APLC Design Summary

Instrument	USORT
nPup	128 x 128 pixels
Coronagraphic throughput (transmitted energy)	0.1877
Core throughput (encircled energy)	0.1554
Lyot stop inner diamater (% of inscribed circle)	0.0
Lyot stop outer diameter (% of inscribed circle)	0.99
Bandpass	15.0%
# wavelengths	5
FPM radius (grayscale)	3.5 λ/D
nFPM	150 pixels
IWA — OWA	3.4—14.0 λ/D
Contrast constraint	10^{-10}
Lyot Stop alignment tolerance	0 pixels

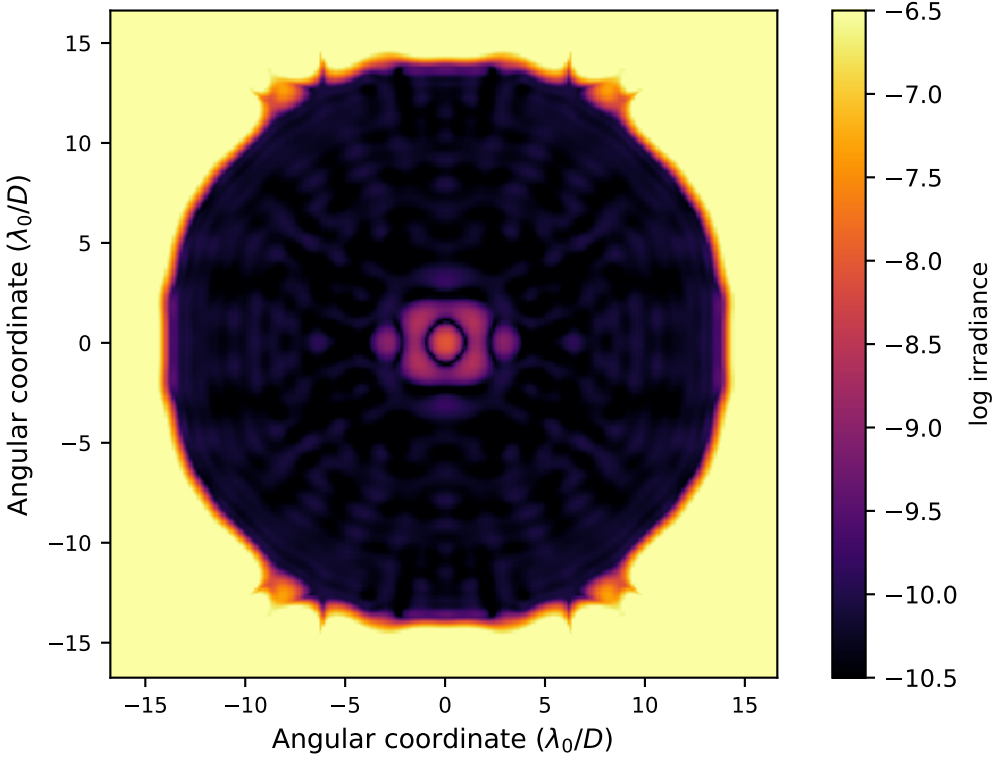
Input Files:

- ▷ *Pupil file*: USORT/TelAp_USORT_offaxis_ovsamp16_N0128.fits
- ▷ *Lyot stop file*: USORT/LS_USORT_hex_ID0000_OD0990_ovsamp16_N0128.fits

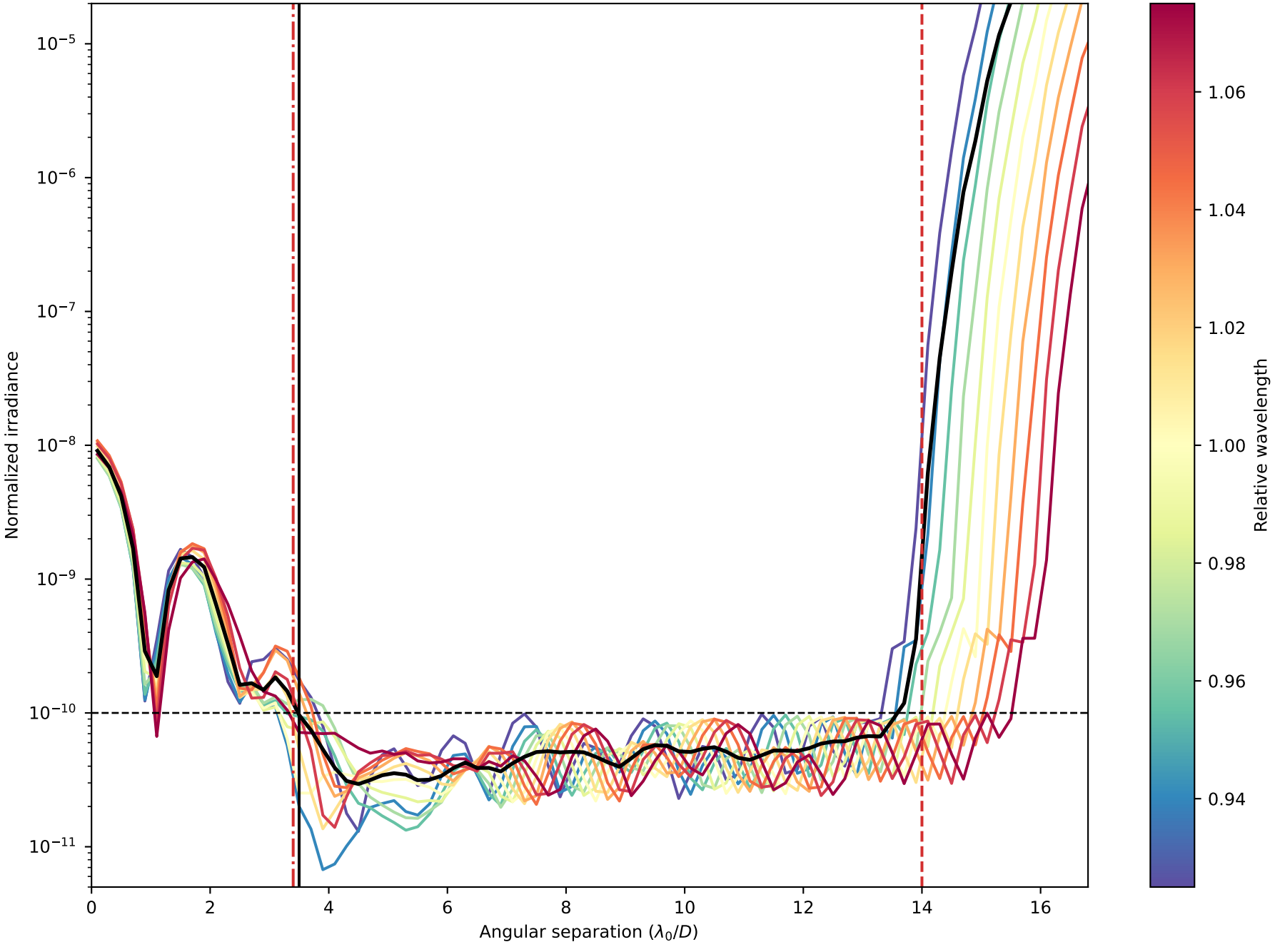
Solution File:

▷ 07_USORT_N128_FPM350M0150_IWA0340_OWA01400_C10_BW15_Nlam5_LS_ID_ID00_ODOD09_ls_0_ovsamp16_N.fits

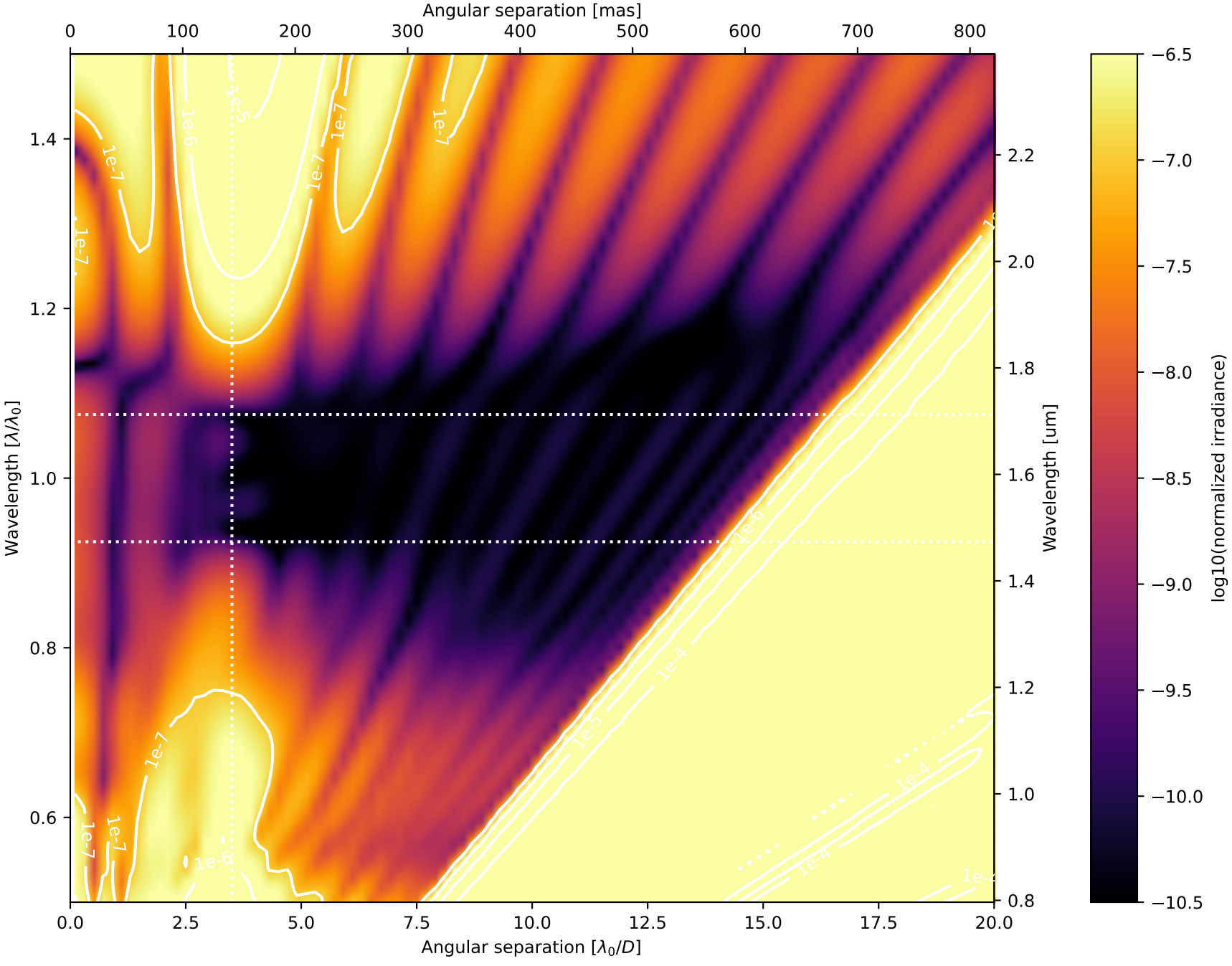
Fri Oct 27 15:46:47 2023

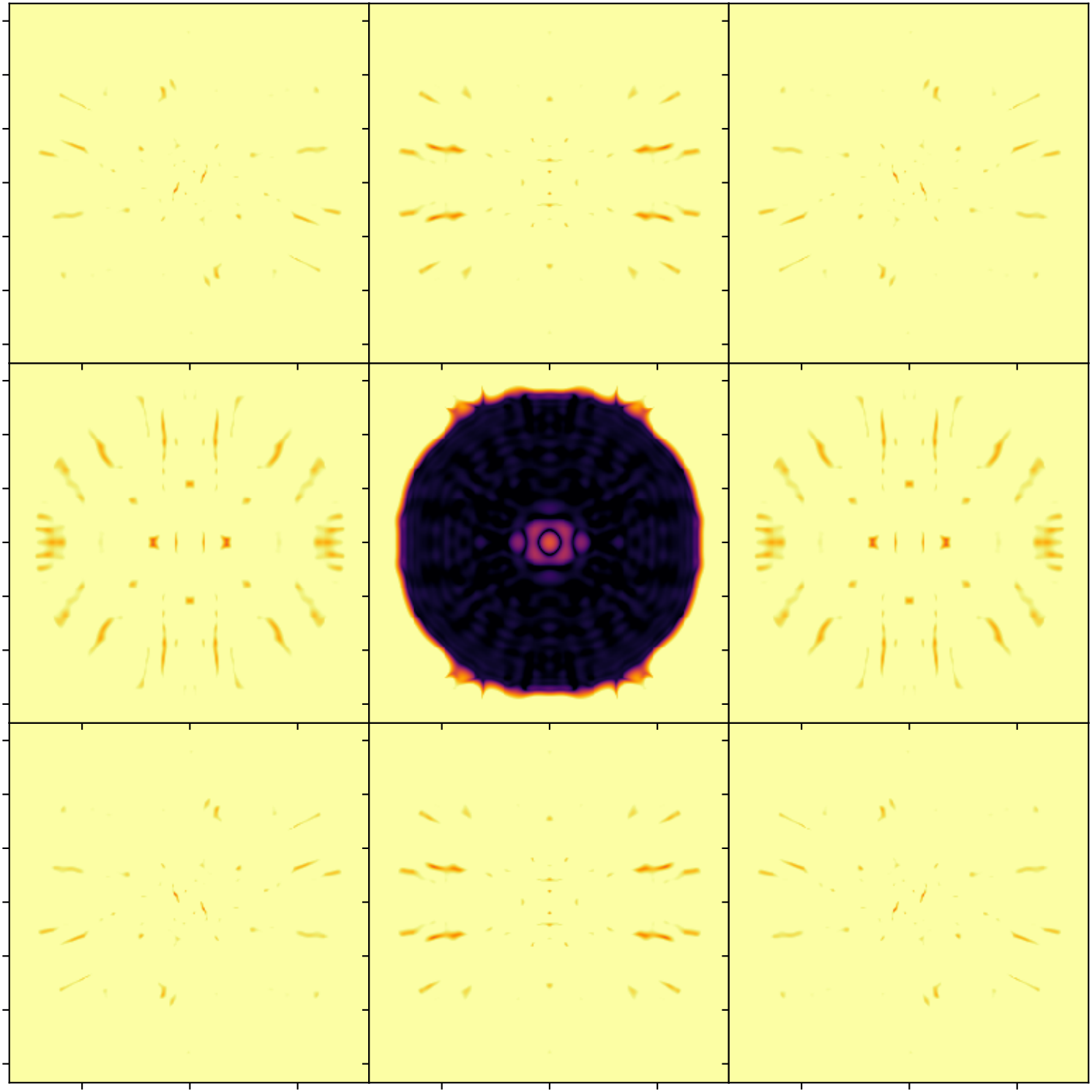


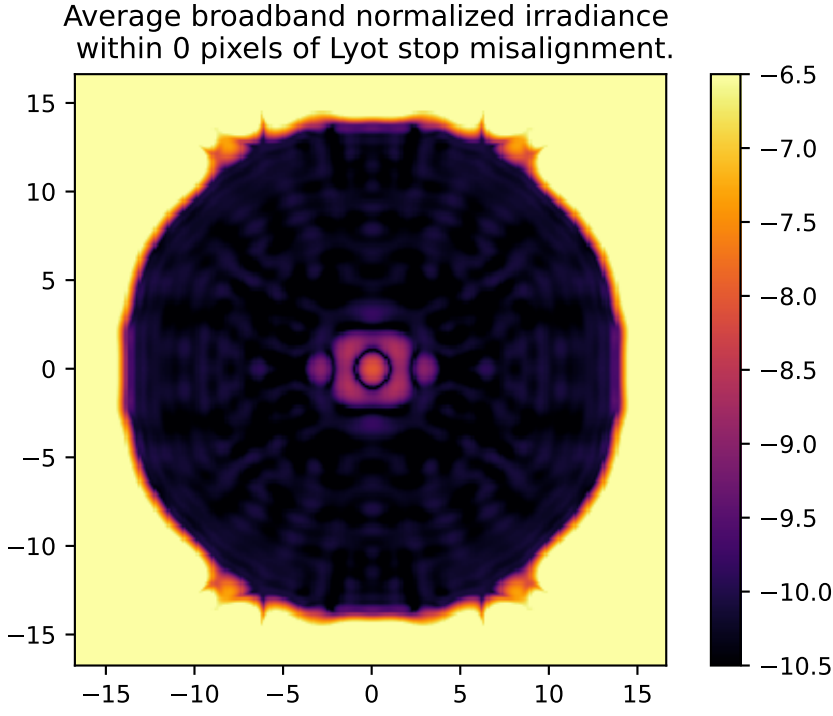
On − axis PSF in log irradiance,
normalized to the peak irradiance value.



Radial intensity profile for the broadband APLC design at 11 simulated wavelengthscentered around λ_0/D and equally spatially sampled over the 15.0% bandpass. The black curve shows the average intensity across the 11 wavelength samples. The dashed red vertical lines delimitthe high-contrast dark zone (between 3.4 and 14.0 λ_0/D). The blue dotted line delimits the FPM radius, set to 3.5 λ_0/D.


Angular separation [mas]
0
100
200
300
400
500
600
700
800
Wavelength [λ/λ0]
1.4
1.2
1.0
0.8
0.6
Wavelength [um]
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
Angular separation [λ0/D]
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
log10(normalized irradiance)
−6.5
−7.0
−7.5
−8.0
−8.5
−9.0
−9.5
−10.0
−10.5
1e-7
1e-6
1e-5
1e-4




Average broadband normalized irradiance
within 0 pixels of Lyot stop misalignment.
15
10
5
0
−5
−10
−15
−15
−10
−5
0
5
10
15
−6.5
−7.0
−7.5
−8.0
−8.5
−9.0
−9.5
−10.0
−10.5

Analysis Summary

Apodizer &
Telescope Aperture

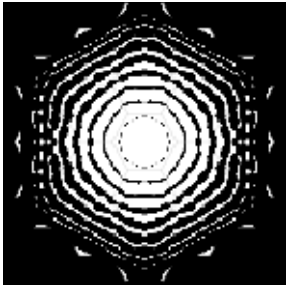


Image plane

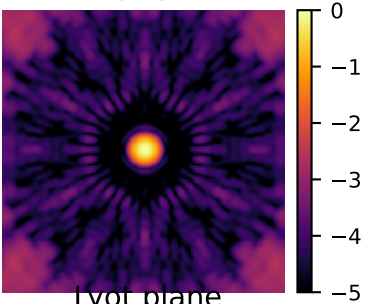
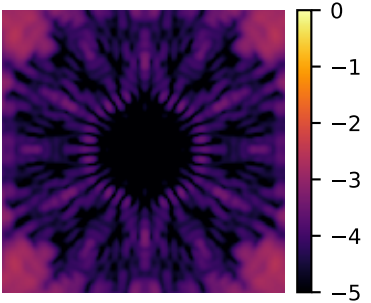
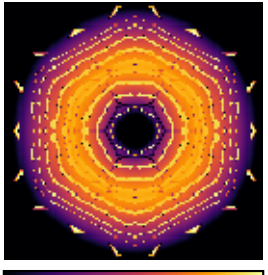


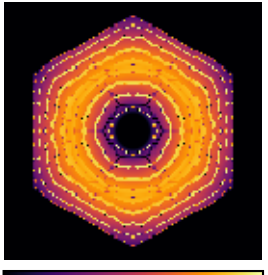
Image plane
w/FPM



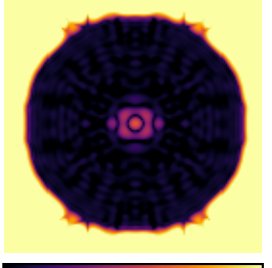
Lyot plane

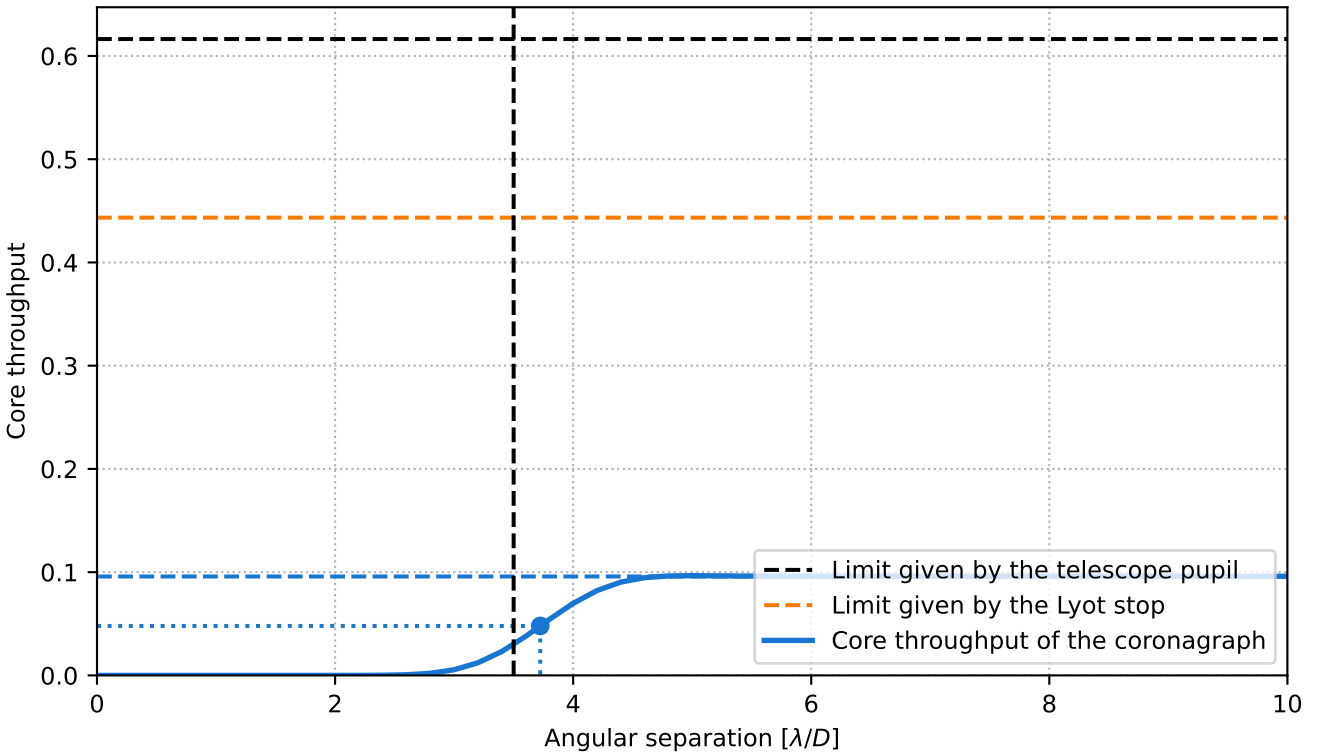


Lyot plane
w/lyot stop

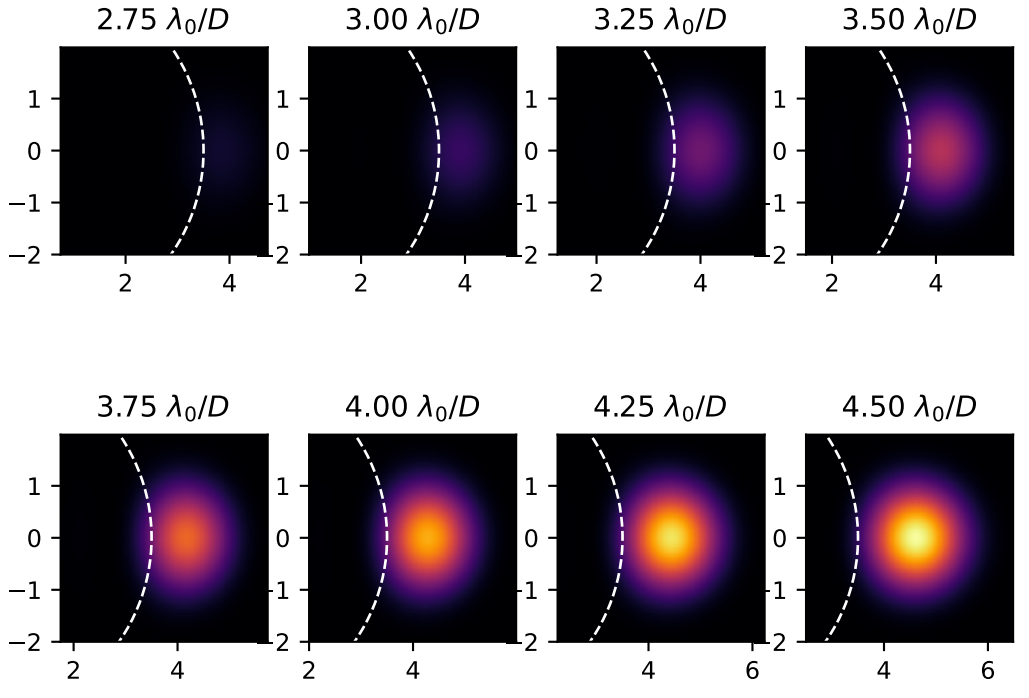


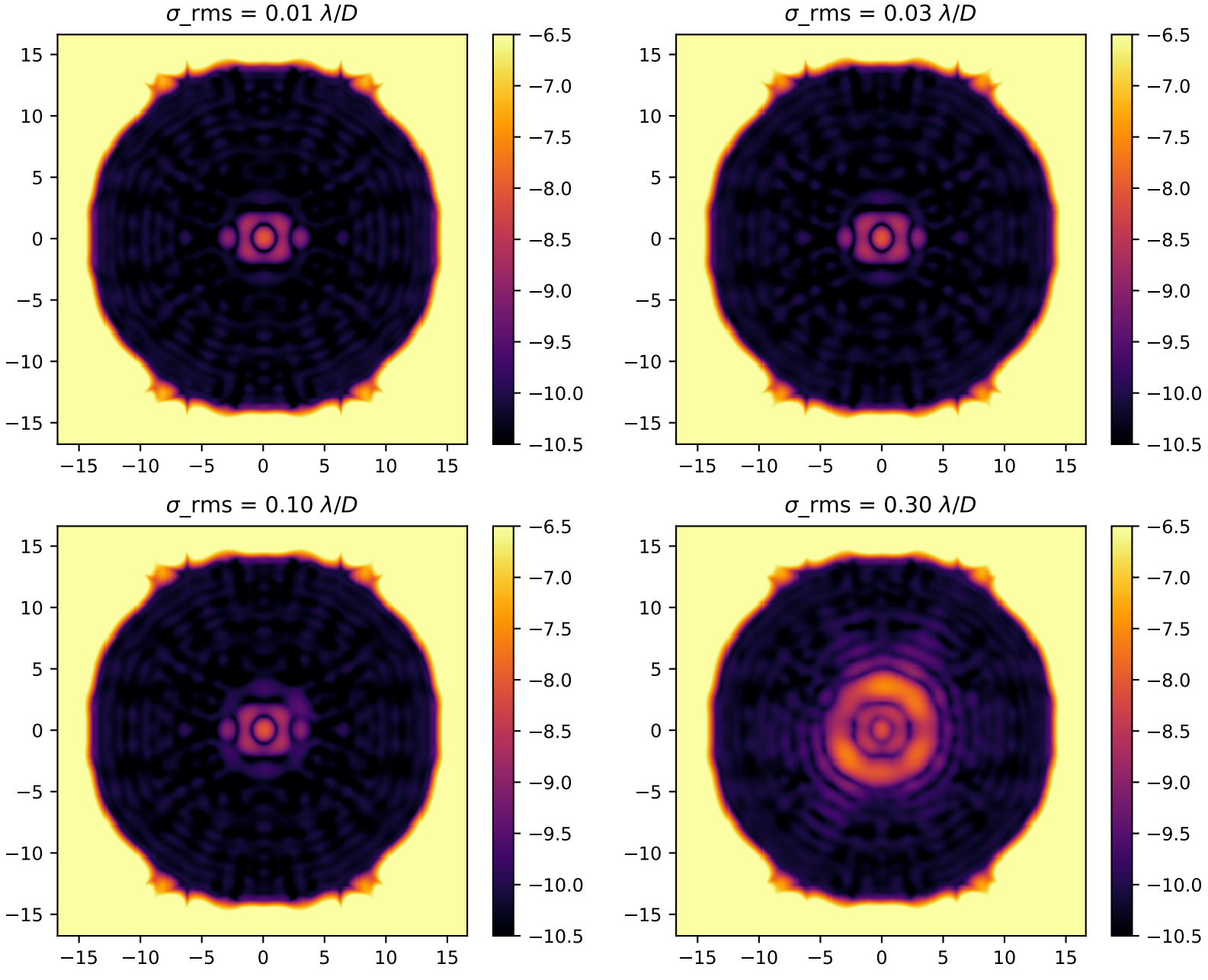
Final image plane

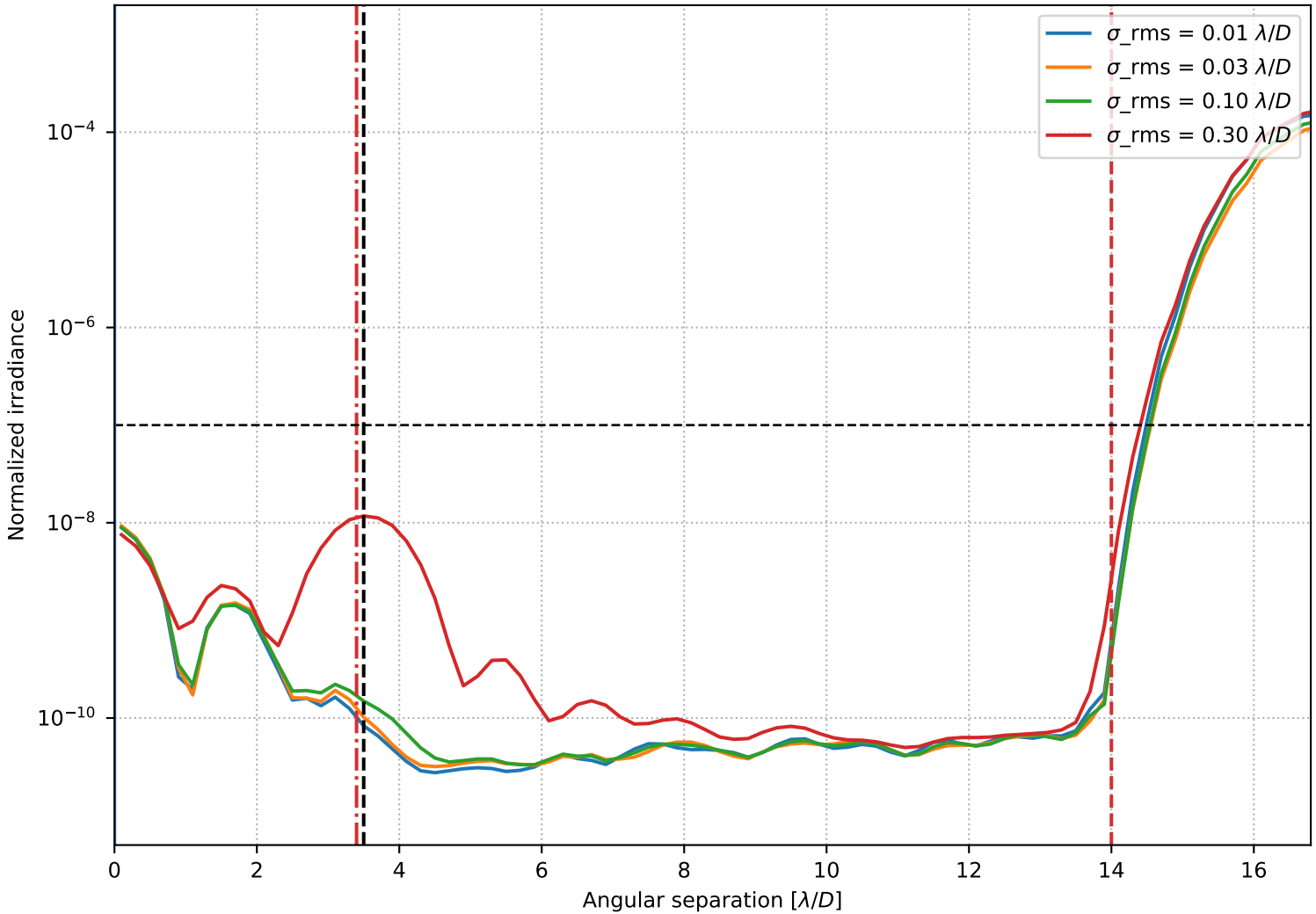




Pupil core throughput:	0.6163835963822561
Lyot stop core throughput:	0.44338273489435265
Maximum core throughput:	0.09580623405434181
Maximum core throughput w.r.t. pupil core throughput:	0.1554328094009281
Maximum core throughput w.r.t. Lyot stop core throughput:	0.2160802090707707
Inner working angle:	3.7235106510148053 λ_0/D


2.75 λ_0/D
3.00 λ_0/D
3.25 λ_0/D
3.50 λ_0/D
3.75 λ_0/D
4.00 λ_0/D
4.25 λ_0/D
4.50 λ_0/D


Broadband normalized irradiance for four representative levels of residual pointing jitter.
σ_rms = 0.01 λ/D
σ_rms = 0.03 λ/D
σ_rms = 0.10 λ/D
σ_rms = 0.30 λ/D
15
10
5
0
−5
−10
−15
−6.5
−7.0
−7.5
−8.0
−8.5
−9.0
−9.5
−10.0
−10.5



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