Review of OCA activities on nulling testbench PERSEE

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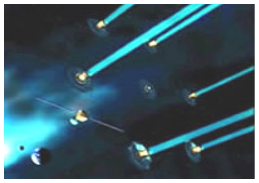
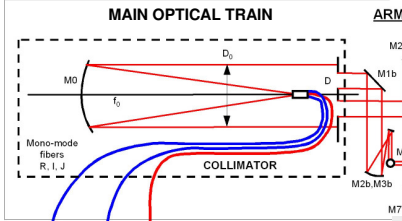
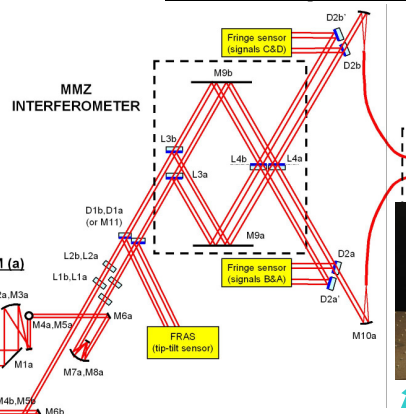
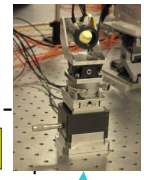
In the frame of *Darwin*/TPF-I and FKSI space missions

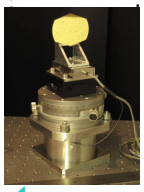


PERSEE optical design



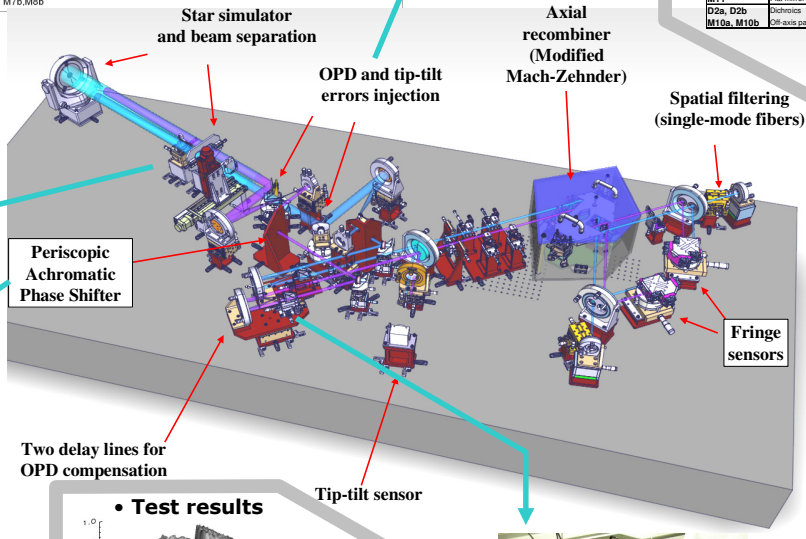


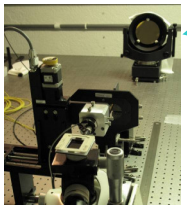




• Tip-tilt mirrors M1,M6 (INJECTION/ CORRECTION)

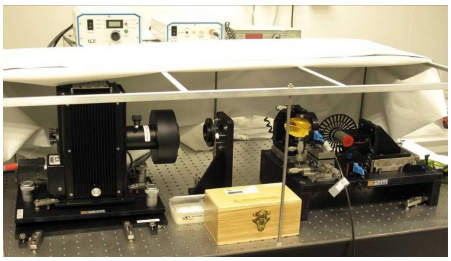
Opto-mechanical design



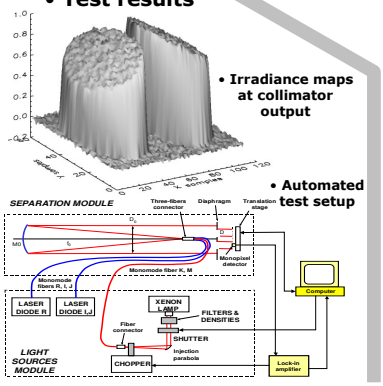


• Star simulator M0

• Periscopic APS (M4,M5)



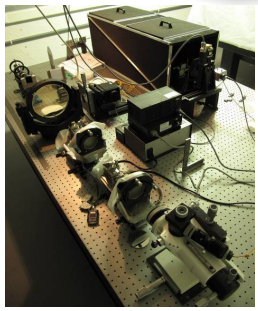
Light sources module



• Test results

• Irradiance maps at collimator output

• Automated test setup



• Delay lines (M7,M8) aligned on the optical bench

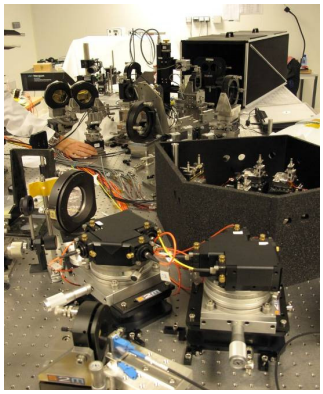
• Alignment requirements

POSITIONING ACCURACY	Lateral translations (decenters)	Axial translation (defocus)	Tilts	Roll angle	Driving requirements
Input SMF	1 µm	10 µm	30 arcsec	5 degs.	Optical axis alignment and flux balance
M0	0.5 mm	0.5 mm	3 arcsec	5 degs.	Optical axis alignment and flux balance
M1a, M1b	0.5 mm	0.5 mm	3 arcsec	5 degs.	Differential polarization
M2a, M2b	10 µm	0.5 mm	3 arcsec	1 deg.	Differential polarization
M3a, M3b	0.5 mm	10 µm	3 arcsec	1 deg.	Differential polarization
M4a, M4b	0.5 mm	0.5 mm	3 arcsec	5 degs.	Differential polarization
M5a, M5b	0.5 mm	0.5 mm	3 arcsec	5 degs.	Differential polarization
M6a, M6b	10 µm	0.5 mm	3 arcsec	5 degs.	Differential polarization
Delay lines	0.5 mm	0.5 mm	1 deg.	5 degs.	
M7a, M7b	0.5 mm	0.5 mm	3 arcsec	5 degs.	Optical axis alignment and image quality
M8a, M8b	10 µm	10 µm	1 deg.	5 degs.	Optical axis alignment and image quality
L1a, L1b	1 µm	0,5 mm	30 arcmin	5 degs.	Accuracy of chromatism compensation
L2a, L2b	1 µm	0,5 mm	30 arcmin	5 degs.	Accuracy of chromatism compensation
M11	0,5 mm	0,5 mm	3 arcsec	5 degs.	Optical axis alignment
D2a, D2b	0,5 mm	0,5 mm	30 arcmin	5 degs.	Optical axis alignment
M10a, M10b	0,5 mm	0,5 mm	10 arcsec	1 deg.	Coupling ratio into SMF
Output SMFs	0.3 µm	0.3 µm	1 deg.	5 degs.	Coupling ratio into SMF

Critical, alignment stages required

• Image quality requirements

Component	Type	Material/Coating	WFE (wavelengths @1.65 µm)	Manufacturing difficulty
M0	Parabolic mirror	Zerodur, unprotected gold coated	0.0153	Moderate
M1a, M1b	Flat mirror	Zerodur, unprotected gold coated	0.0153	Easy
M2a, M2b	Off-axis parabolic mirror	Zerodur, unprotected gold coated	0.0639	Moderate
M3a, M3b	Off-axis parabolic mirror	Zerodur, unprotected gold coated	0.0639	Moderate
M4a, M4b	Flat mirror	Zerodur, unprotected gold coated	0.0153	Easy
M5a, M5b	Flat mirror	Zerodur, unprotected gold coated	0.0153	Easy
M6a, M6b	Flat mirror	Zerodur, unprotected gold coated	0.0153	Easy
M7a, M7b	Parabolic mirror	Zerodur, unprotected gold coated	0.0320	Moderate
M8a, M8b	Parabolic mirror	Zerodur, unprotected gold coated	0.0153	Easy
L1a, L1b	Wedged plate	CAF2, uncoated	0.0014	Easy
L2a, L2b	Wedged plate	CAF2, uncoated	0.0014	Easy
M11	Flat mirror	Zerodur, unprotected gold coated	0.0153	Moderate
D2a, D2b	Dichroics	Fused silica, SR and AR coated	0.0028	Moderate
M10a, M10b	Off-axis parabolic mirror	Zerodur, unprotected gold coated	0.0639	Difficult
		Total WFE RMS	0.1222	Requirement
		Strehl ratio	0.479	> 0.40



• Final integration of PERSEE in Meudon labs, Nov. 2009

To know more, see Lozi *et al*, this conference, Friday 14h50

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