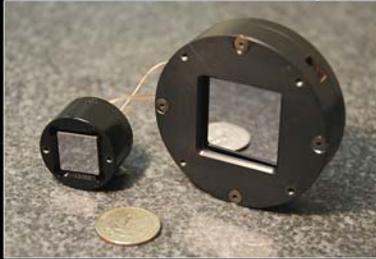


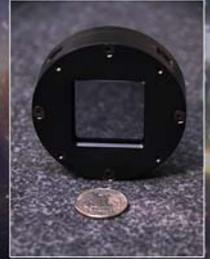
Development and Accomplishments of Deformable Mirrors

Presented by AOA Xinetics



AOA Xinetics Deformable Mirrors offer unparalleled clarity for ground-based images of deep space. AOX deformable mirrors are critical components within major telescopes world-wide, helping astronomers to not only see the beginnings of time but also search for habitable planets. Ground based telescopes with AOX mirrors compliment space-based telescope imagery by providing significantly-larger primary mirror sizes for precision imaging in the visible light bands.

Over the past 20 years, AOA Xinetics has been improving adaptive optics technologies, building and delivering more than 300 mirrors containing over 50,000 actuators.



Towards the Future...

AOA Xinetics is a key technology partner with JPL and NASA, developing the next generation of deformable mirror capable of flying in space as part of the WFIRST coronagraph mission. *Nature Magazine* wrote of the JPL High Contrast Imaging Testbed telescope, using an AOX 1mm spaced 32x32 DM; "This demonstrates that a coronagraphic telescope in space could detect and spectroscopically characterize nearby exoplanetary systems, with the **sensitivity to image an 'Earth-twin' orbiting a nearby star.**"

In 2011, AOX delivered a 1mm spaced 64x64 DM to JPL's HCIT. This DM produced the **highest contrast ratio coronagraph ever measured**, which will enable the stable imaging necessary for planned exoplanet atmospheric spectroscopy in our continued search for life beyond Earth.

AOX is currently fabricating a 1600 actuator deformable mirror for the Daniel K. Inouye Solar Telescope. *Universetoday.com* commented on the project: "**DKIST will be the world's premier ground-based solar observatory in the world...** capable of distinguishing features down to 0.03 arc seconds or just 20-70 km (12-44 miles) wide at the sun's surface. **To achieve such fantastic resolutions the telescope will employ the latest adaptive optics technology to cancel the blurring effects of the atmosphere using a computer-controlled deformable mirror.**"



Palomar Observatory's Hale Telescope

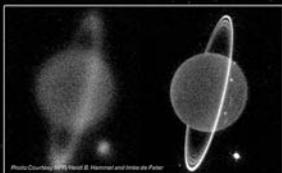
Part of the PALM 3000 AO system, AOX has played a major role in many significant discoveries, including finding and analyzing planets orbiting near stars. AOX deformable mirrors enabled the 65 year-old telescope at Palomar Observatory to obtain its first image of an exoplanet by a ground telescope.



Gemini Observatory North

In 2003, AOX's 177 channel deformable mirror became part of Gemini North's AO system, a key element of exoplanet discovery. *Gemini.edu* states: "Astronomers using the Gemini North telescope and W.M. Keck Observatory on Hawaii's Mauna Kea have obtained **the first-ever direct images identifying a multi-planet system around a normal star.**"

(PHOTO CREDIT: Gemini Observatory/Association of Universities for Research in Astronomy)



W. M. Keck Observatory

In 1997, AOX's 349 channel deformable mirror was included in the Keck II Telescope, improving, among others, images of the Milky Way's rotational center. *Space.com* wrote "The [Keck] Observatory...is a **renowned astronomy shortstop.** When scientists see an exoplanet or other interesting finding in a telescope, Keck is often used to confirm it. Sometimes, of course, Keck leads the way itself."