LISA technology development at JPL
Jet Propulsion Laboratory, California Institute of Technology

LISA Rigid Interferometer Test Bed
Dr. Daniel Shaddock
Position of optical components stable to 10 pm/√Hz (1 mHz-1 Hz)
Insensitive to isotropic thermal expansion, laser noise, oscillator frequency noise, input optical path fluctuations

Optically contacted LISA Interferometer
Optically contacted experimental setup

Ground Test for the DRS
To make direct ground-based measurements of back-reaction force exerted on the LISA proof mass

Space Craft Pointing Sensor
Dr. Carl C. Liebe
Photon noise limited Receiving:
~60 pW
Pointing Noise:
~1 nrad/sqrt(Hz)

Future Work
*Bond Membranes
*Package Membrane
*Place Unit in Vacuum

Optical Displacement Sensor
Dr. Meng P. Chiao
Backup for capacitive sensors for GRS,
2 nm/√Hz above 3 mHz

Picometer Phasemeter
Dr. K. Gromov, Dr. M. Marcin, F. Chowdhury
Baseline interferometer shot-noise limit:
10 pm/√Hz at 1 mHz, 10 -5 cycle/√Hz at 1-1000 mHz
Doppler component 0-15 MHz
Digital PLL/DSP technique (GPS-like) on FPGA
Commercial digital tuner (ICS-652)

Experiment

Present Performance in Air
Membranes

Future Work

Present Performance

Δφ Implies L ± ΔL
Incoming wavefront Quad Cell
Phase-meter

TRL 8
Model Simulation
Space Quality Detector