

An Adaptive Optics Toolkit

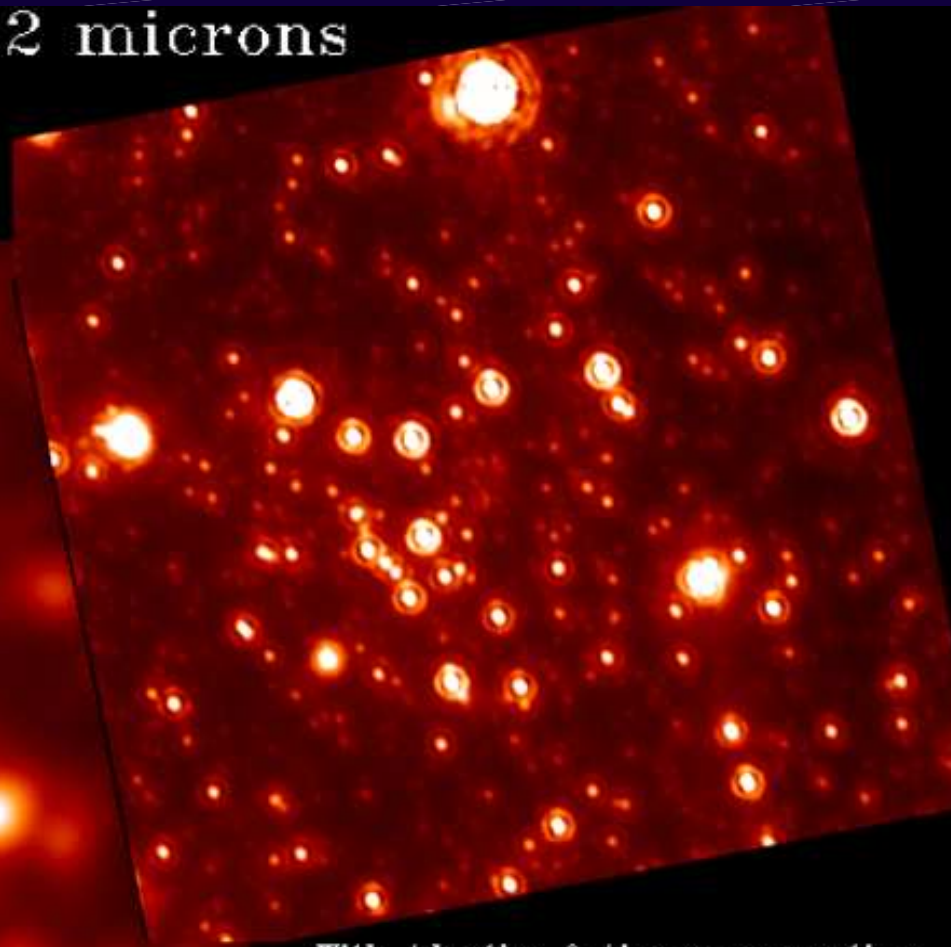
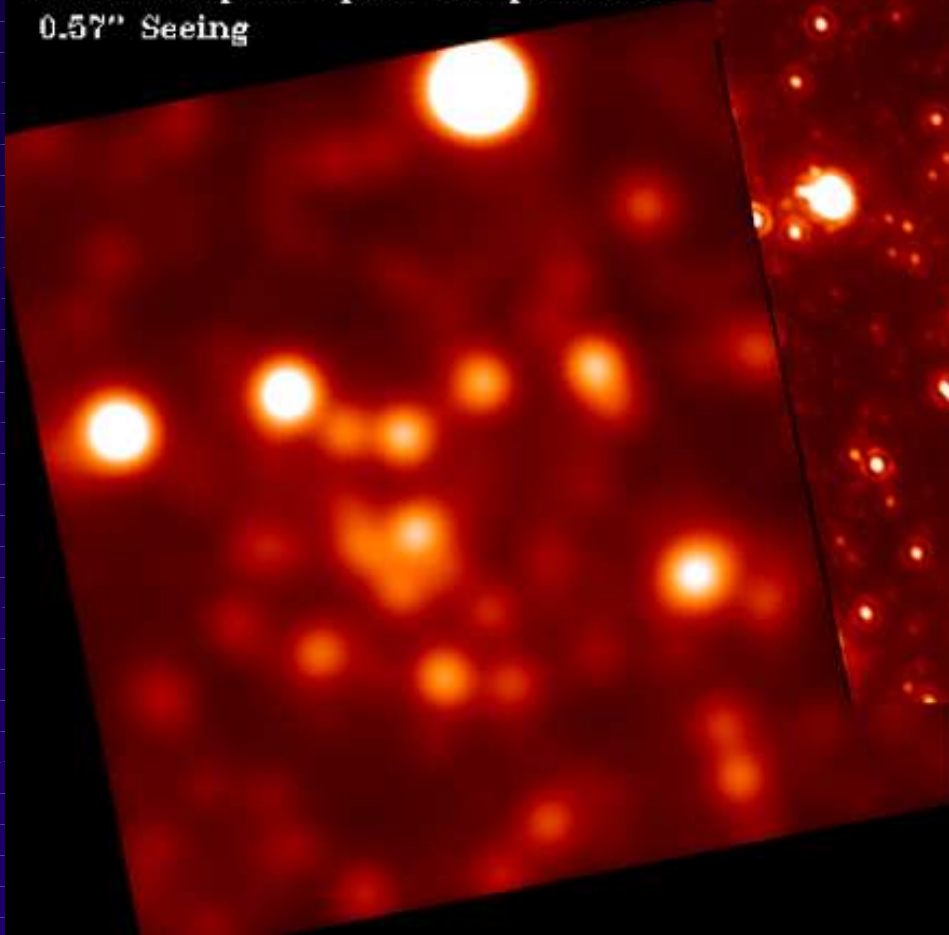
Carl Paterson

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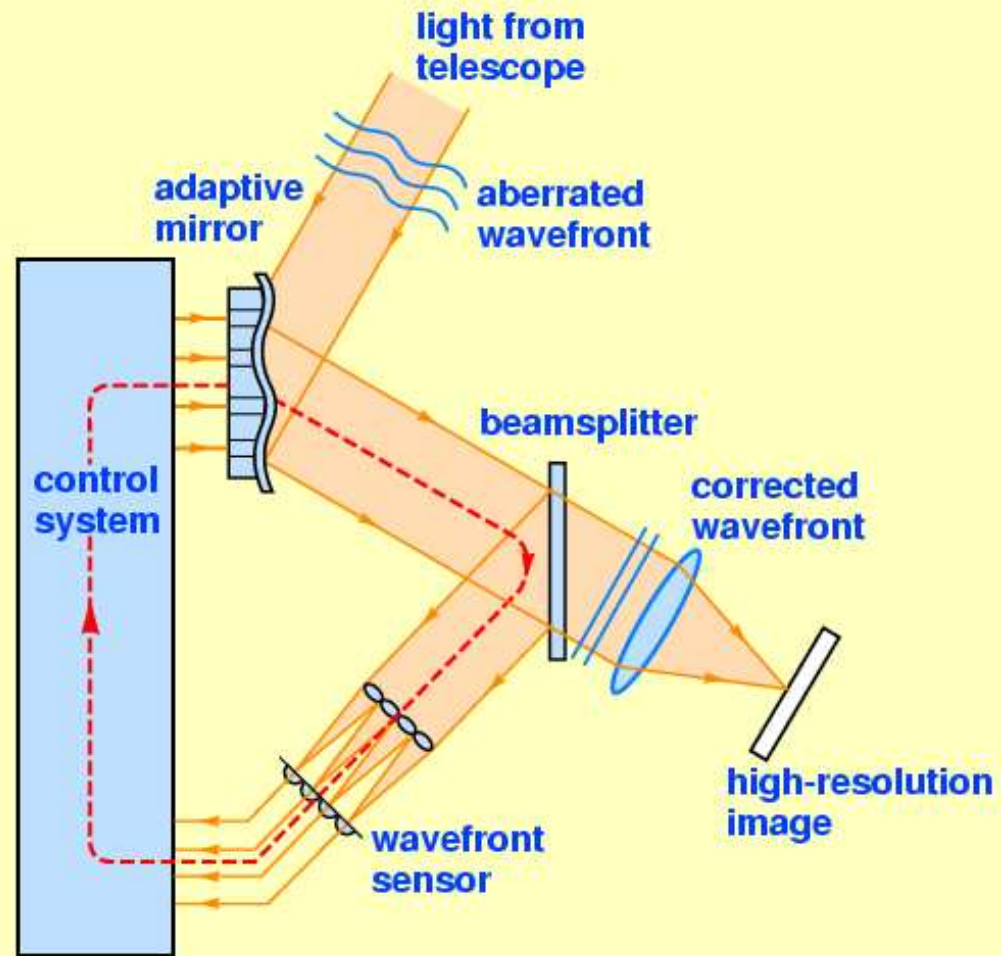
Galactic Center / 2.2 microns

13"x13" Field. 15 minutes exposure.

Without Adaptive Optics compensation
0.57" Seeing



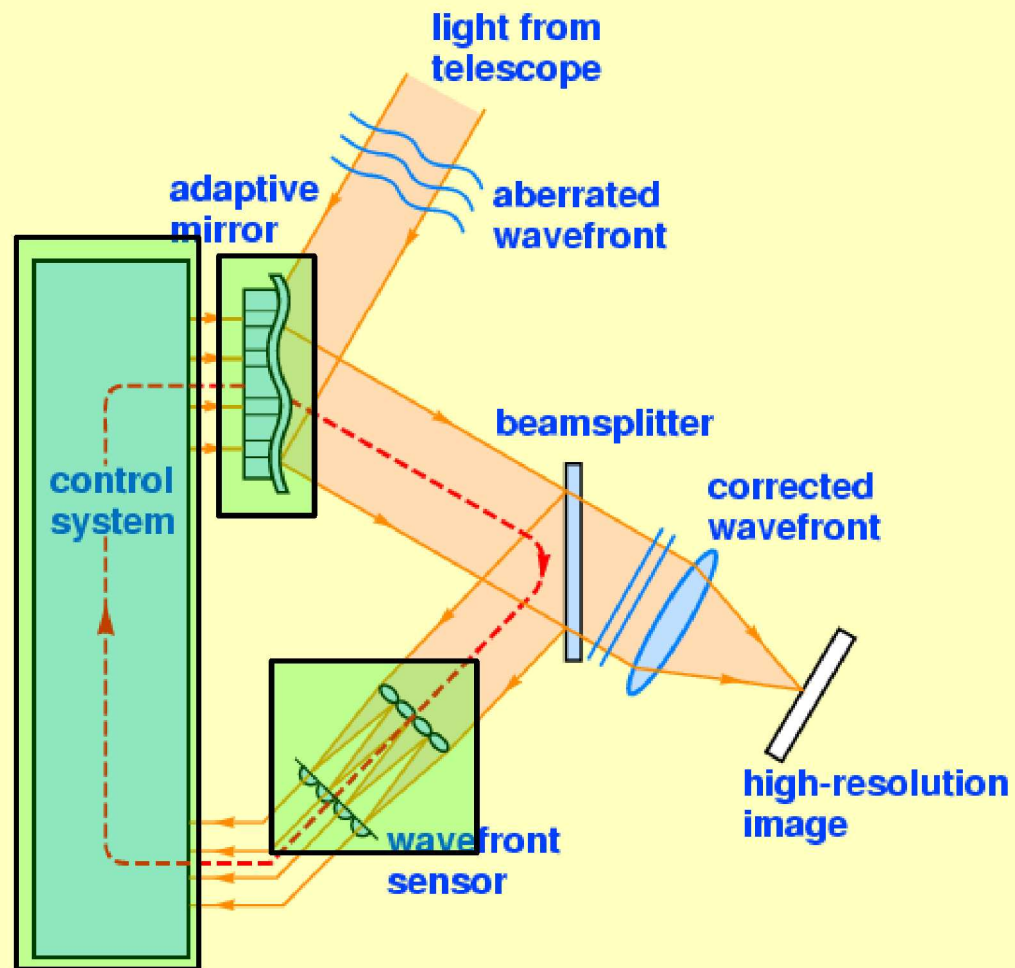
With Adaptive Optics compensation
0.13" Full Width at Half Maximum



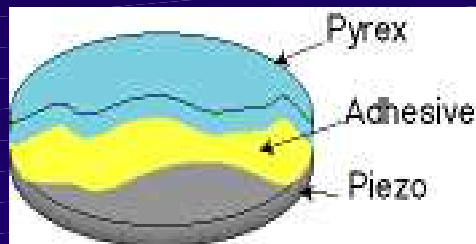
Applications of Adaptive Optics

- Ophthalmology / retinal Imaging / vision correction
- Point-to-point free space optics
- Reconfigurable optical systems
- Microscopy
- Intra-cavity laser correction
- Laser beam control and shaping
- High resolution lithography
- Optical data storage
- ...

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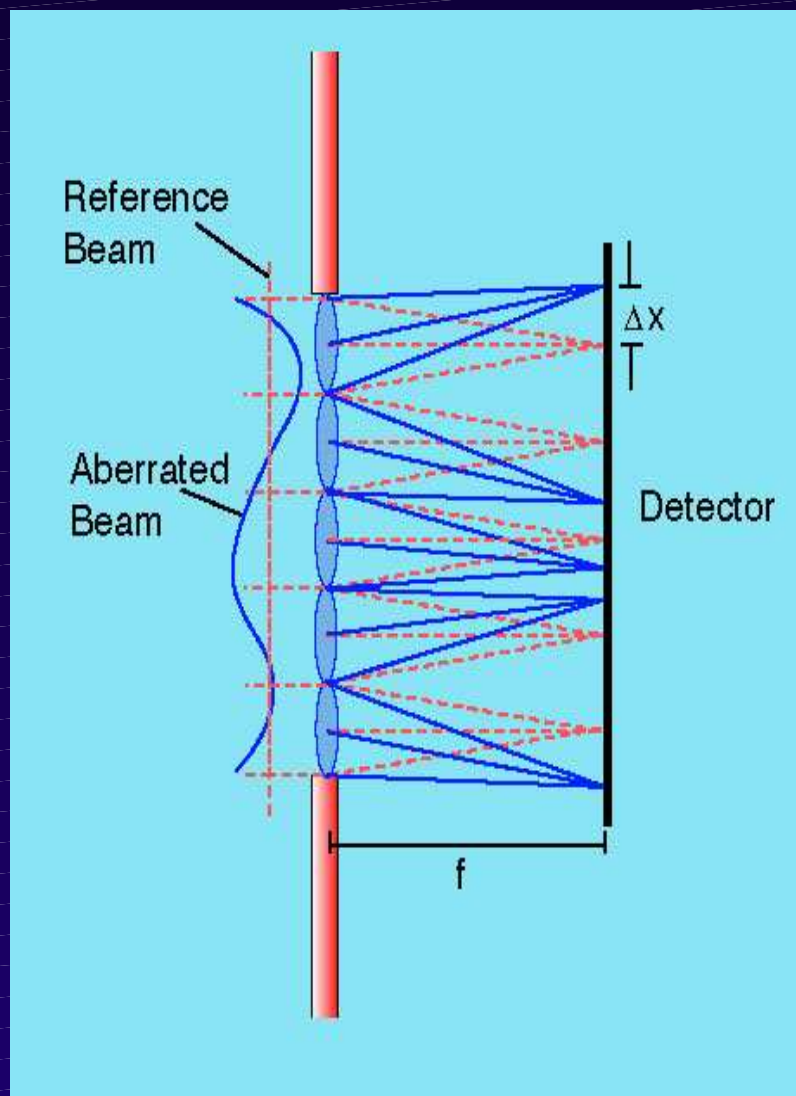
Bimorph Deformable Mirrors



- Curvature
- Robust
- Low-cost

- 10 - 40 Actuators
- 20mm-40mm diameter
- 10 micron stroke
- driver electronics

Wavefront sensing



Shack-Hartmann:

- 25-200 subapertures
- Aperture: 2 - 10 mm

Curvature option

Detectors(2):

- low cost CMOS
- medium CMOS/CCD
- Frame rate: video - 1KHz
- Visible & near IR

The Controller

Two controller options:

- PC based system
- Embedded system
- Bandwidth: 2-200Hz

Software:

- a full framework for standalone components and complete AO system integration.
- incorporate other mirrors where possible.

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- BAE Systems - (bimorph mirror technology)
- OptiSense - (integrated controllers & sensors)
- Imperial College London.
- Davin Optronics - (productionizing)

- Target cost: £10K for full system
- Ophthalmology and retinal imaging, laser cavity correction and beam delivery, line-of-sight optical communications, reconfigurable systems, microscopy, **your applications ?**

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