Achieving Extreme Optical Resolution

Partially Filled Aperture Interferometric Imaging Telescope
ParFAIT
Jeff Kuhn, Institute for Astronomy

1. Decreasing large mirror mass and cost by a factor of ten
   A. eliminating abrasive polishing
   B. using additive (3D printing) active control technologies
2. Decreasing cost (mass), increasing dynamic range sensitivity, of large optical structures
   A. matching stiffness with atmosphere and optical phase errors
   B. trading wide field-of-view for narrow-field coherence
Live-mirror technology

1. Smooth glass, Kirchoff-Love deterministic slumping
2. Printable electroactive polymer printing
   - force measurement (load cells)
   - force actuators
Telescopes optimized to see faint targets near bright objects

PLANETS Telescope

Daniel K. Inouye Solar Telescope
ParFAIT

- 39 5x5m no-polish mirror segments
- 4 arcsecond field-of-view
- 0.001 arcsecond angular resolution (20cm at Geo)
- 75x75m optical support structure
- Mass 110T
- Cost $150M

Companion:
- 1000x fainter
- 2m separation