

# NGAO Laser Guide Star



#### 12/07/2009 MINI-REVIEW (MINI-ANSWERS)





1)	Movie with the pick-off arms moving	⊃ <u>3</u>
2)	Folded motor has additional gear train - check specs for backlash	P4
3)	Illustrations shouldn't show obscuration of the science field.	.Pictures updated
4)	Use shallower angles at the tip-tilt and fold mirror (for making the overall length shorter	.P5
5)	Can we use a yaw-pitch mechanism	. Stalcup
6)	Do we need a pick-off for this ast or use a tetrahedron	P6 & 7
7)	Distortion of the on-sky of the fixed asterism on sky	Stalcup
8)	Eye-bolts to lift the LGS WFS assembly to facilitate lifting	On-Going
9)	Access to the linear stage is limited (the structure is 200 Kgs). Jack screws	On-Going
10) Tracking of the sodium error needs more thought (PW)		





## 2) Backlash elimination



The backlash specified by the vendor is 200  $\mu$ rad (0.011°) for each stages.

This would translate by a field inaccuracy of (300 tan 0.011) + (260 tan 0.011) = 0.112mm

Adding a constant 0.5 Lbs-in (.06Nm) torque (preloaded Spiral Spring) eliminates the backlash for any position of the Crank – Arm over a 360° rotation.

Adding 2 springs diametrically opposed prevents the addition of an undesired torque across the axis of rotation.



## 3) Closing the Fold Mirror angle





Using a 45° angle instead of a 90° angle allows to shorten the beam 34mm.



Using a 30° angle instead of a 90° angle allows to shorten the beam 59mm.

#### 4) Replacing the Fixed Asterism Pick off with a Tetrahedron







# 4.1) Replacing the Fixed Asterism Pick off with a Tetrahedron WAS: