

## APLC Design Summary

Instrument	SCDA
nPup	1024 x 1024 pixels
Coronagraphic throughput (transmitted energy)	0.6138
Core throughput (encircled energy)	0.4265
Lytot stop inner diamater (% of inscribed circle)	0.004
Lytot 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	$10^{-10}$
Lytot Stop alignment tolerance	4 pixels

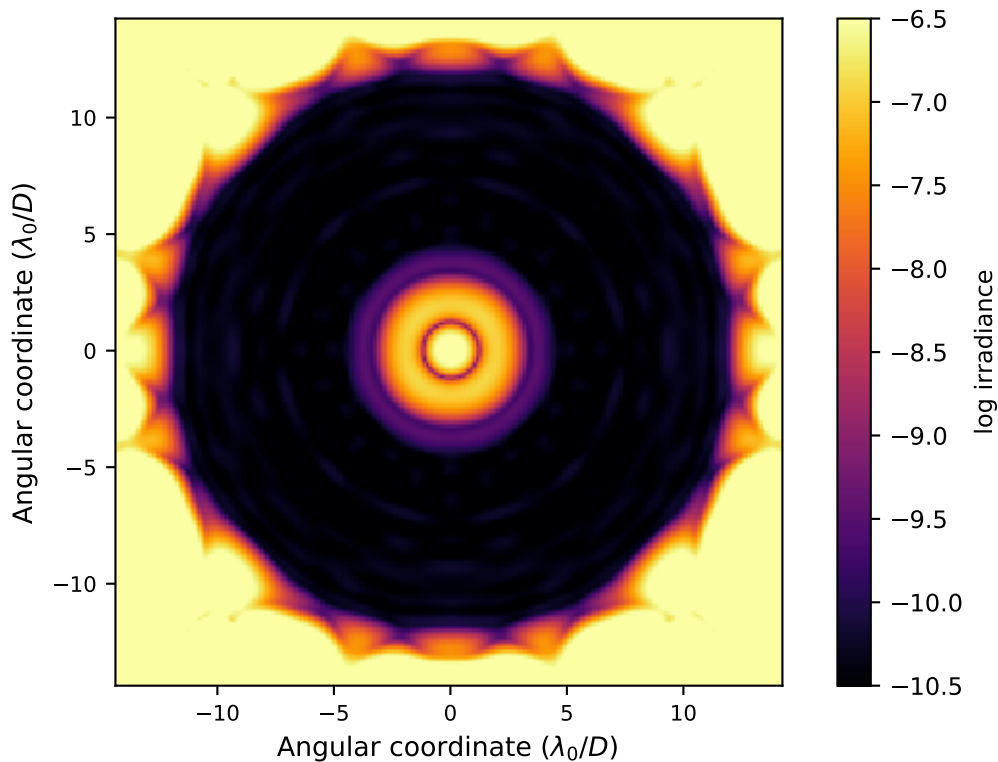
### Input Files :

- ▷ Pupil file : SCDA/TelAp\_LUVex\_04-Hex\_gy\_clipped\_ovsamp04\_N1024.fits
- ▷ Lyot stop file : SCDA/LS\_LUVex\_04-Hex\_ID0000\_OD0982\_no\_struts\_gy\_ovsamp4\_N1024.fits

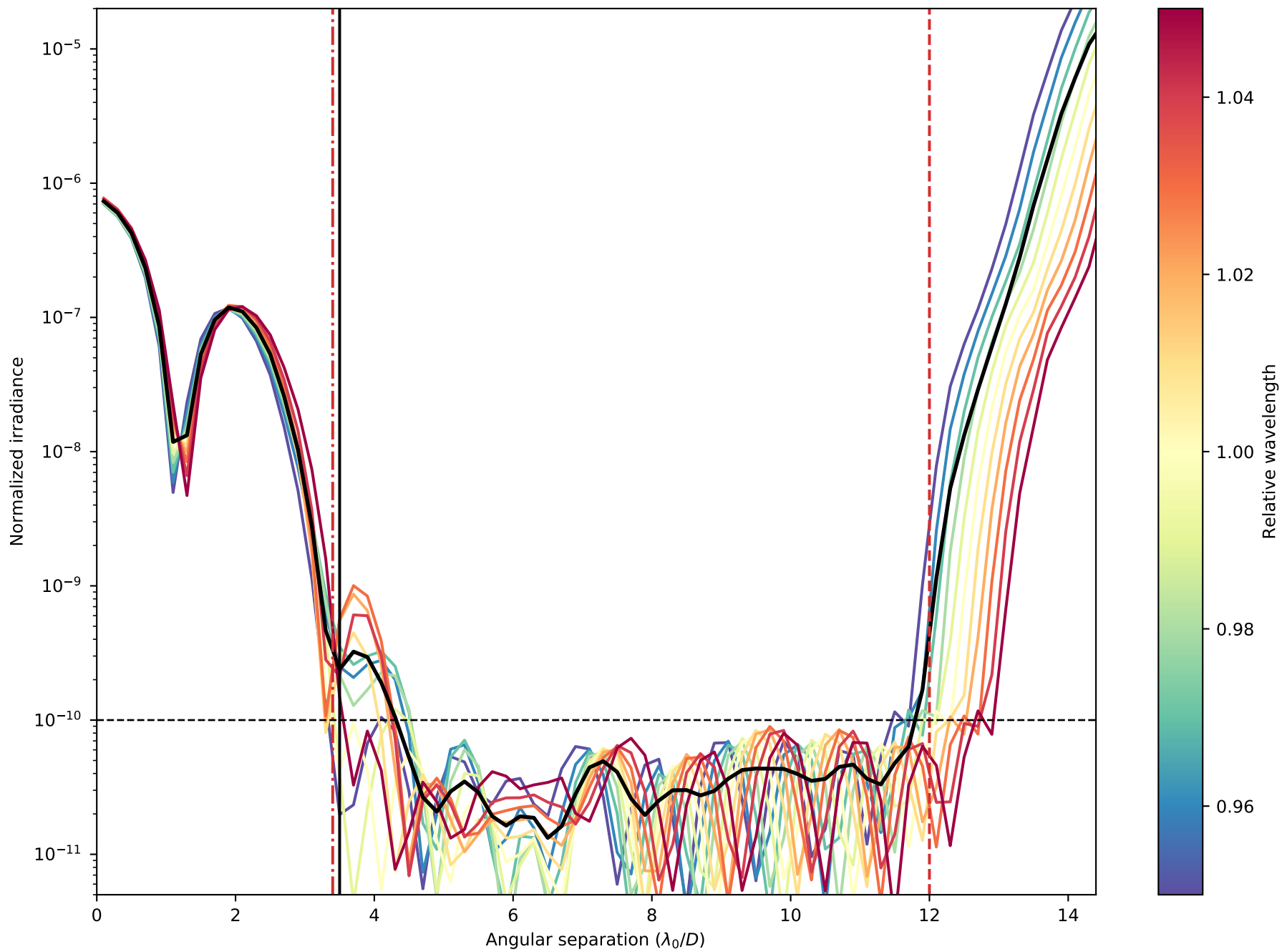
### Solution File :

▷ 0\_SCDA\_N1024\_FPM350M0150\_IWA0340\_OWA01200\_C10\_BW10\_NIam3\_LS\_IDex\_ID\_OD0\_OD\_is\_982\_no\_strut.fits

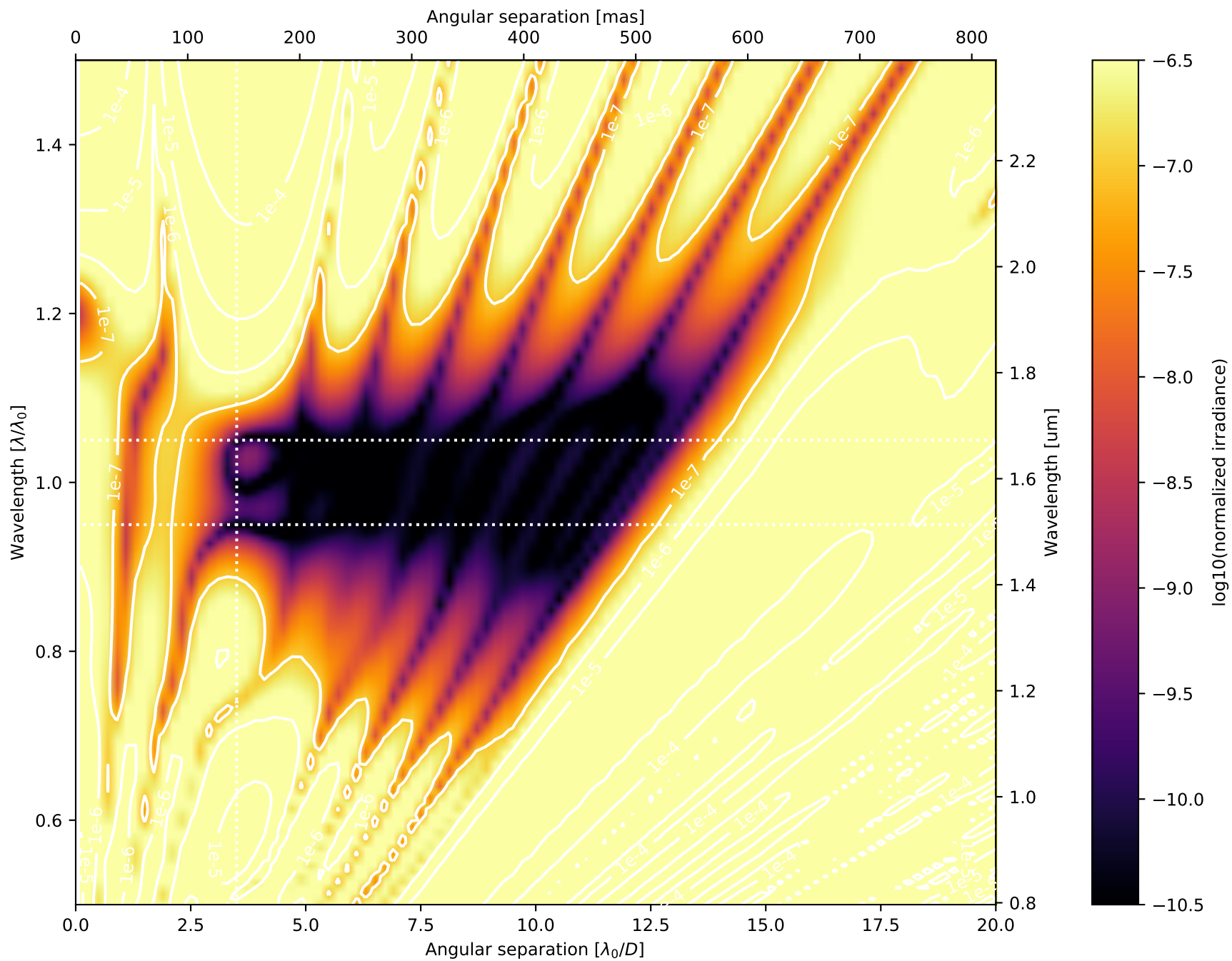
Sat Apr 9 07:19:07 2022



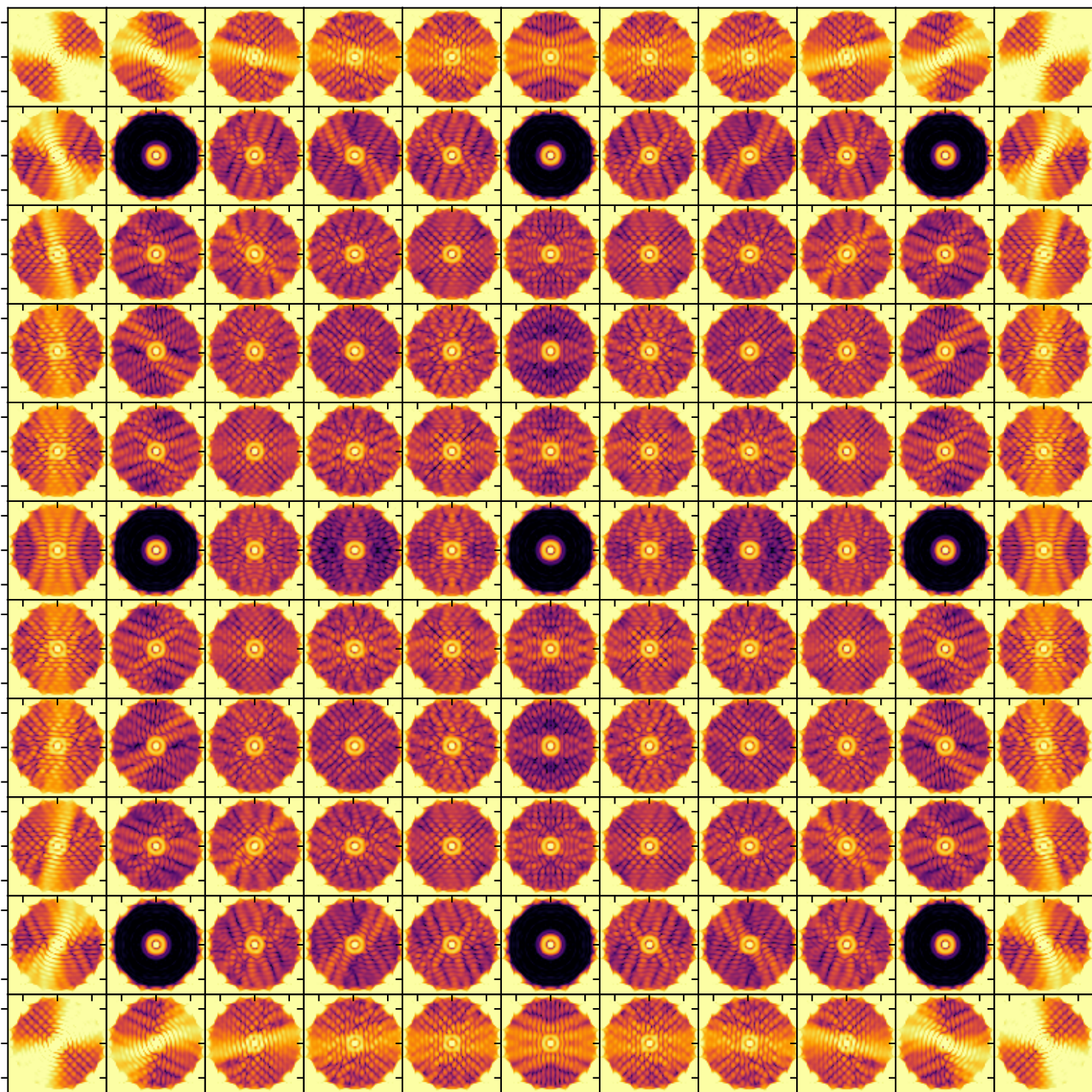
*On – axis PSF in log irradiance,  
normalized to the peak irradiance value.*



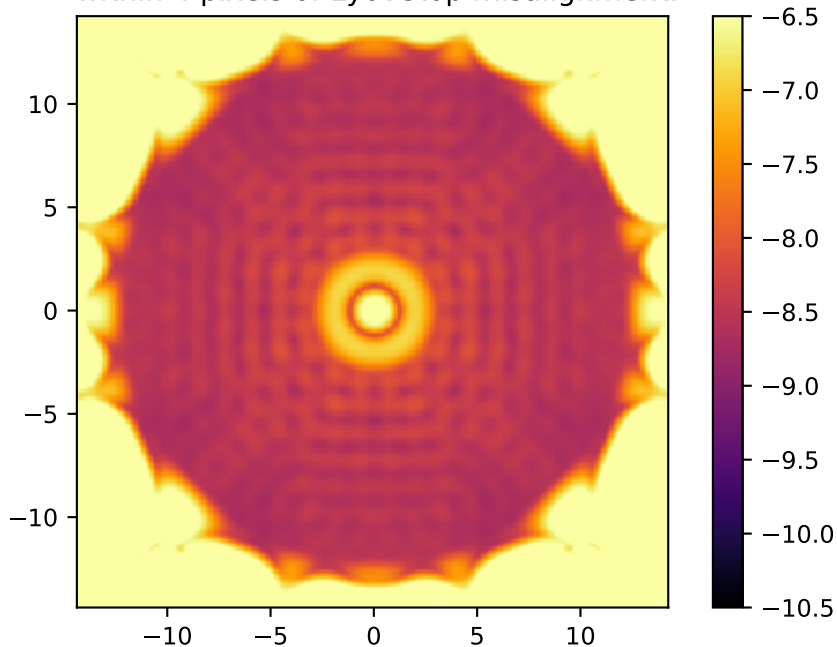
Radial intensity profile for the broadband APLC design at 11 simulated wavelengths centered around  $\lambda_0/D$  and equally spatially sampled over the 10.0% bandpass. The black curve shows the average intensity across the 11 wavelength samples. The dashed red vertical lines delimit the high-contrast 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

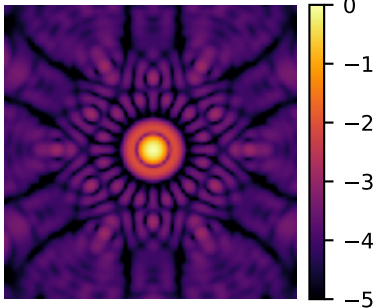
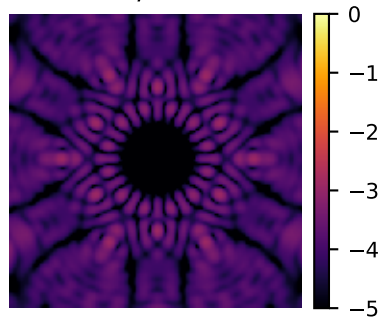
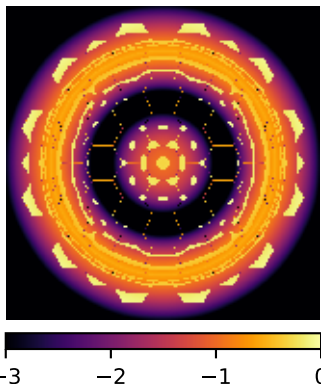


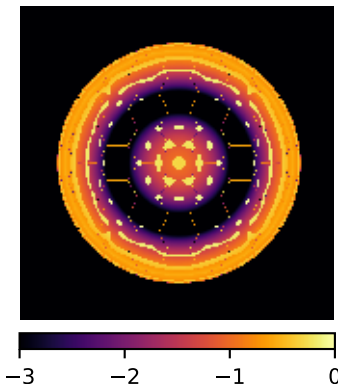
Image plane  
w/FPM



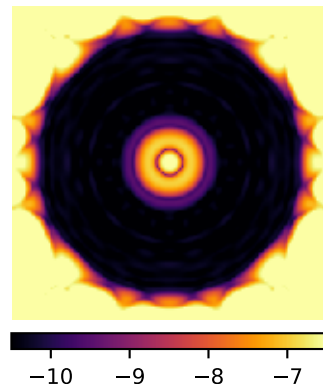
Lyot plane

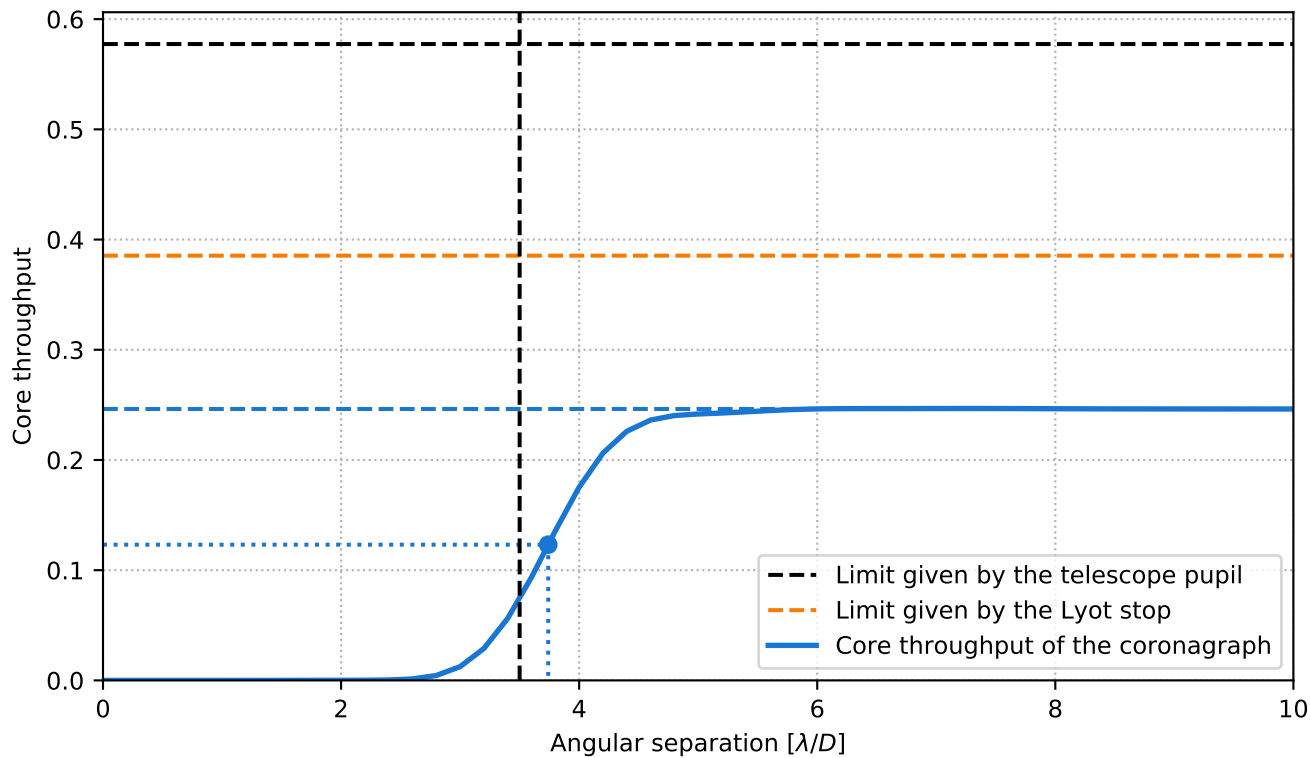


Lyot plane  
w/lyot stop



Final image plane

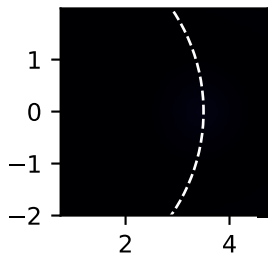




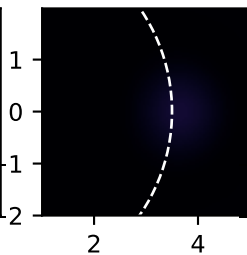
Pupil core throughput:	0.577388750545759
Lyot stop core throughput:	0.3853932887125127
Maximum core throughput:	0.24627690969355648
Maximum core throughput w.r.t. pupil core throughput:	0.4265356910067451
Maximum core throughput w.r.t. Lyot stop core throughput:	0.6390274997167082
Inner working angle:	3.740070165499687 $\lambda_0/D$



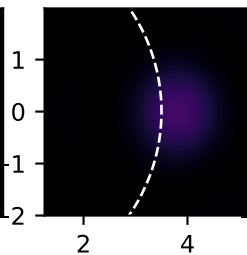
$2.75 \lambda_0/D$



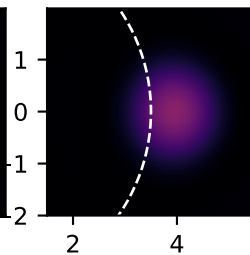
$3.00 \lambda_0/D$



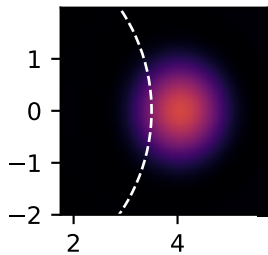
$3.25 \lambda_0/D$



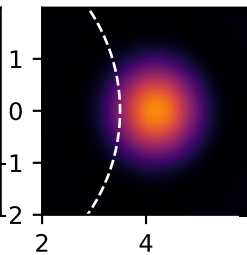
$3.50 \lambda_0/D$



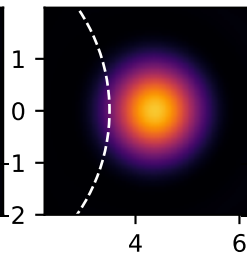
$3.75 \lambda_0/D$



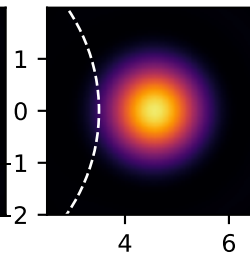
$4.00 \lambda_0/D$



$4.25 \lambda_0/D$

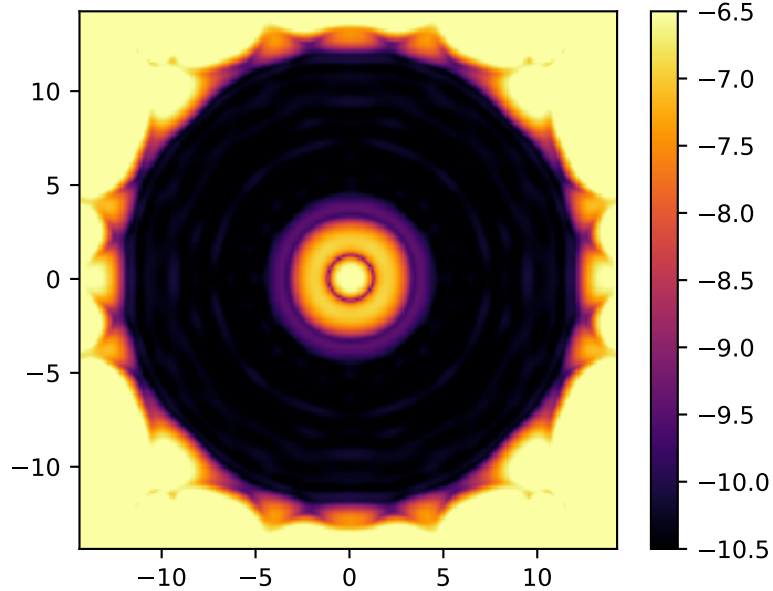


$4.50 \lambda_0/D$

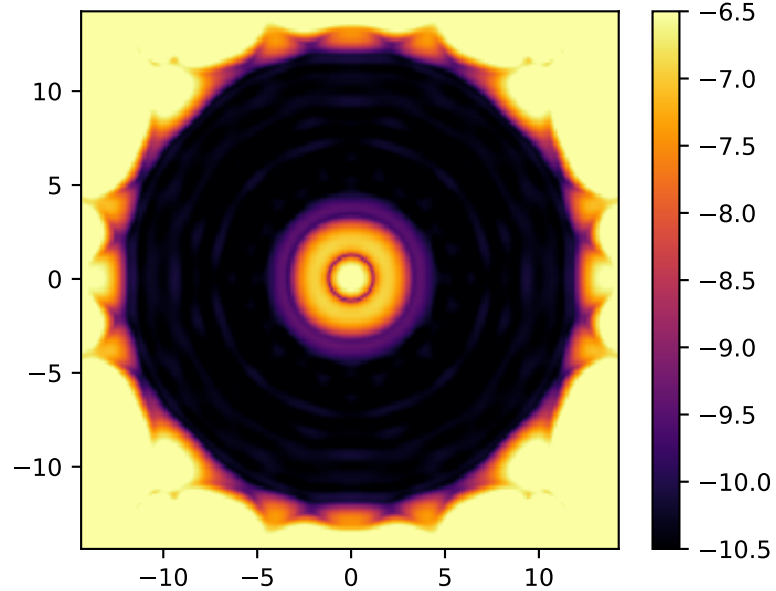


Broadband normalized irradiance for four representative levels of residual pointing jitter.

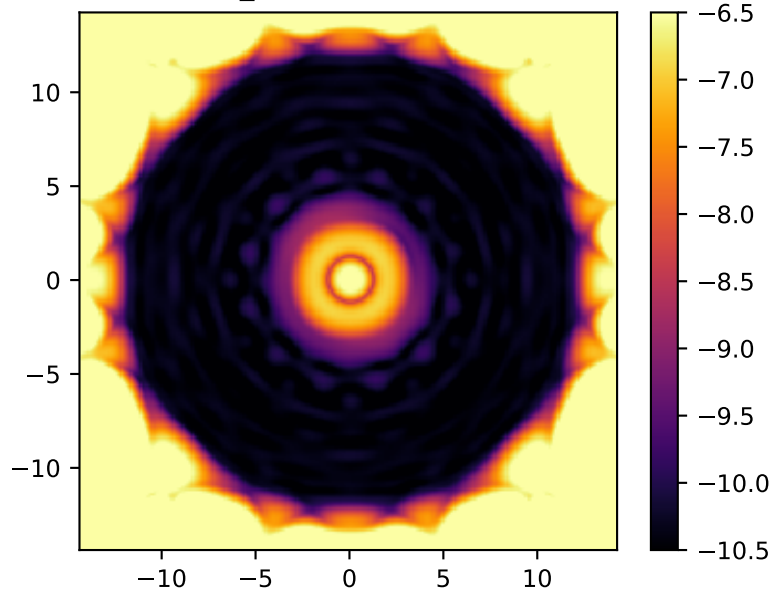
$\sigma_{\text{rms}} = 0.01 \lambda/D$



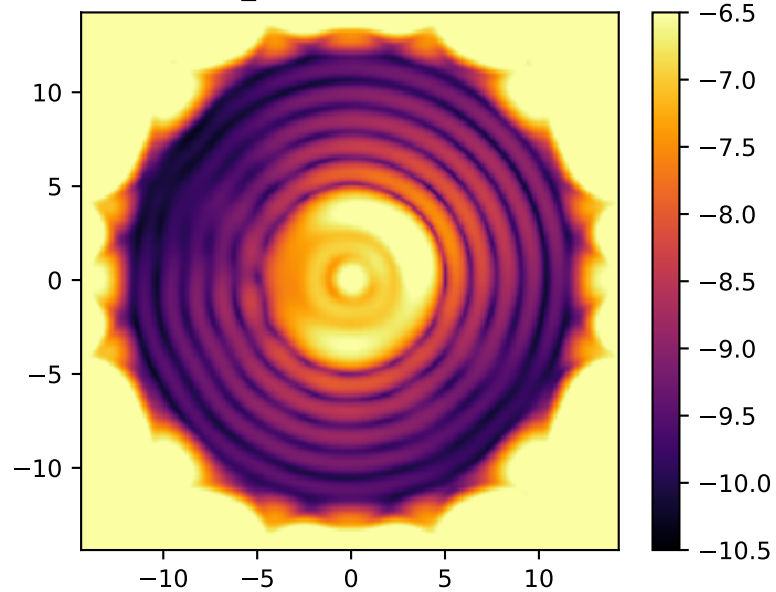
$\sigma_{\text{rms}} = 0.03 \lambda/D$

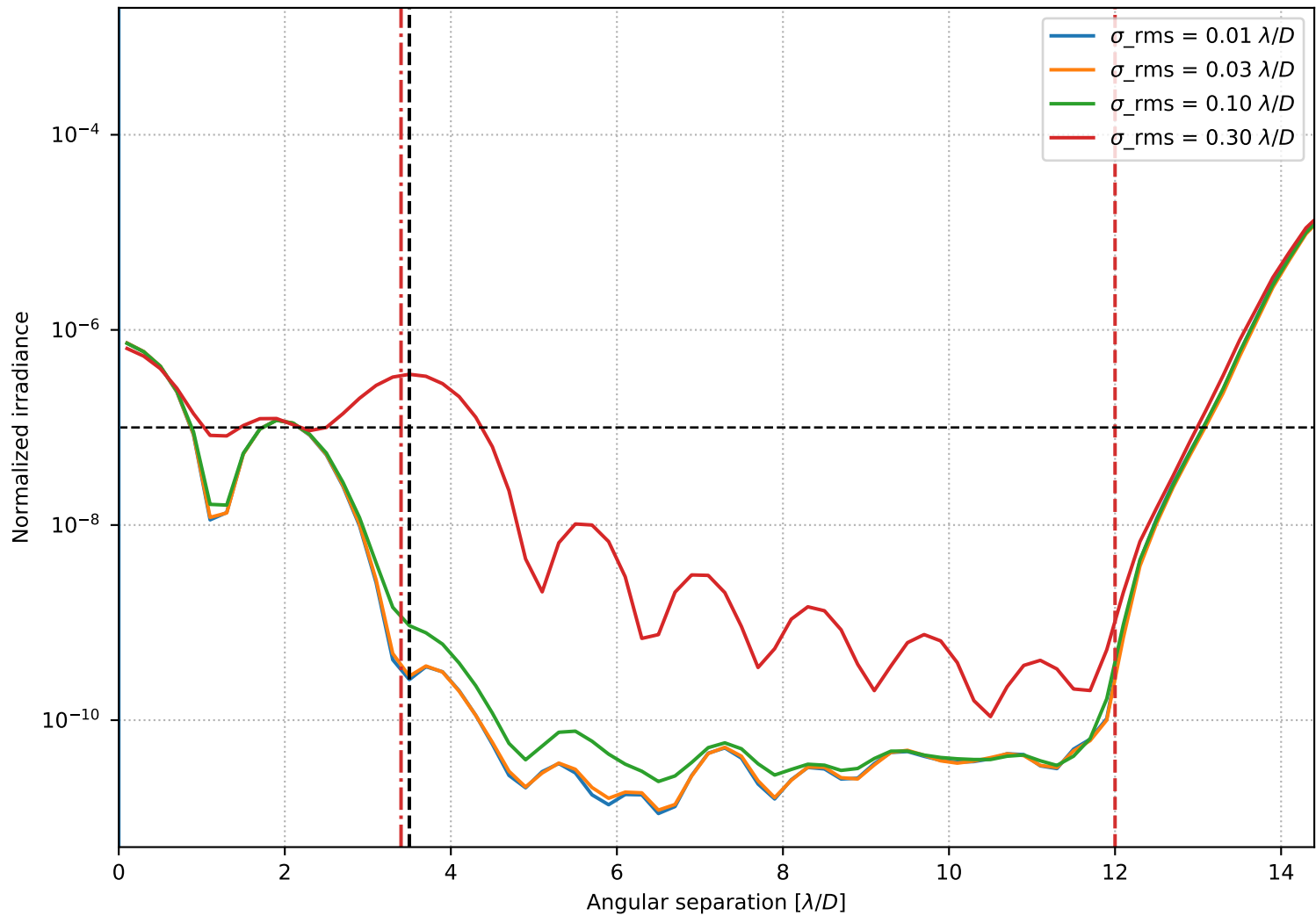


$\sigma_{\text{rms}} = 0.10 \lambda/D$



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





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