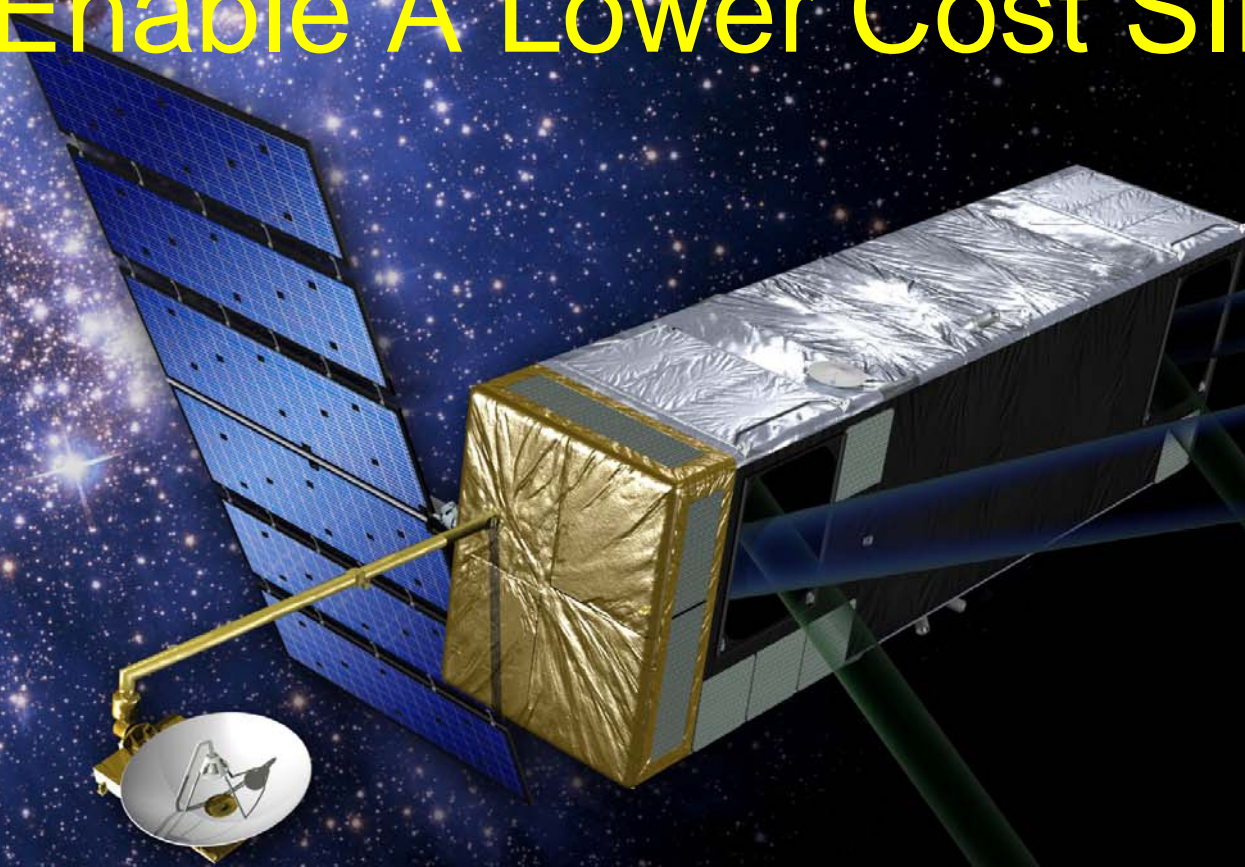
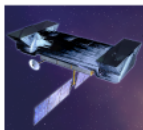


Technology Program Successes Enable A Lower Cost SIM

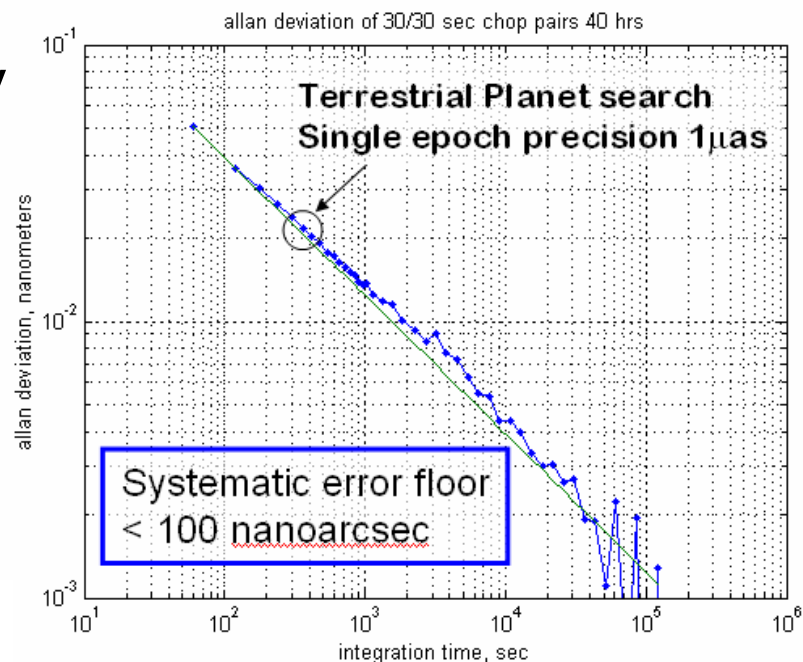
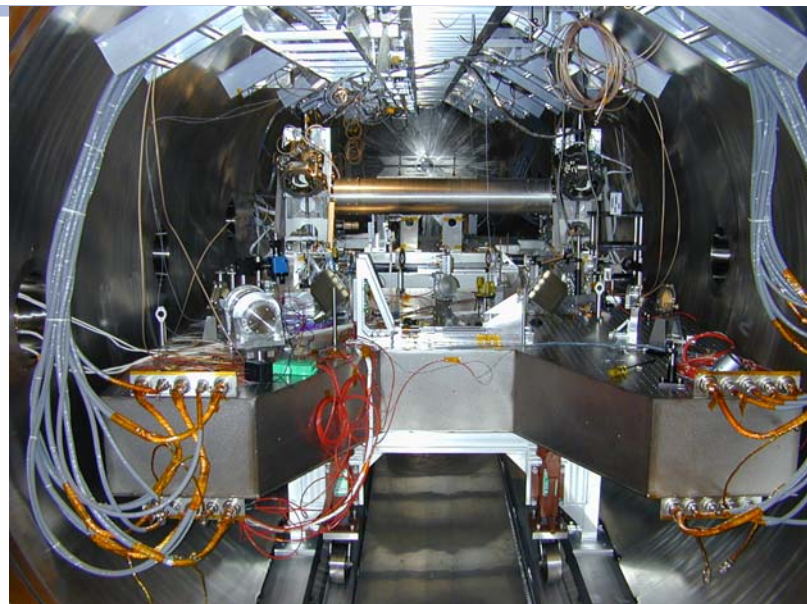


Mike Shao, Project Scientist
Jim Marr, Project Manager

Improved Technology Allows Smaller SIM



- Peer-reviewed technology program completed last of 8 milestones with systematic error floor < 1 picometer!
- ***SIM baseline can be reduced from 9 → 6 m with reduction of mass (and thus cost) while retaining $< 0.05 \mu\text{as}$ mission accuracy (narrow angle)***
- Wide angle astrometry accuracy still $4 \mu\text{as}$, but 1 magnitude worse sensitivity (20 → 19 mag)
- Throughput reduction of 50% can be made up by observing fewer targets or increased mission duration



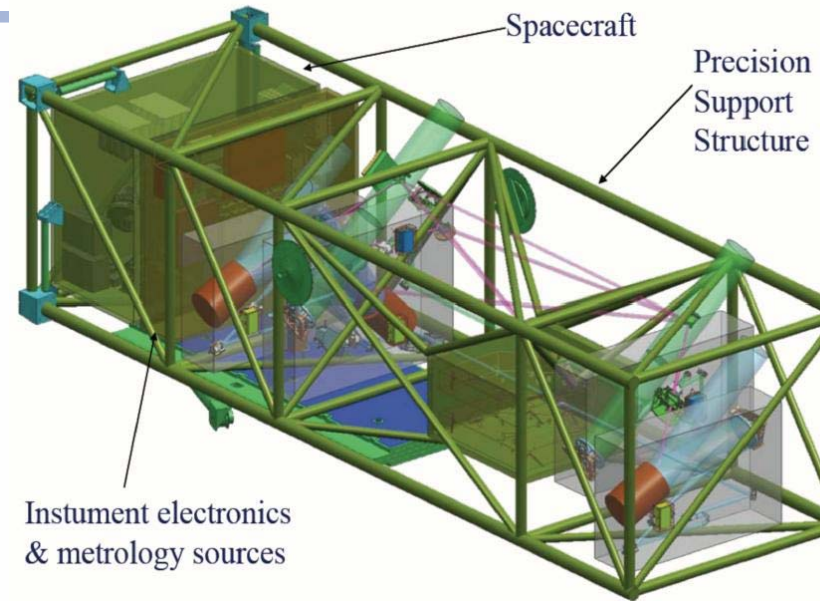
SIM "Lite" Overview

Salient Features

- 6-m baseline science Michelson Interferometer
- One 4-m baseline guide interferometer
- One 30-cm mirror guide telescope
- Earth-trailing solar orbit
- 5 year mission

Science

- Search and characterize Earth-like planets orbiting 65 nearby stars
- Survey more than 1000 stars to reveal planetary system architectures
- Broad program of high precision, faint object astrophysics



Major Elements in Cost Reduction

	SIM-PQ	SIM-Lite
Science Baseline	9m	6m
Number of Interferometers	3	2
optics, mounts, actuators		
computers, cableing		
heaters for thermal control		
solar panels	6KW	4.5KW
Mass	6800kg	4470kg
Launch Vehicle fairing	5*19m	5*11m
BCD schedule	77 months	58 months

- 35% reduction in mass
- Greatly reduced numbers of mechanisms and overall instrument complexity due to removal of second guide interferometer



SIM and GAIA Are Complementary

- GAIA is an ESA survey mission to study $>10^8$ objects with 7-100 μas (7-18 mag) wide angle mission accuracy
- SIM is pointed observatory designed for high accuracy on selected targets
 - SIM's planet searches have x100 greater precision than GAIA (0.05 vs 7 μas end-of-mission accuracy, narrow angle) and can target closest, brightest (<7 mag) stars.
 - SIM has higher precision at fainter magnitudes for wide-angle astrometry than GAIA, targeting globular clusters, LMC/SMC, local group galaxies, AGN with high precision (4 vs 50 μas at 18th mag)



Summary

SIM "Lite" satisfies 1990 and 2000 Decadal Goals and Advances the state of art for Astrometry

	Wide Angle Performance	Narrow Angle Performance
<i>NRC Decadal Requirements/Goals</i>	<i>10 μas (4 μas)</i>	<i>3 μas (1 μas)</i>
SIM Planet Quest	2.4 μ as	0.7 μ as
SIM Lite	4.0 μ as	1.0 μ as

What next in FY08 and FY09?

- Finalize the hardware and mission design
- Continue progress on engineering milestones
- Examine simplified operations scenario
- Complete project cost estimates for new design
- Support Independent Cost Estimate and review
- Present to Decadal Review

