APLC Design Summary

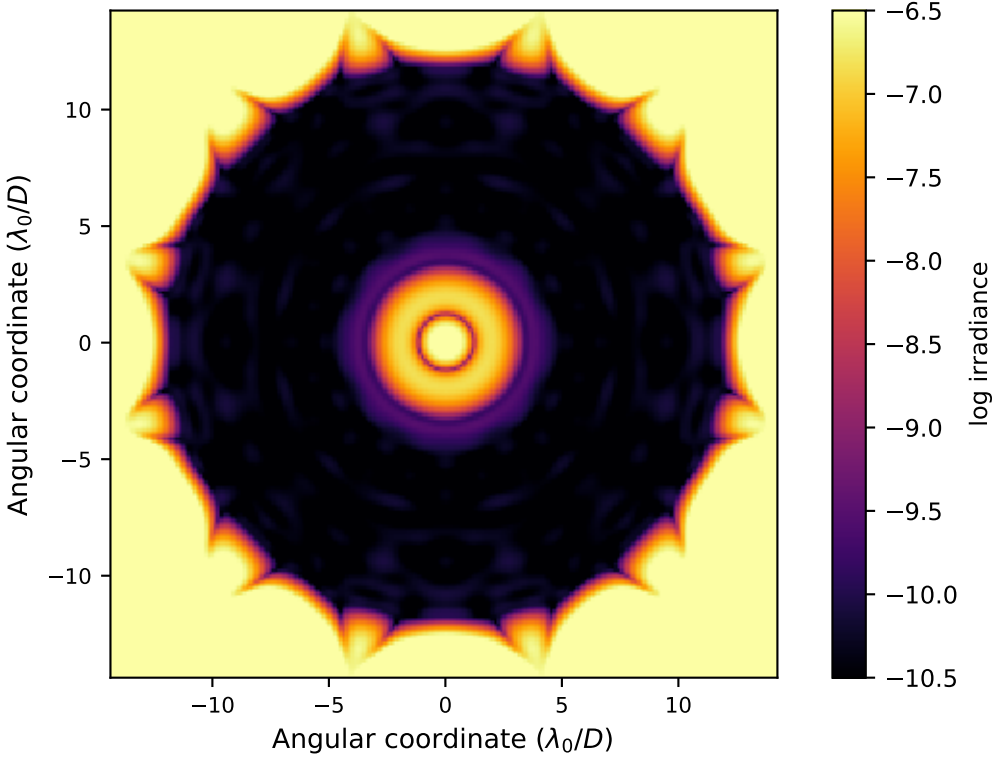
Instrument	SCDA
nPup	1024 x 1024 pixels
Coronagraphic throughput (transmitted energy)	0.6304
Core throughput (encircled energy)	0.4349
Lyot stop inner diamater (% of inscribed circle)	0.004
Lyot stop outer diameter (% of inscribed circle)	0.0
Bandpass	10.0%
# wavelengths	3
FPM radius (grayscale)	3.5 λ/D
nFPM	150 pixels
IWA — OWA	3.4—12.0 λ/D
Contrast constraint	10^{-10}
Lyot Stop alignment tolerance	0 pixels

Input Files:

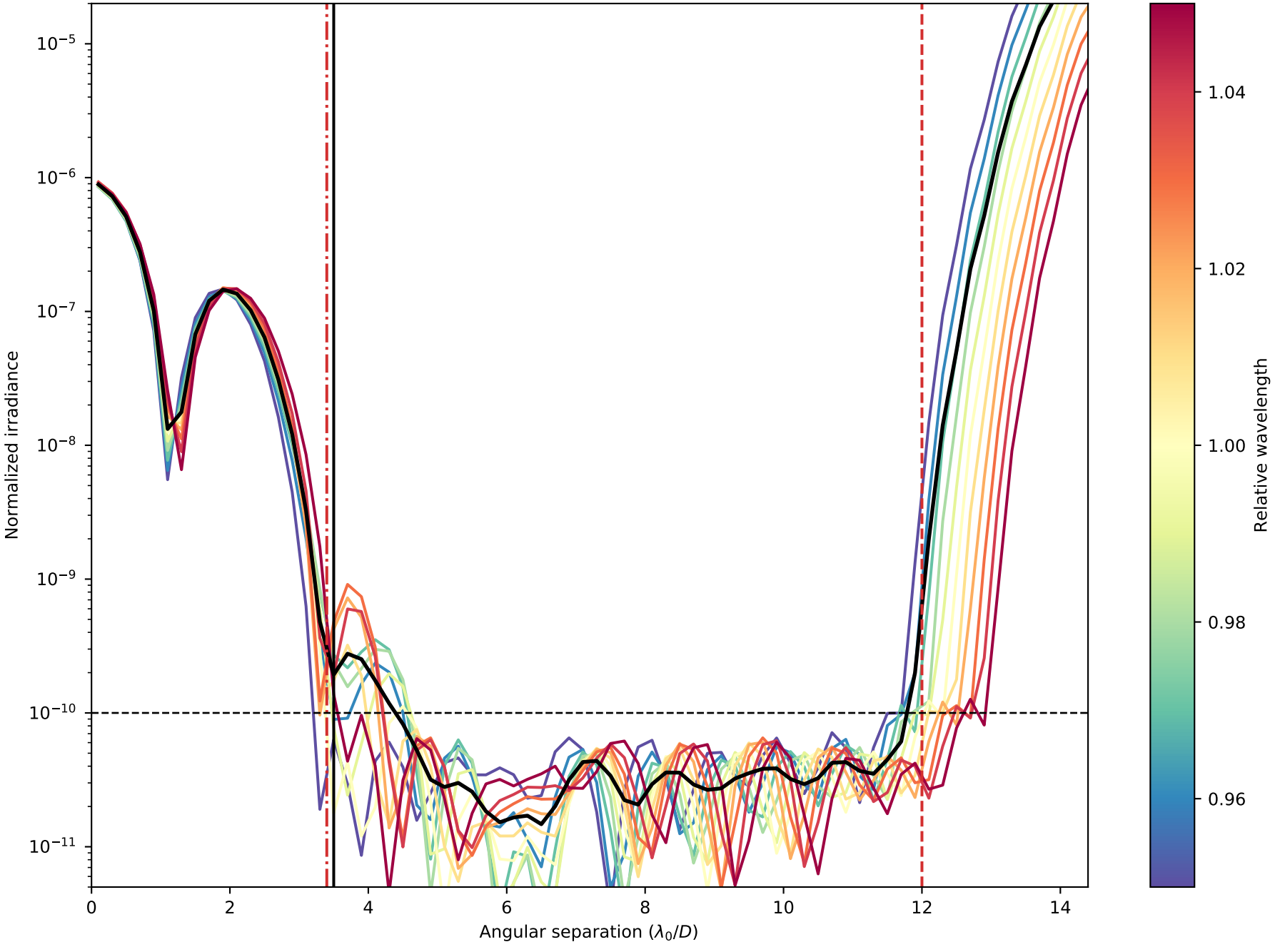
- ▷ *Pupil file*: SCDA/TelAp_LUVex_04-Hex_gy_clipped_ovsamp04__N1024.fits
- ▷ *Lyot stop file*: SCDA/LS_LUVex_04-Hex_ID0000_OD0982_no_struts_gy_ovsamp4_N1024.fits

Solution File:

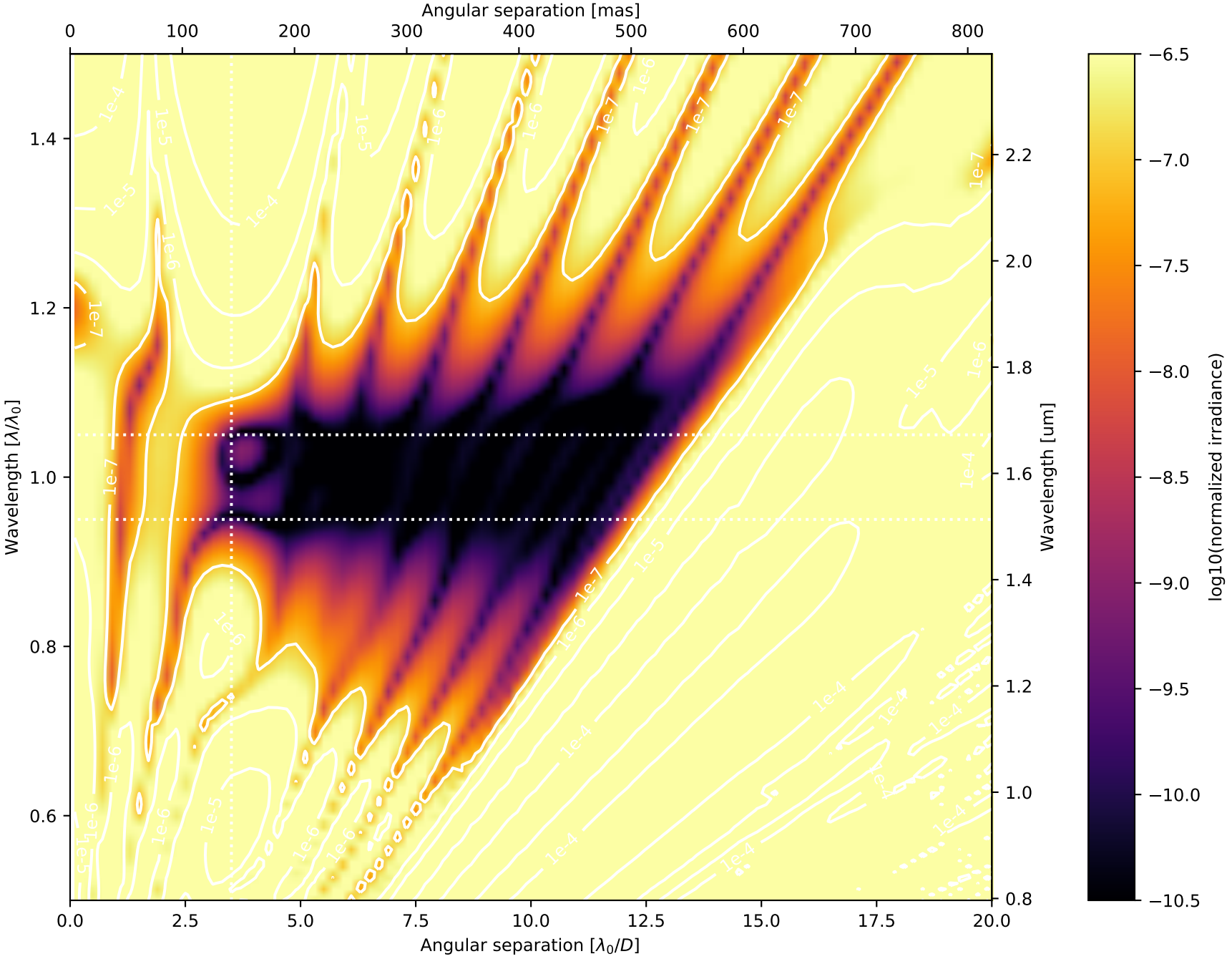
▷ 0_SCDA_N1024_FPM350M0150_IWA0340_OWA01200_C10_BW10_Nlam3_LS_IDex_ID_OD0_OD_ls_982_no_strut.fits Fri Mar 25 03:16:58 2022

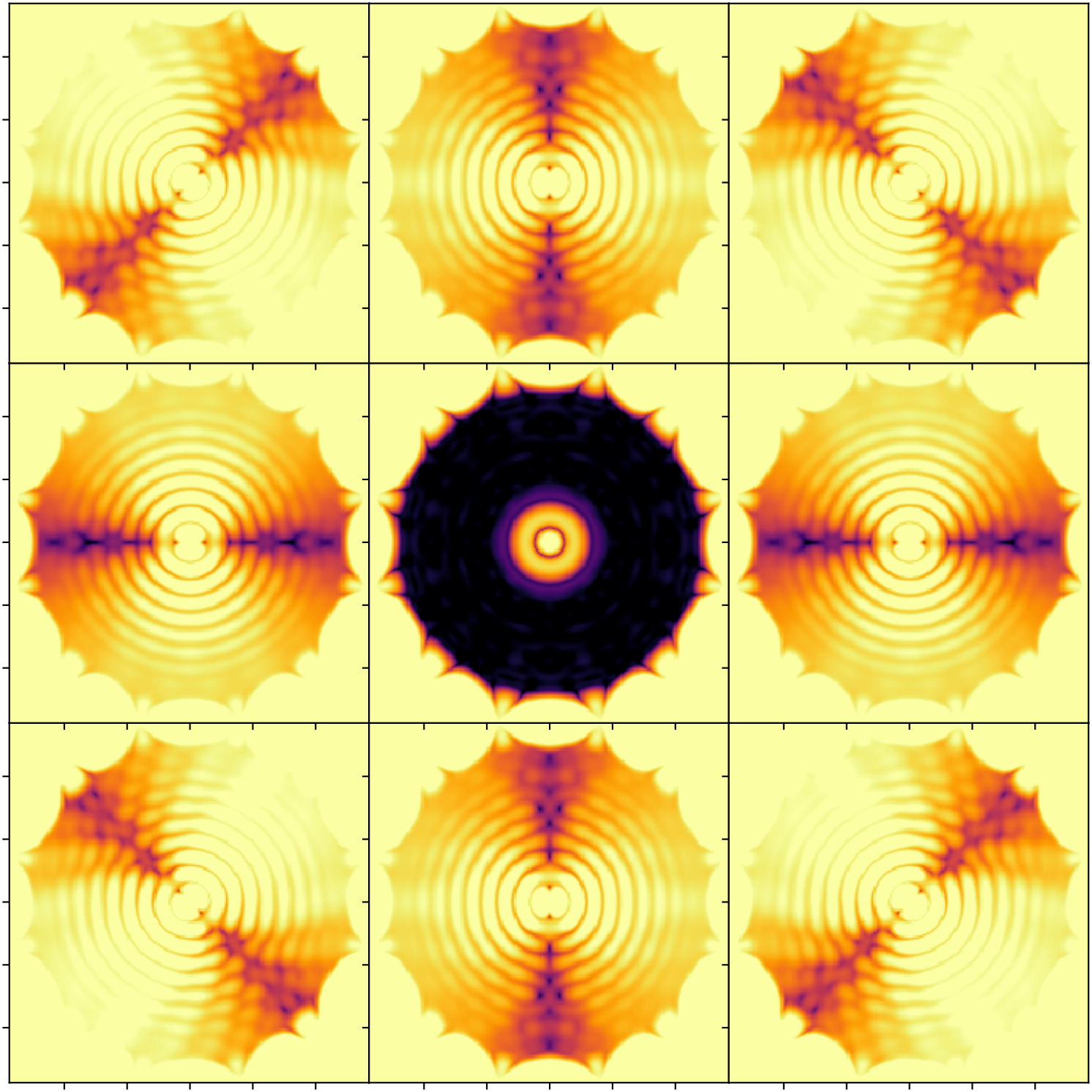


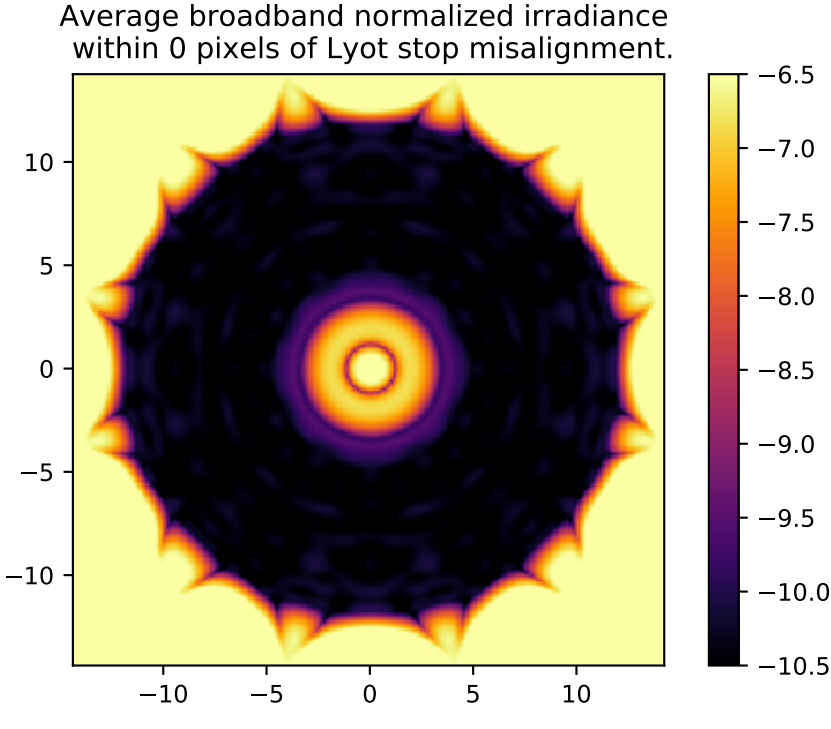
On − axis PSF in log irradiance,
normalized to the peak irradiance value.

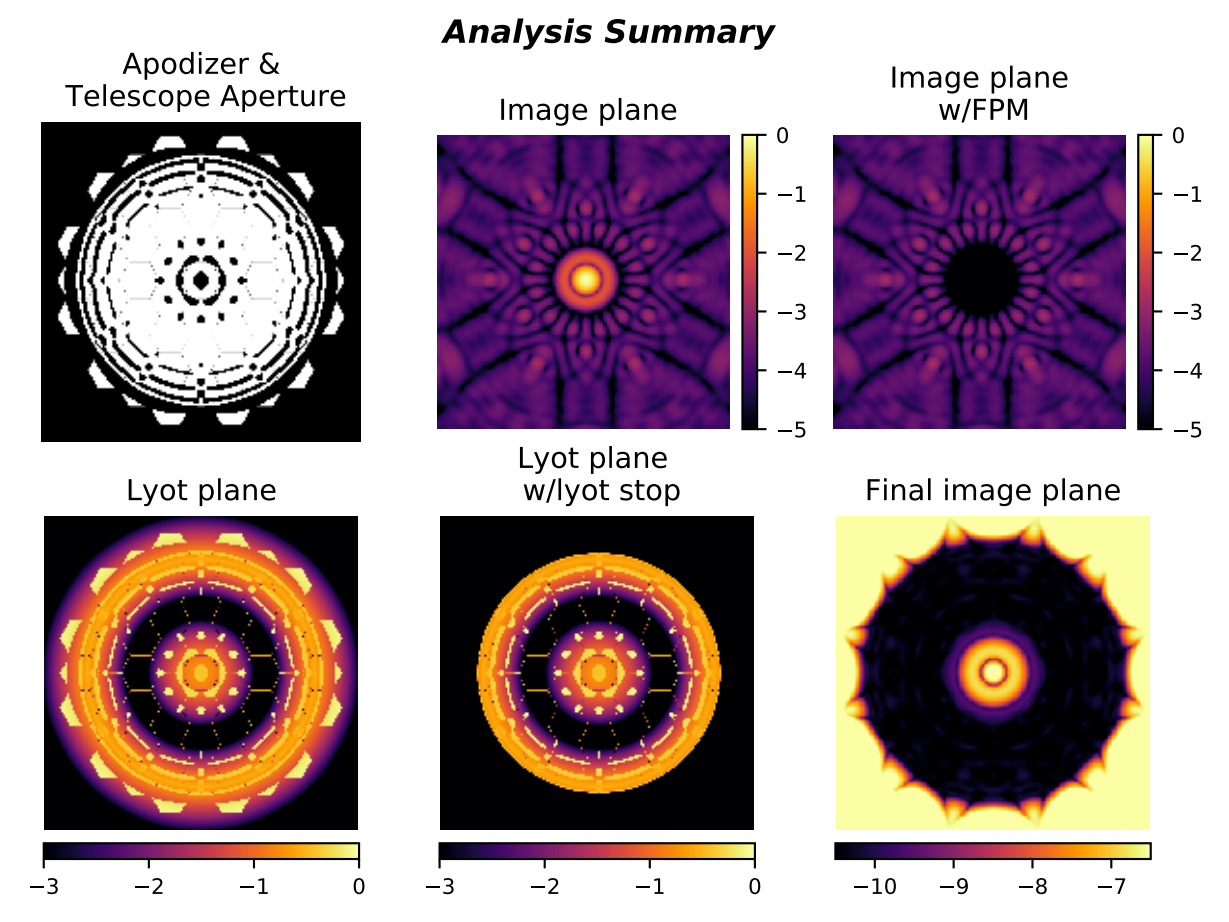


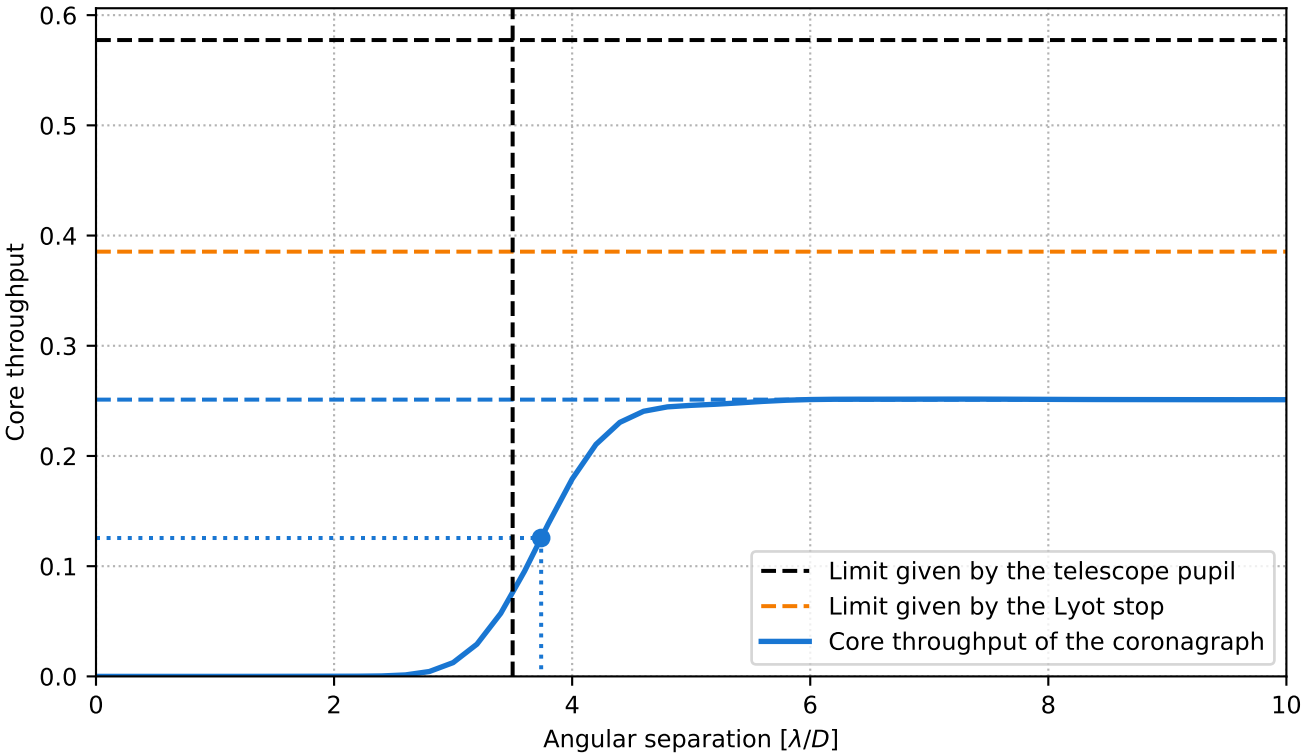
Radial intensity profile for the broadband APLC design at 11 simulated wavelengthscentered around λ_0/D and equally spatially sampled over the 10.0% bandpass. The black curve shows the average intensity across the 11 wavelength samples. The dashed red vertical lines delimitthe high-contrast dark zone (between 3.4 and 12.0 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/λ_0]
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 [λ_0/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

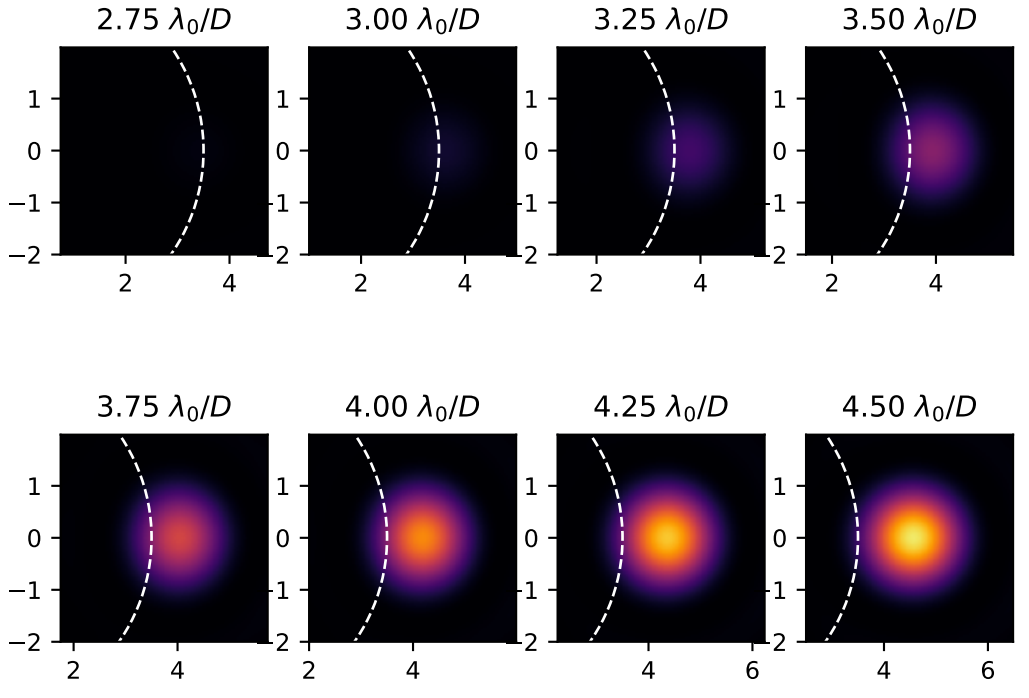


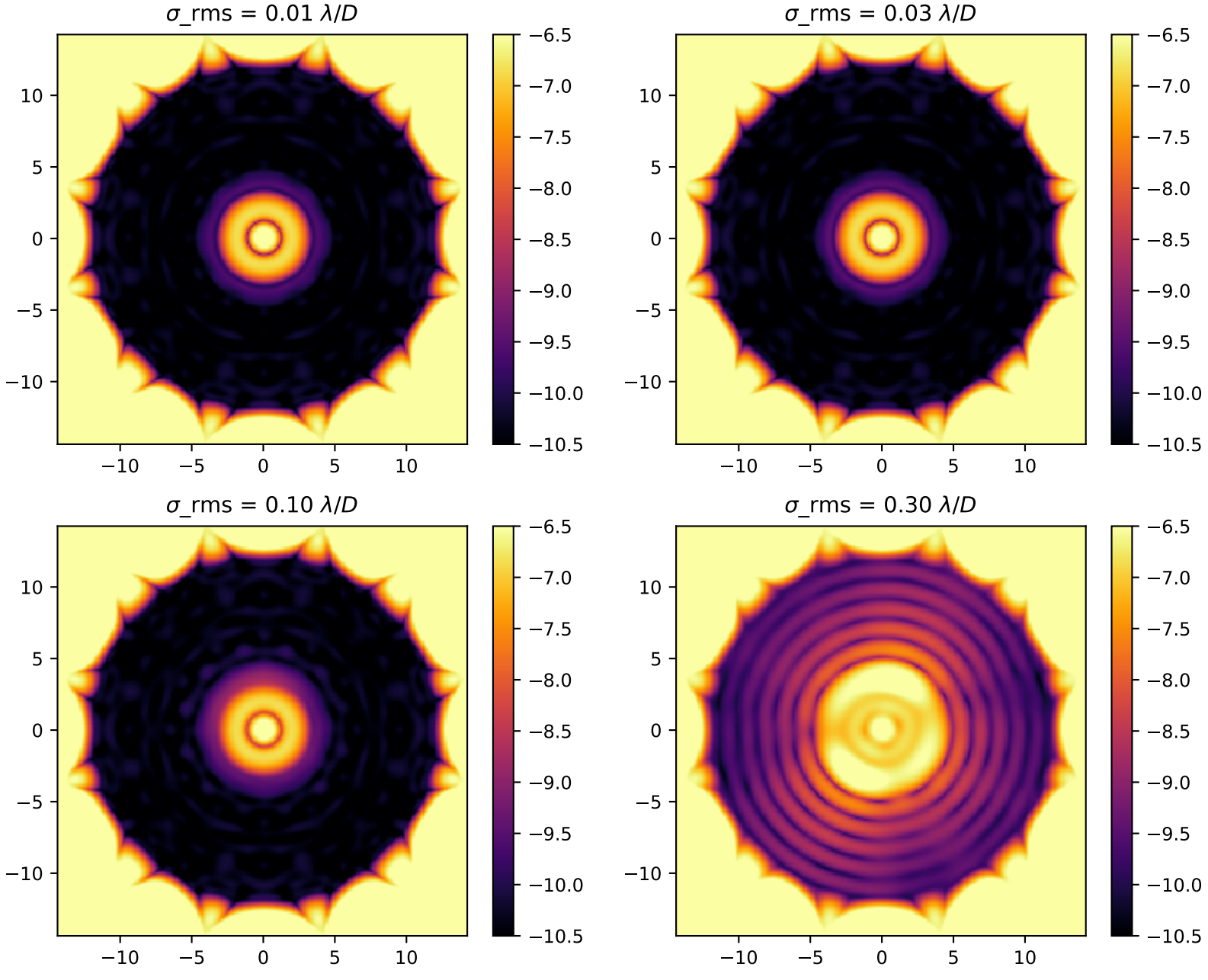

Average broadband normalized irradiance
within 0 pixels of Lyot stop misalignment.
10
5
0
−5
−10
−10
−5
0
5
10
−6.5
−7.0
−7.5
−8.0
−8.5
−9.0
−9.5
−10.0
−10.5

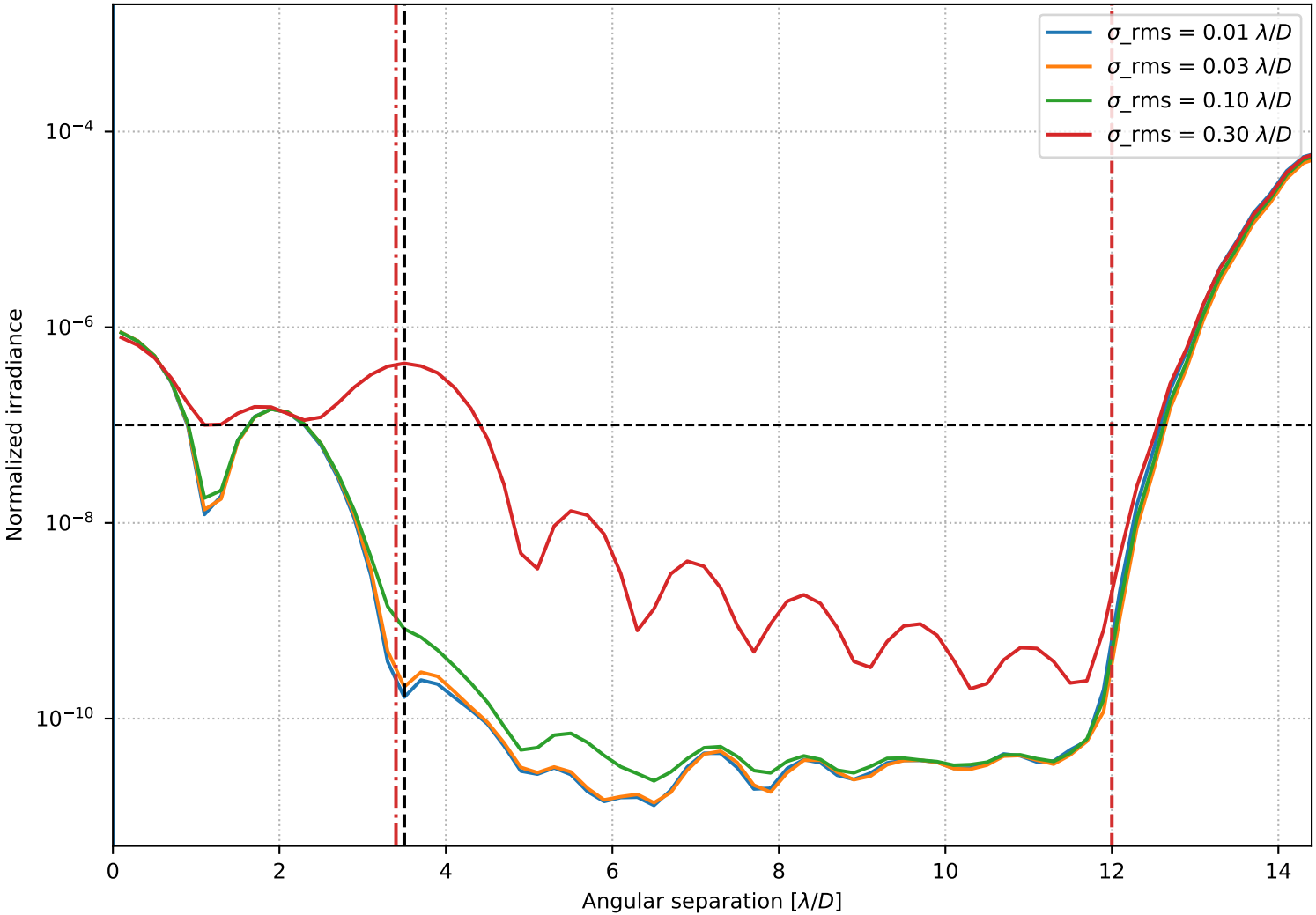

Analysis Summary
Apodizer &
Telescope Aperture
Image plane
Image plane
w/FPM
0
−1
−2
−3
−4
−5
Lyot plane
Lyot plane
w/lyot stop
Final image plane
−3
−2
−1
0
−10
−9
−8
−7



Pupil core throughput:	0.577388750545759
Lyot stop core throughput:	0.3853932887125127
Maximum core throughput:	0.25113071020232025
Maximum core throughput w.r.t. pupil core throughput:	0.43494215979259493
Maximum core throughput w.r.t. Lyot stop core throughput:	0.6516219082103769
Inner working angle:	3.739594616383182 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
10
5
0
−5
−10
−10
−5
0
5
10
−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.