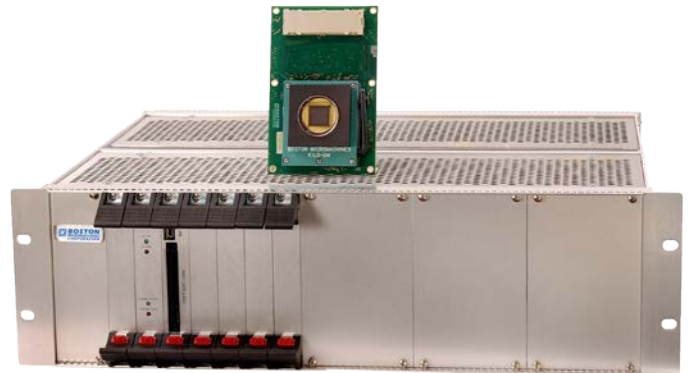


**The 492-DM : A high performance wavefront corrector for astronomy and imaging applications.**

The 492-DM is an enabling component for precise, high speed, high resolution wavefront control. With 492 actuators controlled to under 1 nm of precision and no hysteresis, this system is ideal for demanding applications in astronomy and next-generation imaging. The high-speed electronics driver is capable of 60 kHz frame rate and 14 bit step resolution. As an alternative to the popular *Kilo-DM*, the 492-DM can be used at a lower cost with powerful results.



**MEMS Deformable Mirrors**

MEMS deformable mirrors (DM) are currently the most commonly used in many adaptive optics applications given their versatility, maturity of technology, and the high resolution wavefront correction capabilities. Using advanced, inexpensive manufacturing technology, MEMS DMs' performance strengths are inherent to micromachining:

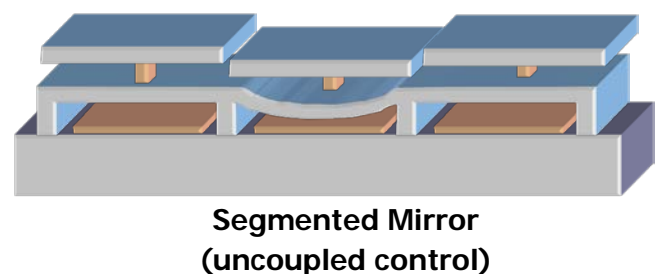
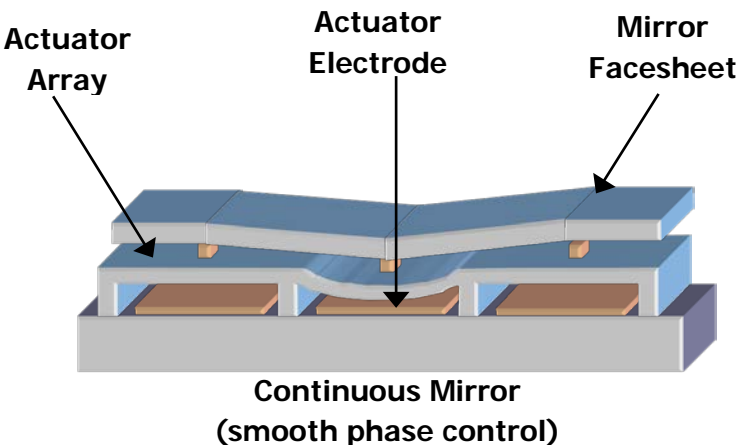
1. Large actuator arrays create high resolution wavefront correction.
2. Advanced microstructures allow minimal influence between adjacent actuators for high spatial frequency surfaces
3. Optimized design enables rapid wavefront shaping for high speed applications.

**DM Specifications:**

- Continuous (DM) or Segmented (SLM) Surface
- 492 actuators (24 across a circular aperture)
- Coating: Aluminum, Gold or Protected Silver
- Protective window with AR coating
- Zero hysteresis
- Fill Factor >99% (DM), 98% (SLM)
- Sub-nm average step size
- Surface Finish: <30nm RMS
- Stroke: 1.5  $\mu\text{m}$ , 3.5  $\mu\text{m}$
- Aperture 6.9 mm, 9.2 mm
- Pitch: 300  $\mu\text{m}$ , 400  $\mu\text{m}$

**Driver Specifications:**

- DIO Interface: SFP fiber link connection via PCIe Interface Card
- 14 bit step resolution
- Maximum Frame Rate: 34 kHz / 60 kHz (Low Latency)
- Response Time: 22 $\mu\text{s}$  / 17 $\mu\text{s}$  (Low Latency)
- Dimensions: 5.25" x19" x14" (3U Chassis)
- Power Draw: <40W



**The *Kilo-DM* : A high performance wavefront corrector for demanding applications in astronomy, laser communications and imaging through scattering media.**

The *Kilo-DM* is an enabling component for precise, high speed, high resolution wavefront control. With 952 actuators controlled to under 1nm of precision and no hysteresis, this system is ideal for demanding applications. The high-speed drive electronics are capable of 60 kHz frame rate and 14 bit step resolution. Originally developed for a DARPA coherent laser communication project, the *Kilo-DM* is currently used by the European Southern Observatory, the Lick Observatory at Mt. Hamilton, and various defense agencies. In addition, it is being used to develop next-generation sub-surface imaging techniques.



**DM Specifications:**

- Continuous (DM) or Segmented (SLM) Surface
- 952 actuators (34 across a circular aperture)
- Coating: Aluminum, Gold or Protected Silver
- Protective window with AR coating
- Zero hysteresis
- Fill Factor >99% (DM), 98% (SLM)
- Sub-nm average step size
- Surface Finish: <30nm RMS
- Stroke: 1.5  $\mu\text{m}$ , 3.5  $\mu\text{m}$
- Aperture: 9.9 mm, 13.2 mm
- Pitch: 300  $\mu\text{m}$ , 400  $\mu\text{m}$

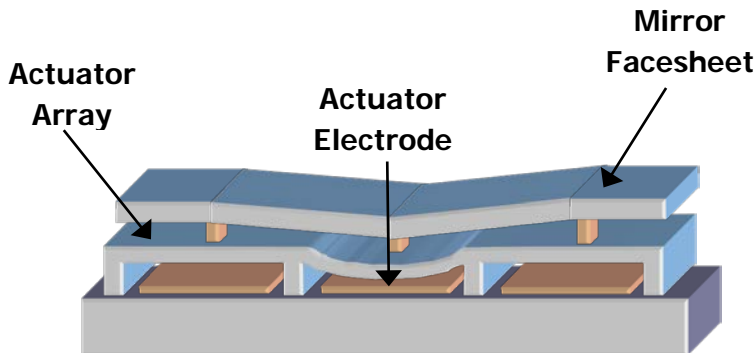
**MEMS Deformable Mirrors**

MEMS deformable mirrors are currently the most commonly used architecture in many adaptive optics applications given their versatility, maturity of technology, and high resolution wavefront correction capabilities. Using advanced, inexpensive manufacturing technology, MEMS DMs' performance strengths are inherent to micromachining:

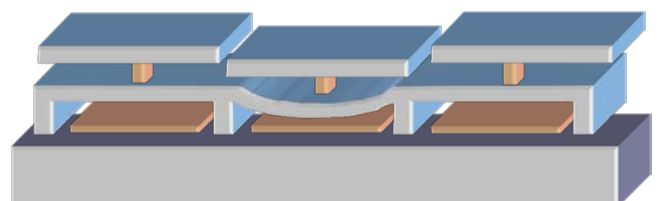
1. Large actuator arrays create high resolution wavefront correction.
2. Advanced microstructures allow minimal influence between adjacent actuators for high spatial frequency surfaces
3. Optimized design enables rapid wavefront shaping for high speed applications.

**Driver Specifications:**

- DIO Interface: SFP fiber link connection via PCIe Interface Card
- 14 bit step resolution
- Maximum Frame Rate: 34 kHz / 60 kHz (Low Latency)
- Response Time: 22 $\mu\text{s}$  / 17 $\mu\text{s}$  (Low Latency)
- Dimensions: 5.25" x19" x14" (3U Chassis)
- Power Draw: <40W



**Continuous Mirror  
(smooth phase control)**



**Segmented Mirror  
(uncoupled control)**