



LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
RECORD OF DECISION/AGREEMENT (RODA)

Document	LIGO-M 060032 -Y	
Date:	2/28/2006	
Title:	RODA: Elimination of the Photon Drive from the AL baseline	
To the Attention of:	aligo_aos, aligo_sus, aligo_isc	
cc:	aligo_sys	
From/ signatories:	Name/Title:	Dennis Coyne, System Engineer Signature: _____
	Name/Title:	Peter Fritschel, System Scientist & ISC Leader Signature: _____
	Name/Title:	Phil Willems, AOS Cognizant Sci. Signature: _____
	Name/Title:	Justin Greenhalgh, SUS/UK Project Manager Signature: _____
	Name/Title:	Helena Armandula, COC/Coatings Leader Signature: _____
System(s) affected:	<input type="checkbox"/> Initial LIGO <input checked="" type="checkbox"/> Advanced LIGO <input type="checkbox"/> Other: _____	
Nature/Scope:	<input checked="" type="checkbox"/> Design Decision <input type="checkbox"/> Requirements Decision <input type="checkbox"/> Work Scope Decision <input type="checkbox"/> Working Agreement between Groups <input type="checkbox"/> Other _____	
Subsystem(s) affected	<input type="checkbox"/> Relevant Subsystem(s)/Component(s): AOS (photon actuator in AOS scope), SUS (lines of sight), COC (coating reflectivity), ISC (global actuation)	
Primary Contacts	Group or Affiliation and Contact	AOS, Phil Willems ISC, Peter Fritschel SUS, Justin Greenhalgh COC, Helena Armandula
Reference Documents:		

DECISION/AGREEMENT STATEMENT:

The Photon Actuator (aka the photon drive) is removed from the baseline design. The Electro-Static Drive (ESD) will be used as the final stage of global length and alignment actuation in the run (locked) operational mode of the interferometer. However, design provisions (lines of sight, viewports, stay clear areas, adequate reflectance at the photon actuation wavelength) must be made

for the addition of a photon actuation system in the event that the ESD proves to be too noisy. Calibration will be accomplished with the existing photon calibration system.

BACKGROUND:

The Electro-Static Drive (ESD) is needed for force authority in lock-acquisition mode. The force requirements in run mode are large (on the order of 10^{-8} N rms, though this is still under study). If the run mode actuator were to be a photon drive, it would either need to be > 10 W and fairly quiet, or at lower power with multiple bounces and proportionally more quiet. We suspect that the ESD noise can be made low enough to be acceptable in run mode. Moreover we would not likely approach the ESD noise limits until well into interferometer commissioning.

If line of sight & optical viewport provisions are made for the photon actuator, then it can be added fairly easily to the system as a fallback (if needed during commissioning).

The photon actuator was also intended to serve as a photon calibrator. The current photon calibrators can serve this purpose. We don't know how precise ESD's are but we expect them to be something we would rather calibrate than rely upon for calibration.