Adaptive Optics Systems VI

Laird M. Close
Laura Schreiber
Dirk Schmidt
Editors

10–15 June 2018
Austin, Texas, United States

Sponsored by
SPIE

Cosponsored by
4D Technology (United States) • Andor Technology, Ltd. (United Kingdom) • Astronomical Consultants & Equipment, Inc. (United States) • Giant Magellan Telescope (Chile) • G Pixel, Inc. (China) • Harris Corporation (United States) • Materion Corporation (United States) • Optimax Systems, Inc. (United States) • Princeton Infrared Technologies (United States) • Symétrie (France) • Teledyne Technologies, Inc. (United States) • Thirty Meter Telescope (United States)

Cooperating Organizations
European Space Organisation • National Radio Astronomy Observatory (United States) • Science & Technology Facilities Council (United Kingdom) • Canadian Astronomical Society (Canada) • Canadian Space Association ASC (Canada) • Royal Astronomical Society (United Kingdom) • Association of Universities for Research in Astronomy (United States) • American Astronomical Society (United States) • Australian Astronomical Observatory (Australia) • European Astronomical Society (Switzerland)

Published by
SPIE

Volume 10703
Part One of Three Parts

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.
# Contents

<table>
<thead>
<tr>
<th>xvi</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>xix</td>
<td>Conference Committee</td>
</tr>
</tbody>
</table>

## Part One

<table>
<thead>
<tr>
<th>SESSION 1</th>
<th>AO SYSTEMS AND STATUS I</th>
</tr>
</thead>
<tbody>
<tr>
<td>10703 02</td>
<td>Adaptive Optics Facility: from an amazing present to a brilliant future... [10703-3]</td>
</tr>
<tr>
<td>10703 03</td>
<td>The ERIS adaptive optics system: from design to hardware [10703-2]</td>
</tr>
<tr>
<td>10703 04</td>
<td>The CHARA array adaptive optics program [10703-4]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SESSION 2</th>
<th>ASTRONOMY WITH AO</th>
</tr>
</thead>
<tbody>
<tr>
<td>10703 05</td>
<td>Two decades of exoplanetary science with adaptive optics (Invited Paper) [10703-5]</td>
</tr>
<tr>
<td>10703 06</td>
<td>Keck Planet Imager and Characterizer: status update [10703-6]</td>
</tr>
<tr>
<td>10703 07</td>
<td>LASSO: Large Adaptive optics Survey for Substellar Objects using the new SAPHIRA detector on Robo-AO [10703-7]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SESSION 3</th>
<th>AO SYSTEMS AND STATUS II</th>
</tr>
</thead>
<tbody>
<tr>
<td>10703 09</td>
<td>MagAO-X: project status and first laboratory results [10703-9]</td>
</tr>
<tr>
<td>10703 0A</td>
<td>Adaptive optics systems at the Large Binocular Telescope: status, upgrades, and improvements [10703-10]</td>
</tr>
<tr>
<td>10703 0B</td>
<td>Commissioning multi-conjugate adaptive optics with LINC-NIRVANA on LBT [10703-11]</td>
</tr>
<tr>
<td>10703 0C</td>
<td>GTC adaptive optics first performance tests in laboratory [10703-12]</td>
</tr>
<tr>
<td>10703 0E</td>
<td>SHARK-NIR: the coronagraphic camera for LBT in the AIV phase at INAF-Padova [10703-14]</td>
</tr>
</tbody>
</table>
10703 OF  Laboratory integration of the DKIST wavefront correction system (Invited Paper) [10703-15]

10703 OG  Progress on solar multi-conjugate adaptive optics at the New Vacuum Solar Telescope [10703-16]

SESSION 4  POST-PROCESSING AO DATA

10703 OH  Mining the GPIES database [10703-17]

10703 OI  Point-spread function reconstruction for integral-field spectrograph data [10703-18]

SESSION 5  AO SYSTEMS AND STATUS III

10703 OJ  On-sky results from the wide-field ground-layer adaptive optics demonstrator ‘imaka [10703-19]

10703 OK  The Gemini Planet Imager: looking back over five years and forward to the future [10703-20]

10703 OL  Status of MagAO and review of astronomical science with visible light adaptive optics [10703-21]

10703 OM  On-going and future AO activities on Subaru Telescope [10703-22]

10703 ON  Ground layer adaptive optics for the W. M. Keck Observatory: feasibility study [10703-23]

SESSION 6  AO SYSTEMS AND STATUS IV

10703 OO  Adaptive optics tracking and pushing system for space debris manoeuvre [10703-24]

10703 OP  An infusion of new blood using the Toptica laser with GeMS: results of the commissioning and science performance [10703-25]

SESSION 7  LGS

10703 OQ  LGS alternative wave-front sensing: Projected Pupil Plane Pattern (PPPP) [10703-26]

10703 OR  Studies towards a directional polychromatic sodium laser guide star [10703-28]

10703 OS  A 100-W 1178-nm continuous-wave single-frequency linearly polarized Raman fiber amplifier [10703-29]
Semiconductor guidestar laser for astronomy, space, and laser communications: prototype design and expected performance [10703-30]

Measuring the return flux for a sodium beacon created by combining two laser beams [10703-31]

Dealing with the cigar: preliminary performance estimation of an INGOT WFS [10703-32]

An overview and status of GMT active and adaptive optics (Invited Paper) [10703-33]

Preliminary on-sky results of the next generation GMT phasing sensor prototype [10703-34]

Adaptive optics program at TMT (Invited Paper) [10703-35]

Wavefront control architecture and expected performance for the TMT Planetary Systems Imager [10703-36]

Adaptive optics at the ESO ELT (Invited Paper) [10703-37]

MAORY for ELT: preliminary design overview [10703-38]

The MICADO first-light imager for the ELT: towards the preliminary design review of the MICADO-MAORY SCAO [10703-40]

Single conjugate adaptive optics for METIS [10703-41]

Status of the preparatory work for the 4m European Solar Telescope [10703-42]

Phase A AO system design and performance for MOSAIC at the ELT [10703-43]

The Real-Time controller (RTC) for the Narrow Field Infrared Adaptive Optics System (NFIRAOS) for TMT final design [10703-44]

Prototyping AO RTC using emerging high performance computing technologies with the Green Flash project [10703-45]

An ELT scale MCAO real-time control prototype using Xeon Phi technologies [10703-46]

A calibration source for ELT AO systems [10703-47]
### SESSION 10  ADVANCES IN AO CONTROL I

<table>
<thead>
<tr>
<th>10703 1B</th>
<th>Overview of multi-conjugate adaptive optics reconstructors (Invited Paper) [10703-48]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10703 1D</td>
<td>Dealing with spiders on ELTs: using a Pyramid WFS to overcome residual piston effects [10703-50]</td>
</tr>
<tr>
<td>10703 1E</td>
<td>The compute and control for adaptive optics (CACAO) real-time control software package [10703-51]</td>
</tr>
<tr>
<td>10703 1F</td>
<td>Wavefront reconstruction and prediction with convolutional neural networks [10703-52]</td>
</tr>
</tbody>
</table>

### SESSION 11  ADVANCES IN AO CONTROL II

<table>
<thead>
<tr>
<th>10703 1G</th>
<th>The AO in AOF (Invited Paper) [10703-53]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10703 1H</td>
<td>Adaptive gain in closed-loop tilt control and adaptive optics [10703-54]</td>
</tr>
<tr>
<td>10703 1I</td>
<td>Innovative real-time processing for solar adaptive optics [10703-55]</td>
</tr>
<tr>
<td>10703 1J</td>
<td>Status of point spread function determination for Keck adaptive optics [10703-59]</td>
</tr>
<tr>
<td>10703 1K</td>
<td>The multi-object adaptive optics system for the GIRMOS spectrograph on Gemini-South [10703-56]</td>
</tr>
<tr>
<td>10703 1M</td>
<td>Advanced control laws for the new generation of AO systems (Invited Paper) [10703-58]</td>
</tr>
</tbody>
</table>

### SESSION 12  POINT SPREAD FUNCTION RECONSTRUCTION

<table>
<thead>
<tr>
<th>10703 1N</th>
<th>LLAMAS: low-latency adaptive optics at LLNL [10703-60]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10703 1O</td>
<td>Off-axis PSF reconstruction for integral field spectrograph: instrumental aberrations and application to Keck/OSIRIS data [10703-61]</td>
</tr>
</tbody>
</table>

### SESSION 13  EXTREME AO

<table>
<thead>
<tr>
<th>10703 1Q</th>
<th>Statistical analysis and lessons learned of SPHERE adaptive optics performance [10703-63]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10703 1S</td>
<td>A laser communication adaptive optics system as a testbed for extreme adaptive optics [10703-65]</td>
</tr>
</tbody>
</table>
Focal plane wavefront sensing and control strategies for high-contrast imaging on the MagAO-X instrument

Review of high-contrast imaging systems for current and future ground-based and space-based telescopes: Part II. Common path wavefront sensing/control and coherent differential imaging (Invited Paper)

C-RED 2 InGaAs 640×512 600-fps infrared camera for low order wavefront sensing

Update on development of WFS cameras at ESO for the ELT

Error breakdown of ELT-elongated LGS wavefront-sensing using CANARY on-sky measurements

Part Two

The MAORY laser guide star wavefront sensor: design status

Adaptive optics with an infrared pyramid wavefront sensor (Invited Paper)

A modal approach to optical gain compensation for the pyramid wavefront sensor

Design of the MagAO-X pyramid wavefront sensor

Analysis and mitigation of pupil discontinuities on adaptive optics performance

On-sky results of the Leiden EXoplanet Instrument (LEXI)

A conceptual design study for Subaru ULTIMATE GLAO

Closed loop operation with extremely elongated LGS spots in CANARY Phase D

From Clear to DKIST: advancing solar MCAO from 1.6 to 4 meters

The Robo-AO-2 facility for rapid visible/near-infrared AO imaging and the demonstration of hybrid techniques

The Copernico Telescope testing facility for AO on-sky demonstrations
<table>
<thead>
<tr>
<th>SESSION 16</th>
<th>CHARACTERIZATION, MEASUREMENT AND MODELING OF THE DISTURBANCES FACED BY AO</th>
</tr>
</thead>
<tbody>
<tr>
<td>10703 2A</td>
<td>Low wind effect on VLT/SPHERE: impact, mitigation strategy, and results (Invited Paper) [10703-83]</td>
</tr>
<tr>
<td>10703 2B</td>
<td>Optimizing multi-LGS WFS AO performance in the context of sodium profile evolution and non-common path aberration [10703-84]</td>
</tr>
<tr>
<td>10703 2C</td>
<td>Implications for contrast as a result of the wind vector and non-stationary turbulence [10703-85]</td>
</tr>
<tr>
<td>10703 2D</td>
<td>An on-line turbulence profiler for the AOF: on-sky results [10703-86]</td>
</tr>
<tr>
<td>10703 2E</td>
<td>Representative atmospheric turbulence profiles for ESO Paranal [10703-87]</td>
</tr>
<tr>
<td>10703 2G</td>
<td>Point spread function reconstruction coupling AO telemetry and focal plane images [10703-89]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SESSION 17</th>
<th>WAVEFRONT CORRECTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10703 2H</td>
<td>Prototyping of large deformable mirrors for TMT: test results [10703-91]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POSTER SESSION: ASTRONOMY WITH AO</th>
</tr>
</thead>
<tbody>
<tr>
<td>10703 2J</td>
</tr>
<tr>
<td>10703 2K</td>
</tr>
<tr>
<td>10703 2L</td>
</tr>
<tr>
<td>10703 2M</td>
</tr>
<tr>
<td>10703 2N</td>
</tr>
<tr>
<td>10703 2P</td>
</tr>
<tr>
<td>10703 2Q</td>
</tr>
</tbody>
</table>
POSTER SESSION: POST-PROCESSING AO DATA

10703 2R  Exoplanet detection in angular and spectral differential imaging: local learning of background correlations for improved detections [10703-101]

10703 2T  The hunt for Sirius Ab: comparison of algorithmic sky and PSF estimation performance in deep coronagraphic thermal-IR high contrast imaging [10703-103]

10703 2U  Fast cadence speckle-free high-contrast imaging: SFADI and SFI [10703-104]

10703 2V  Recurrence quantification analysis as a post-processing technique in adaptive optics high contrast imaging [10703-105]

10703 2Z  Slope-based wavefront sensor optimisation with multi-resolution analysis [10703-109]

10703 31  Approximate nonnegative matrix factorization algorithm for the analysis of angular differential imaging data [10703-111]

10703 32  Parallel processing of solar image restoration with phase diversity technique [10703-112]

POSTER SESSION: AO SYSTEMS AND STATUS

10703 33  Adaptive optics corrected imaging for satellite and debris characterisation [10703-113]

10703 36  Experiments of GLAO using the domeless solar telescope of the Hida Observatory [10703-116]

10703 38  Preliminary design of SALTO: the Belgian adaptive optics demonstrator [10703-118]

10703 39  A near-infrared pyramid wavefront sensor for Keck adaptive optics: real-time controller [10703-119]

10703 3A  Upgrades to the AO system of the 1.5m Gregor solar telescope [10703-120]

10703 3B  First version of the fiber injection unit for the Keck Planet Imager and Characterizer [10703-121]

10703 3C  SAMplus: adaptive optics at optical wavelengths for SOAR [10703-122]

10703 3D  The Gran Telescopio Canarias laser guide star AO system: error budget and expected performance [10703-123]

10703 3E  High-contrast observations of circumstellar environments with GTC/FRIDA: design and study of the coronagraphic devices [10703-125]

10703 3F  Servo control simulations and preliminary laboratory results for GTC adaptive optics with NGS [10703-126]
10703 3G  Near-infrared pyramid wavefront sensor for Keck adaptive optics: opto-mechanical design [10703-127]
10703 3I  Control electronics of the ERIS AO and CU subsystems [10703-129]
10703 3J  Electronics design of the LOR WFS module of MAORY [10703-130]

POSTER SESSION: LASER GUIDE STAR SYSTEMS

10703 3L  Design of a laser guide star wavefront sensor system for NFIRAOS [10703-132]
10703 3N  Dueling lasers! A comparative analysis of two different sodium laser technologies on sky [10703-134]
10703 3P  Current status of the laser guide star upgrade at Subaru Telescope [10703-136]
10703 3R  Simulations of continuous-wave sodium laser guide stars with polarization modulation at Larmor frequency [10703-138]
10703 3S  Confirmation of laser-induced Raman scattering at Cerro Pachón [10703-139]
10703 3T  Switching between two laser guide star facilities: an overview of the optomechanical design for the new laser beam injector at the Gemini South Observatory [10703-141]

POSTER SESSION: AO FOR ELTs

10703 3V  NFIRAOS adaptive optics for the Thirty Meter Telescope [10703-144]
10703 3X  Opto-mechanical designs for the HARMONI adaptive optics systems [10703-146]
10703 3Y  Extending the pyramid WFS to LGSs: the INGOT WFS [10703-147]
10703 40  Line of sight mesospheric sodium profiles obtained from the LGS signal for optimal ELT LGS-AO [10703-150]
10703 41  ELT-HIRES the high resolution spectrograph for the ELT: implementing exoplanet atmosphere reflection detection with a SCAO module [10703-151]
10703 42  High Contrast Imaging for Python (HCIPy): an open-source adaptive optics and coronagraph simulator [10703-152]
10703 43  MAORY real-time computer preliminary design [10703-153]
10703 44  Wavefront reconstruction for ELT-sized telescopes with pyramid wavefront sensors [10703-154]
10703 45  Fitting error analysis and performance evaluation of M4 deformable mirror [10703-155]

10703 46  LO WFS of MAORY: performance and sky coverage assessment [10703-156]

10703 47  Real-time end-to-end AO simulations at ELT scale on multiple GPUs with the COMPASS platform [10703-157]

10703 48  The real time MCAO solar prototype for the EST [10703-158]

10703 49  Point spread function reconstruction simulations for laser guide star multi-conjugate adaptive optics on extremely large telescopes [10703-159]

10703 4A  Modeling of PSF corrected by adaptive optics systems [10703-160]

10703 4B  Design and performance of a scalable GPU-based AO RTC prototype [10703-161]

10703 4D  Status of the preliminary design of the NGS WFS subsystem of MAORY [10703-164]

10703 4F  Vibration environment of the LBTO/AO system [10703-166]

10703 4G  Next generation adaptive optics: a low-voltage ASIC driver for MEMS deformable mirrors [10703-167]

10703 4H  MAORY for ELT: preliminary mechanical design of the support structure [10703-168]

10703 4I  Numerical simulations of MAORY MCAO module for the ELT [10703-169]

10703 4J  MAORY requirements flow down and technical budgets [10703-265]

10703 4K  Estimation of polarization aberrations and its effect on the point spread function of the Thirty Meter Telescope [10703-266]

Part Three

POSTER SESSION: ADVANCES IN AO CONTROL

10703 4L  Scalable soft real-time supervisor for tomographic AO [10703-170]

10703 4M  Fourier wavefront reconstruction with a pyramid wavefront sensor [10703-171]

10703 4N  Optimization of contrast in adaptive optics for exoplanet imaging [10703-172]

10703 4O  Rolling shutter detector data flow strategies to push the limits of AO performance [10703-173]
10703 4P  Analysis of AO modeling for pseudo-synthetic interaction matrix at the LBT [10703-174]
10703 4R  The calibration procedure of the LINC-NIRVANA ground and high layer WFS [10703-176]
10703 4S  Geometric distortion calibration using a pinhole mask [10703-177]
10703 4T  High level adaptive optics supervision software for fast transition to optimal performance [10703-178]
10703 4U  An integrated identification and predictive control strategy for high wind velocity adaptive optics applications [10703-179]
10703 4V  Adaptive optics for high precision polarimetry: preliminary tests of DM polarization [10703-180]
10703 4W  EMCCD in-situ periodic characterization in Shack-Hartmann wavefront sensor for GTCAO [10703-182]

POSTER SESSION: EXTREME AO

10703 4Y  Optical and mechanical design of the extreme AO coronagraphic instrument MagAO-X [10703-184]
10703 4Z  Modeling coronagraphic extreme wavefront control systems for high contrast imaging in ground and space telescope missions [10703-185]
10703 50  Subaru Coronagraphic Extreme-AO (SCExAO) wavefront control: current status and ongoing developments [10703-187]
10703 51  Fast focal plane wavefront sensing on ground-based telescopes [10703-188]
10703 54  Nonlinear estimation with a pyramid wavefront sensor [10703-191]
10703 55  Optical field/pupil rotator with a novel compact K-mirror for MagAO-X [10703-192]
10703 56  Air, telescope, and instrument temperature effects on the Gemini Planet Imager’s image quality [10703-267]
10703 57  The segmented pupil experiment for exoplanet detection: Part 3. Advances and first light with segments cophasing [10703-268]
10703 58  Optimizing optics and opto-mechanical mounting to minimize static aberrations in high-contrast instruments [10703-269]
10703 59  SCExAO, an instrument with a dual purpose: perform cutting-edge science and develop new technologies [10703-270]
10703 5A  Characterization of deformable mirrors for the MagAO-X project [10703-272]
| 10703 5C | Stirling cycle cryocooler exported vibration analysis [10703-274] |
| 10703 5D | Effect of multiple deformable mirrors in broadband high-contrast coronagraphs [10703-275] |

**POSTER SESSION: WAVEFRONT SENSING**

| 10703 5F | Effects of the telescope spider on extreme adaptive optics systems with pyramid wavefront sensors [10703-198] |
| 10703 5G | Solar MCAO with a single sensor: simulating tomographic reconstruction with the plenoptic camera [10703-205] |
| 10703 5H | Demonstration of a photonic lantern low order wavefront sensor using an adaptive optics testbed [10703-202] |
| 10703 5I | The latency measurement of wavefront sensor camera and its impact on the performance of an adaptive optical system [10703-209] |
| 10703 5J | Low light level quadriwave lateral shearing interferometer for in-situ wavefront sensing [10703-210] |
| 10703 5L | On-sky verification of a solution to the MCAO partial illumination issue and wind-predictive wavefront control [10703-195] |
| 10703 5M | Application of phase diversity to estimate the non-common path aberrations in the Gemini planet imager: results from simulation and real data [10703-204] |
| 10703 5O | On-sky compensation of non-common path aberrations with the ZELDA wavefront sensor in VLT/SPHERE [10703-206] |
| 10703 5P | The DKIST low order wavefront sensor [10703-194] |
| 10703 5Q | A fast wavefront reconstructor for the nonlinear curvature wavefront sensor [10703-208] |
| 10703 5R | EMCCD for pyramid wavefront sensor: laboratory characterization [10703-207] |
| 10703 5S | A direct reconstruction technique to retrieve phase in a non-linear curvature wavefront sensor [10703-199] |
| 10703 5T | First on-sky results, performance, and future of the HiCIBaS-LOWFS [10703-196] |
| 10703 5U | Spatial filtering applied to the pyramid WFS: simulations and preliminary results [10703-203] |

**POSTER SESSION: PATHFINDERS FOR AO**

| 10703 5W | Wavefront sensing and adaptive optics for solar prominences [10703-211] |
CACAO: a generic low-cost adaptive optics system for small aperture telescopes

CHOUGH: current status and future plans

The adaptive optics lucky imager (AOLI): presentation, commissioning, and AIV innovations

PPPP: an on-sky experiment for zero-cone effect LGS alternative

Simulation of a cascaded adaptive optic system for high contrast imaging

Uplink correction demonstrator: test bench and experimental results

A flexible adaptive optics concept for general purpose high angular resolution science on the DAG 4m telescope

Design and development of IR camera

Developing new adaptive secondary electronics for the MAPS project

ALIOLI: Adaptive and Lucky Imaging Optics Lightweight Instrument

POSTER SESSION: CHARACTERIZATION, MEASUREMENT, AND MODELING OF THE DISTURBANCES FACED BY AO

Limits of turbulence and outer scale profiling with non-Kolmogorov statistics

Deconstructing turbulence and optimizing GLAO using imaka telemetry

Characterization of lemniscate atmospheric aberrations in Gemini Planet Imager data

Improvements to MASS turbulence profile estimation at Paranal

Evaluation of filtering techniques to increase the reliability of weather forecasts for ground-based telescopes

Determination of the residual and static aberrations of an adaptive-optics integral field spectrograph

CATS: an autonomous station for atmospheric turbulence characterization

Towards the forecast of atmospheric parameters and optical turbulence above an astronomical site on 24h time scale

Monitoring the low wind effect on the Starfire Optical Range 3.5-m telescope
The characterization of the Zernike modes at the focal plane for Extremely Large Telescope projects [10703-242]

Vibration model identification using the maximum likelihood method [10703-243]

DAG-TGI: turbulence generator instrument for DAG (Eastern Anatolia Observatory) [10703-246]

Turbulence monitoring at the Plateau de Calern with the GDIMM instrument [10703-247]

First seasonal study of solar seeing and wind speed vertical distribution at Baikal Astrophysical Observatory [10703-248]

Tropospheric seeing effects on site selection and the use of adaptive optics for solar telescopes [10703-251]

Demonstration of a speckle nulling algorithm and Kalman filter estimator with a fiber injection unit for observing exoplanets with high-dispersion coronagraphy [10703-252]

Cryo micro-deformable mirrors for next generation AO systems [10703-253]

Characterization of ALPAO deformable mirrors for the NAOMI VLTI Auxiliary Telescopes adaptive optics [10703-254]

Wavefront control for minimization of speckle coupling into a fiber injection unit based on the electric field conjugation algorithm [10703-255]

The crystal ball, the spider and other stories: a journey around the test tower of the M4 adaptive mirror [10703-256]

Multi-actuator adaptive lens in astronomy: in lab test results [10703-257]

Testing and characterization of deformable mirrors [10703-258]

GTCAO real time AO closed loop software implementation and initial computer performance analysis [10703-259]

A CVD SiC deformable mirror with monolithic waterline for adaptive optics [10703-260]

Calibration and test procedures for the NFIRAOS deformable mirror prototypes [10703-261]

A possible concept for the day-time calibration and co-phasing of the adaptive M4 mirror at the E-ELT telescope [10703-262]

Design of an active metal mirror for large space telescopes [10703-263]
Non-contact displacement measure method based on eddy current sensors in the large aperture adaptive mirror system [10703-264]
The deployment of the NAOMI adaptive optics system on the VLTI is a perfect illustration of the benefit of high and stable Strehl ratio for ground-based optical interferometry in general and fringe tracking in particular. Beyond the transmission improvement, the VLTI can now operate with the ATs in degraded seeing conditions, which increases the amount of scientifically exploitable time on the interferometer: a previously unusable AT-level seeing threshold of 1.4" would correspond to a +15% increase in usable time, based on Paranal seeing statistics. 2018, in Optical and Infrared Interferometry and Imaging VI, Proc. SPIE, 10701, 1070103 [Google Scholar]. All Tables.