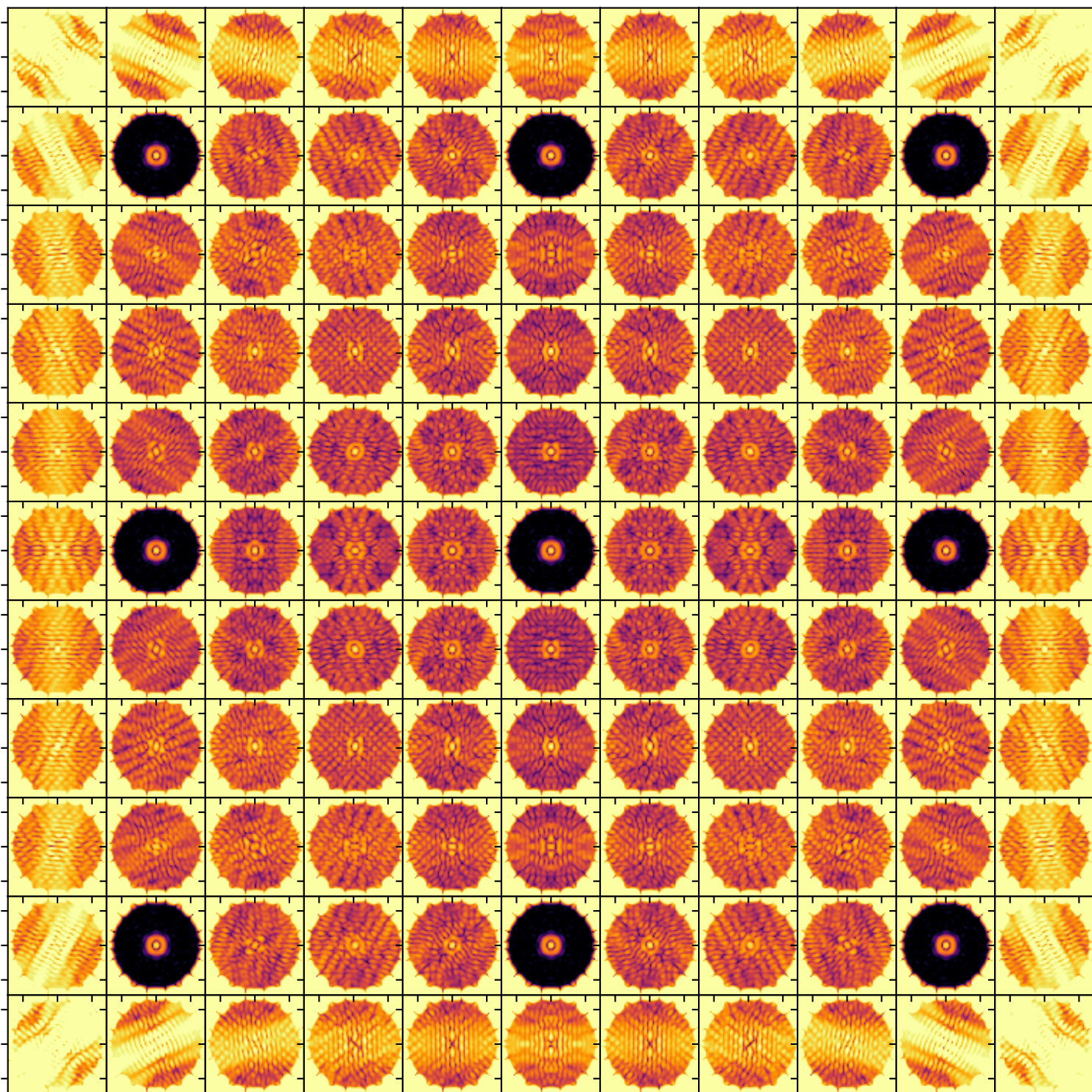


*On – axis PSF in log irradiance,
normalized to the peak irradiance value.*

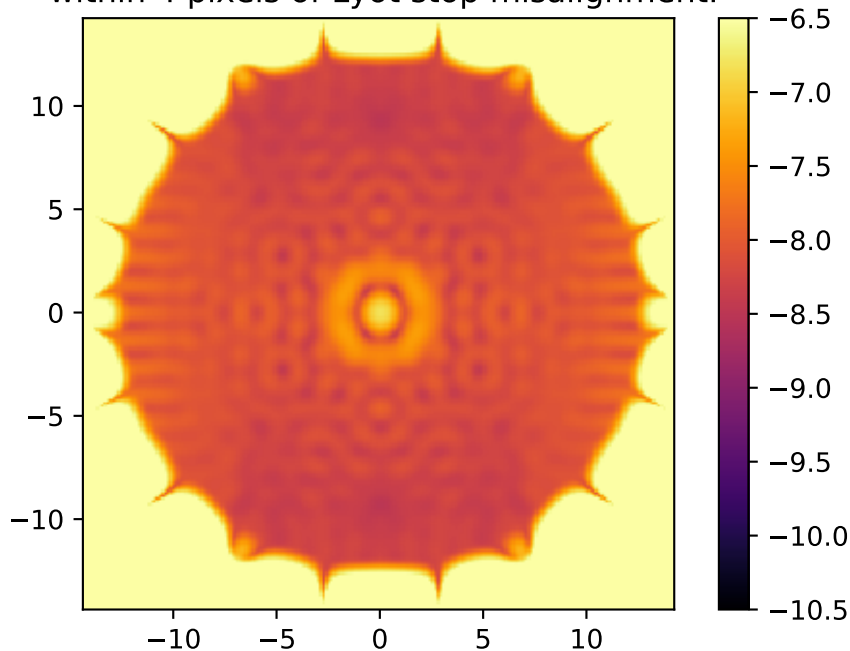


Radial intensity profile for the broadband APLC design at 11 simulated wavelengths centered around λ_0/D and equally spatially sampled over the 10.0% bandpass. The black curve shows the average intensity across the 11 wavelength samples. The dashed red vertical lines delimit the high-contrast dark zone (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 4 pixels of Lyot stop misalignment.



Analysis Summary

Apodizer &
Telescope Aperture



Image plane

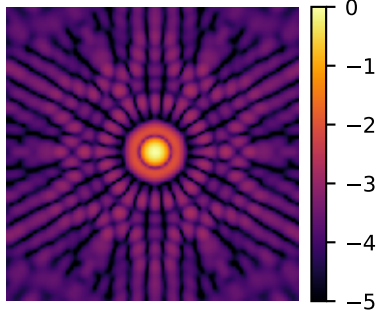
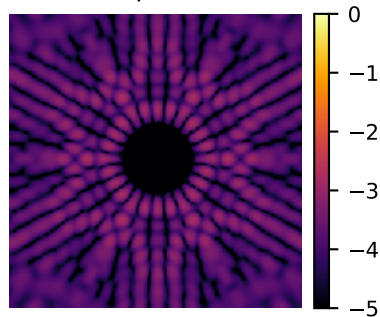
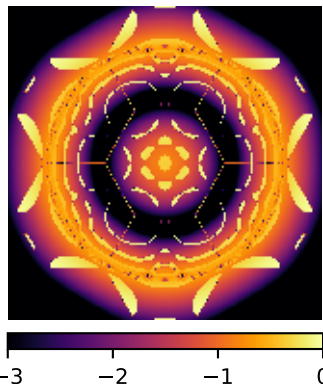


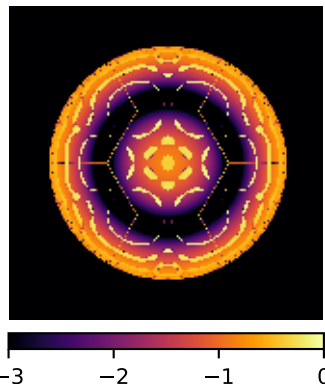
Image plane
w/FPM



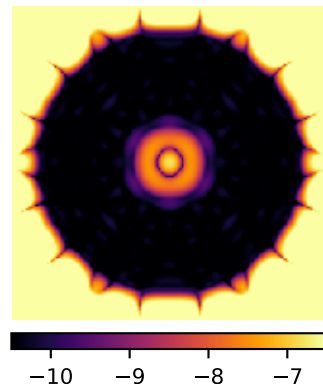
Lyot plane

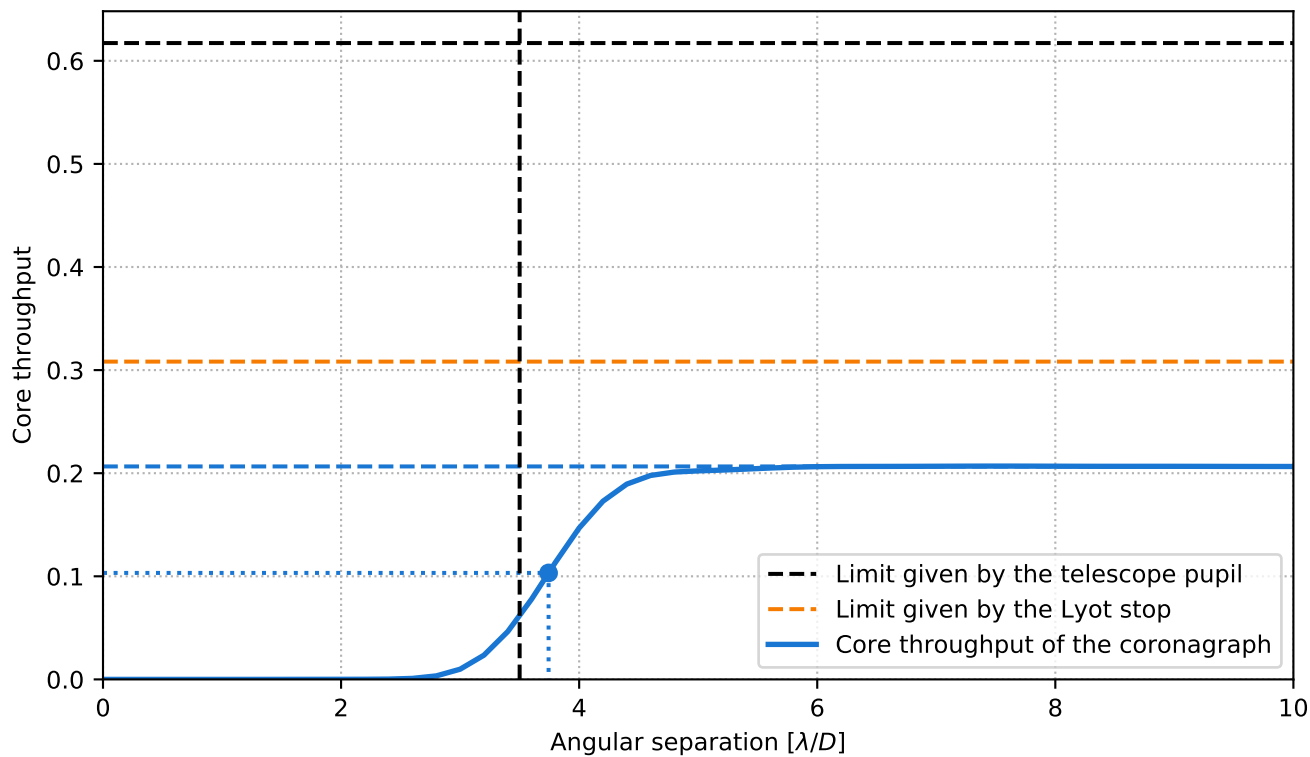


Lyot plane
w/lyot stop



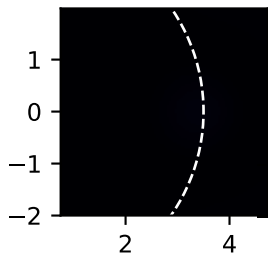
Final image plane



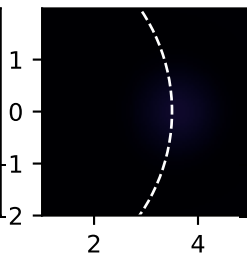


Pupil core throughput:	0.6172240718952715
Lyot stop core throughput:	0.30824098779178305
Maximum core throughput:	0.20655297087318605
Maximum core throughput w.r.t. pupil core throughput:	0.3346482748784193
Maximum core throughput w.r.t. Lyot stop core throughput:	0.6701022221376759
Inner working angle:	3.7431807450769243 λ_0/D

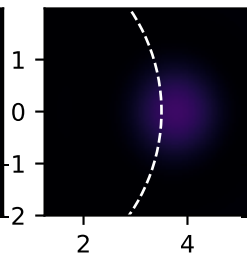
$2.75 \lambda_0/D$



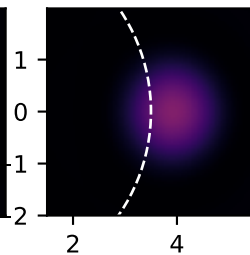
$3.00 \lambda_0/D$



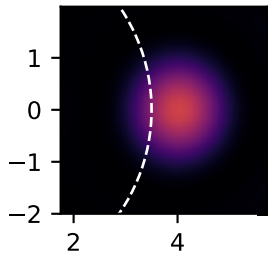
$3.25 \lambda_0/D$



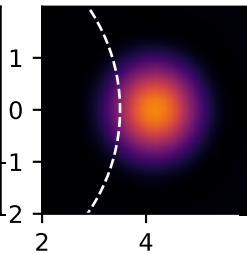
$3.50 \lambda_0/D$



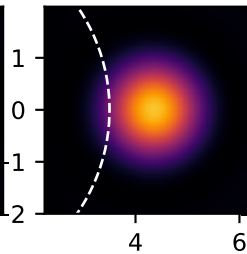
$3.75 \lambda_0/D$



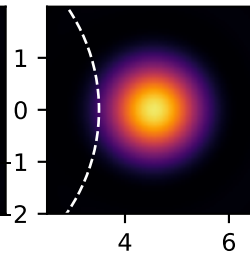
$4.00 \lambda_0/D$



$4.25 \lambda_0/D$

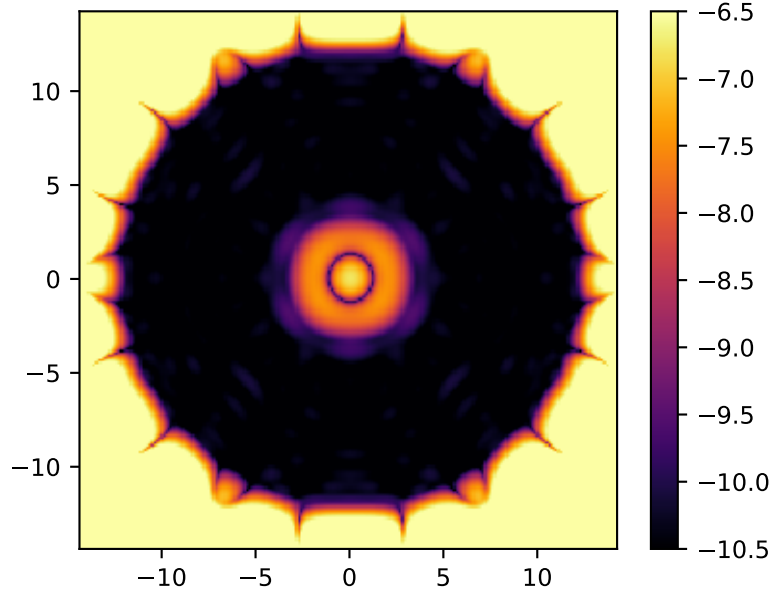


$4.50 \lambda_0/D$

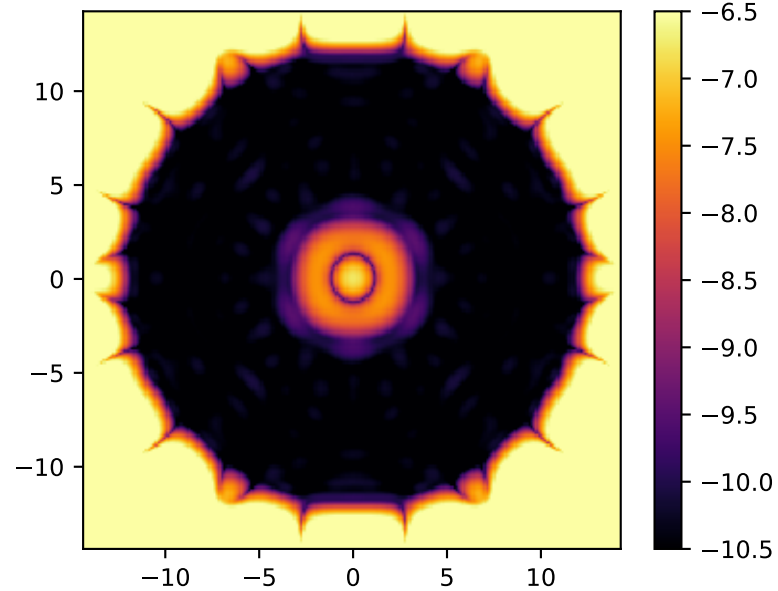


Broadband normalized irradiance for four representative levels of residual pointing jitter.

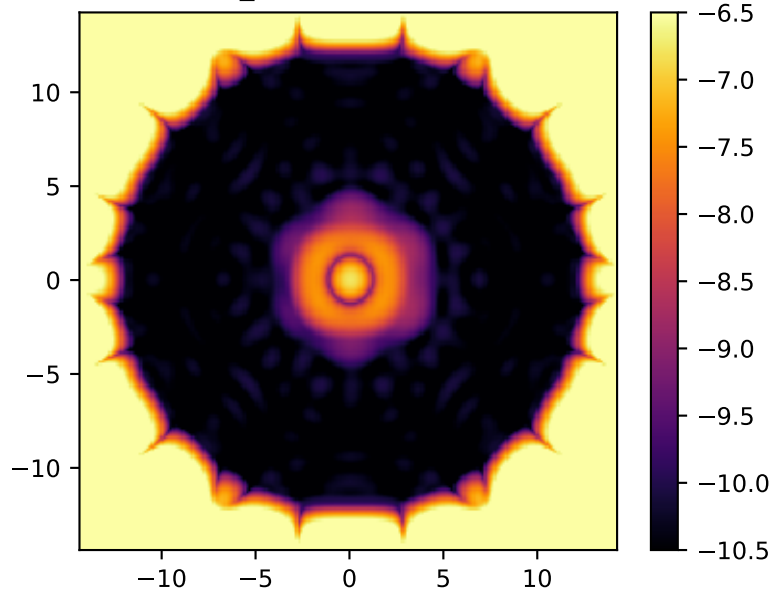
$\sigma_{\text{rms}} = 0.01 \lambda/D$



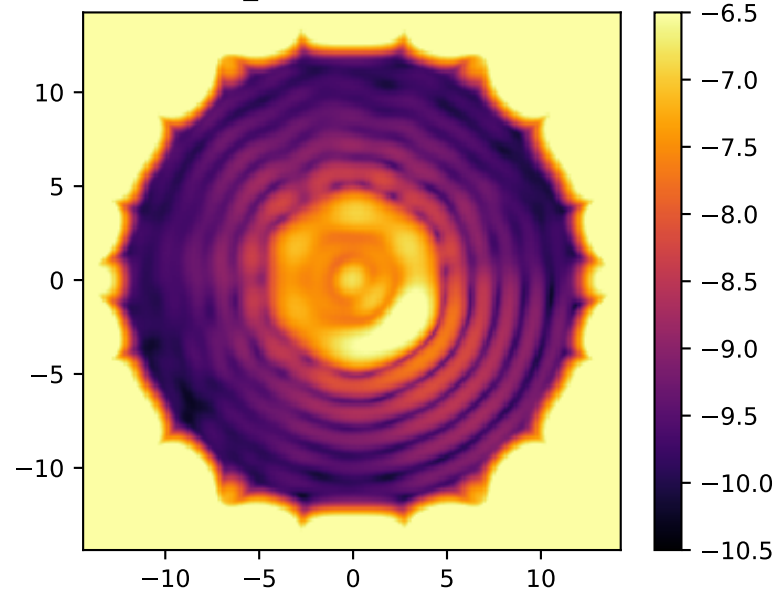
$\sigma_{\text{rms}} = 0.03 \lambda/D$

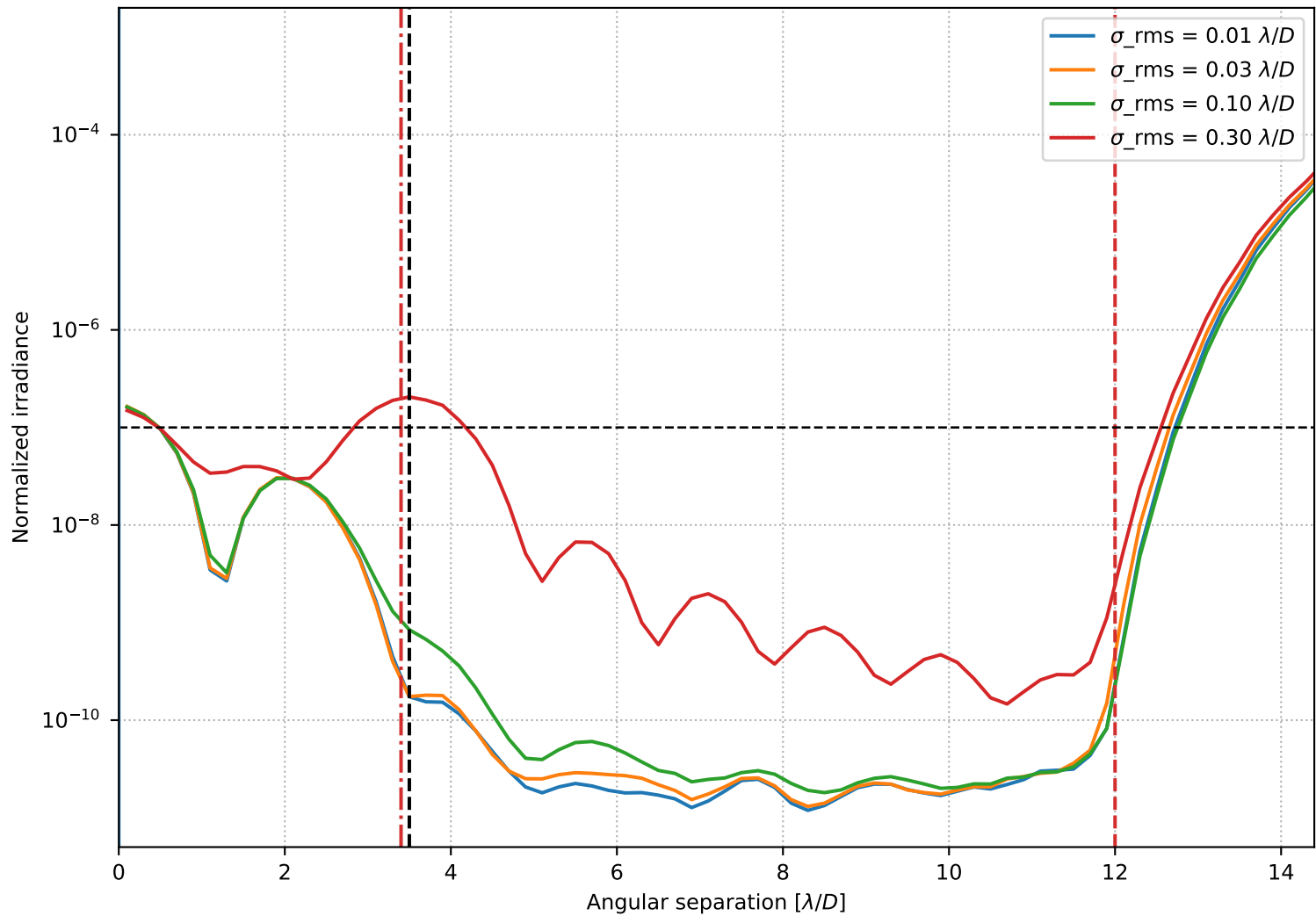


$\sigma_{\text{rms}} = 0.10 \lambda/D$



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





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