

K1 Example Upgrade Path Performance Summary 7/10/07 R. Dekany of KAON 461 Appendix 3 by P. Wizinowich	K1	Single-laser	NIR TT	HOWFS	2x DM	Sci Inst.	Vibes	50 W laser	3 Na LGS	NGAO
	LGS	tomography	Sensor	CCID56					Tomography on 12" radius asterism	(incr. to 6 Na LGS w/
	(Optimal reconstructor based on Cn2(h))									plus 3 Na LGS AO systems for a 2 TT and 1 TTFA LOWFS
(100 W LMCT in aster + 3 x 20W LMCT in LOWFS)										
Atmospheric Fitting Error	118	118	118	118	66	66	66	66	66	45
Bandwidth Error	75	75	75	71	77	77	77	59	59	27
High-order Measurement Error	135	135	135	131	141	141	141	105	106	41
LGS Focal Anisoplanatism Error	158	127	127	127	127	127	127	127	53	40
Asterism Deformation Error	0	0	0	0	0	0	0	0	0	18
Multispectral Error	19	19	19	19	19	19	19	19	19	19
Scintillation Error	11	11	11	11	11	11	11	11	11	11
WFS Scintillation Error	10	10	10	10	10	10	10	10	10	10
Uncorrectable Static Telescope Aberrations	66	66	66	66	55	55	55	55	55	43
Uncorrectable Dynamic Telescope Aberrations	72	72	71	67	74	74	73	53	53	21
Static WFS Zero-point Calibration Error	25	25	25	25	25	25	25	25	25	25
Dynamic WFS Zero-point Calibration Error	50	50	50	50	50	50	50	50	50	50
Leaky Integrator Zero-point Calibration Error	15	15	15	15	15	15	15	15	15	15
Go-to Control Errors	0	0	0	0	0	0	0	0	0	0
Residual Na Layer Focus Change	19	19	19	19	19	19	19	19	19	19
DM Finite Stroke Errors	26	26	26	26	3	3	3	3	3	2
DM Hysteresis	13	13	13	13	13	13	13	13	13	13
High-Order Aliasing Error	39	39	39	39	22	22	22	22	22	15
DM Drive Digitization	1	1	1	1	1	1	1	1	1	1
Uncorrectable AO System Aberrations	30	30	30	30	30	30	30	30	30	30
Uncorrectable Instrument Aberrations (10" FoV)	80	80	80	80	80	32	32	32	32	32
DM-to-lenslet Misregistration	15	15	15	15	15	15	15	15	15	15
DM-to-lenslet Pupil Scale Error	15	15	15	15	15	15	15	15	15	15
Angular Anisoplanatism Error	53	53	53	53	53	53	53	53	53	53
Total High Order Wavefront Error	300	284	284	280	265	255	255	225	195	136
H-Strehl (1650 nm)										
R-Strehl (700 nm)										
Tilt Measurement Error (one-axis)	21.2	21.2	4.9	4.8	4.5	4.3	3.3	3.0	2.7	2.3
Tilt Bandwidth Error (one-axis)	3.3	3.3	1.0	1.0	1.0	0.9	1.2	1.1	1.0	0.9
Tilt Anisoplanatism Error (one-axis)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residual Centroid Anisoplanatism	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Residual Atmospheric Dispersion	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Science Instrument Mechanical Drift	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Long Exposure Field Rotation Errors	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Residual Telescope Pointing Jitter (one-axis)	15.7	15.7	4.8	4.8	4.6	4.5	2.9	2.6	2.5	2.2
Total Tip/Tilt Error (one-axis)	26.8	26.8	7.7	7.7	7.3	7.1	5.7	5.3	5.1	4.8
Total Effective Wavefront Error	441	403	314	310	294	283	274	244	215	159
KAON 461	529	--	--	--	--	494	425	419	--	158
HOWFS Rate (Hz)	1304	1304	1303	1222	473	473	473	659	993	1639
TTWFS Rate (Hz)	194	194	970	991	1076	1134	725	833	1014	1137
Asterism / Total Laser Power (Watts, LP laser equiv.)	40	40	40	40	40	40	40	100	200 (+ 3 x 40)	600 (+ 3 x 40)
HOWFS Camera	CCD39	CCD39	CCD39	CCID56	CCID56	CCID56	CCID56	CCID56	CCID56	CCID56
N_subap (across)	20	20	20	20	40	40	40	40	40	64
Sci Inst	NIRC2	NIRC2	NIRC2	NIRC2	NIRC2	TBD	TBD	TBD	TBD	TBD
Amp of Telescope Vibrations (")	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
TT Sensor	STRAP	STRAP	H2RG	H2RG	H2RG	H2RG	H2RG	H2RG	H2RG	H2RG
Laser architecture	NO	YES	YES	YES	YES	YES	YES	YES	3 + 3 Na LGS	6 + 3 Na LGS
r0 = 16 cm; theta0 = 2.7 at zenith	4e9 atoms/cm2 sodium									
10 deg zenith	8 m/s turb. weighted wind speed									
5 arcsec science anisoplanatism	30 m/s Na layer vertical velocity									
10x centroid anisoplanatism reduction	M type TT star on-axis (null mode stars off axis for tomography cases)									
No ADC in TT sensor	300 sec exposure time									