



The 8th International Workshop on Adaptive Optics for Industry and Medicine

5th-9th June 2011, Murcia, Spain

The aim of the workshop is to discuss the use of novel adaptive optical elements, concepts and systems as they apply to high power lasers, medical devices, imaging, industrial lasers and microscopy. The **International Workshop on Adaptive Optics for Industry and Medicine (AOIM)** provides scientists and engineers from both industry and academia with opportunities to explore recent developments, current practices and future trends in adaptive optics and related fields. A key feature of this single-session meeting is the relaxed atmosphere with all participants encouraged to present and discuss their work either as a talk or a poster. The meeting in Murcia will continue the tradition of previous meetings, the last ones held in Shatura, Russia (2009) and Galway, Ireland (2007).

Venue: "Centro Social Universitario", Campus de Espinardo, Murcia

Program

SOCIAL EVENT SUMMARY (Registered accompanying persons welcome)

Sunday, June 5th

20:30 Reception and registration (Hotel Silken 7 Coronas, downtown Murcia)

Monday, June 6th

20:00 Reception (during the poster session)

Tuesday, June 7th

17:00 Excursion and conference dinner (visit to Roman Theatre in Cartagena & Mar Menor boat trip)

Wednesday, June 8th

15:15 Group photo.

20:00 Murcia City guided tour and Farewell Reception

MONDAY, JUNE 6th

9:15-9:30 *Welcome address by the Rector of the University of Murcia and Pablo Artal*

9:30-11:30 Session I. Adaptive Optics for ultrafast and ultrahigh power lasers

Moderator: Alexis Kudryashov (Moscow, Russia)

9:30-10:00 **Luis Roso** (Salamanca, Spain)

Invited talk (30') Frontiers in ultra-high-power lasers. What adaptive optics can offer?

10:00-10:15 **Stefano Bonora** (Padova, Italy)

Adaptive Diffraction grating for a compensated high order harmonics monochromator

10:15-10:30 **Rocio Borrego-Varillas** (Salamanca, Spain)

A method to measure the wavefront of short pulsed lasers through second-harmonic generation

10:30-10:45 **Ivan Doudet** (Palaiseau, France)

3D focal spot control for high power lasers using adaptive optics

10:45-11:15 **Sven Verpoort** (Munster, Germany)

Invited talk (30') Deformable mirrors for high power lasers

11:15-11:30 Discussion

11:30-12:00 Coffee Break

12:00-13:45 Session II. Wavefront corrector devices I. Spatial light modulators

Moderator: Ulrich Wittrock (Munster, Germany)

12:00-12:30 **Andrew Forbes** (Pretoria, South Africa)

Invited talk (30') Controlling light with spatial light modulators

12:30-13:00 **Pedro Prieto** (Murcia, Spain)

Invited talk (30') Wavefront shaping with LCOS devices

13:00-13:15 **Vladimir Venediktov** (St. Petersburg, Russia)

Dynamic Holography in Liquid Crystalline Matrix in Adaptive Optics

13:15-13:30 **Josua Fernandez** (Murcia, Spain)

LCOS performance in white light

13:30-13:45 Discussion

13:45-15:30 Lunch

15:30-17:30 Session III. Biomedical imaging and AO

Moderator: Juan Bueno (Murcia, Spain)

15:30-16:00 **Hans Gerritsen** (Utrecht, Netherlands)

Invited talk (30') Adaptive Optics and biomedical imaging

16:00-16:15 **Zoran Popovic** (Mölnådal, Sweden)

Dual-conjugate adaptive optics imaging of foveal capillary network in human eyes

16:15-16:30 **Brian Vohnsen** (Dublin, Ireland)

Promises and limitations of wavefront corrections with annular apertures using Scanning Laser Ophthalmoscopy

16:30-16:45 **Robert Zawadzki** (Sacramento, USA)

Performance of an AO - sub system for imaging human retina in vivo: An update on the UC Davis AO-OCT / AO-SLO instrument

16:45-17:15 **Ashkan Arianpour** (San Diego, USA)

Invited talk (30') Medical Imaging Systems Using Bio-Inspired Fluidic Lenses

17:15-17:30 Discussion

17:30-18:00 Coffee Break

18:00-21:00 Poster session and reception

POSTER LIST (Monday, June 6th, 18:00-21:00)

- P1. **Reza Atashkhoei** (Terrassa, Spain)
Adaptive feedback control in self-mixing interferometry using active optical elements
- P2. **Leonardo Blanco** (Chatillon, France)
Marginal blind deconvolution of adaptive-optics corrected images: first applications to experimental retinal images
- P3. **Stefano Bonora** (Padova, Italy)
Distributed actuator deformable mirror application in visual and ultrafast optics
- P4. **Liesl Burger** (Pretoria, South Africa)
Intra-cavity beam control: a comparison of spatial light modulators and adaptive mirrors
- P5. **Ivan Capraro** (Padova, Italy)
PushPull deformable mirror: performances in closed loop operation and comparison with membrane mirror
- P6. **Sara Castillo** (Dublin, Ireland)
Visual impact of interference gratings created with a liquid-crystal spatial light modulator
- P7. **Ivan Doudet** (Palaiseau, France)
Thick samples image improvement from image aberration function correction
- P8. **Armando Gomez-Vieyra** (Mexico DF, Mexico)
Wavefront aberrations in off-axis spherical mirror systems
- P9. **Pablo de Gracia** (Madrid, Spain)
Benefit of Adaptive Optics correction of Ocular High Order Aberrations on Contrast Sensitivity
- P10. **Ignacio Iglesias** (Murcia, Spain)
Phase Detection for Quantitative Optical Microscopy
- P11. **Steven Knox** (Teddington, UK)
Measurement of the laser beam M2 parameter using a novel device incorporating a liquid lens
- P12. **Bo Liang** (Chengdu, China)
Effects of ocular aberrations on contrast detection in noise
- P13. **Mikhail Loktev** (Rijswijk, Netherlands)
On the application of speckle imaging using projection methods
- P14. **Marco Lombardo** (Rome, Italy)
Regional differences in parafoveal cone density distribution investigated with a compact adaptive optics ophthalmoscope
- P15. **Kiyoko Nakashima** (Paris, France)
Adaptive Optics enhances imaging in Age-related Macular Degeneration
- P16. **Erika Odlund** (Orsay, France)
High speed dynamics characterization, system identification, and control to optimize the dynamic behavior of an electromagnetic deformable mirror for ophthalmic applications
- P17. **Michael Shaw** (Teddington, UK)
Adaptive optics in high numerical aperture microscopy
- P18. **Marwan Suheimat** (Galway, Ireland)
High resolution flood illumination retinal imaging system with adaptive optics
- P19. **Gleb Vdovin** (Rijswijk, Netherlands)
Deformable mirrors for low-order correction

TUESDAY, JUNE 7th

9:15-10:30 **Session IV. Wavefront corrector devices II. Deformable mirrors**

Moderator: **Sergio Restaino** (Albuquerque, USA)

- 9:15-9:30 **Stefano Bonora** (Padova, Italy)
Photocontrolled deformable mirror
- 9:30-9:45 **Claudia Bruchmann** (Jena, Germany)
Optical characterization of a screen printed actuator deformable mirror
- 9:45-10:00 **Ivo Buske** (Stuttgart, Germany)
Compensating aberrations of a 6 inch concave membrane mirror
- 10:00-10:15 **Eric ten Have** (Delft, Netherlands)
Closed-Loop AO Performance of a Liquid Mirror
- 10:15-10:30 Discussion

10:30-11:00 *Coffee Break*

11:00-14:00 **Session V. Wavefront sensors, control systems and strategies**

Moderator: **Gordon Love** (Durham, UK)

- 11:00-11:30 **Sergio Restaino** (Albuquerque, USA)
Invited talk 1 (30') Test-bed systems for AO
- 11:30-11:45 **Alexis Kudryashov** (Shatura, Russia)
Shack-Hartmann wavefront sensor and its problems
- 11:45-12:00 **Kaccie Li** (Groningen, Netherlands)
Control system design and implementation for compensating the eye's wave aberrations
- 12:00-12:15 **Irina Sergievskaya** (Terrassa, Spain)
Fast correction in adaptive optical system using block control
- 12:15-12:30 **Otávio G. de Oliveira** (Minas Gerais, Brazil)
Minimization of the microlens density in a Hartmann-Shack sensor
- 12:30-12:45 **Diego Rativa** (Dublin, Ireland)
Wavefront sensing using a liquid-filled photonic crystal fiber
- 12:45-13:00 **Tim van Werkhoven** (Utrecht, Netherlands)
Coherence-gated phase-shifting wavefront measurements
- 13:00-13:15 **Vadim Samarkin** (Shatura, Russia)
Wavefront correction with deformable mirror – how to put actuators
- 13:15-13:45 **Vladimir Lukin** (Tomsk, Russia)
Invited talk 2 (30') Dynamics of adaptive optics systems
- 13:45-14:00 Discussion

14:00-15:30 *Lunch*

15:30-17:00 **Session VI. Industry breakthroughs**

Moderator: **Josua Fernandez** (Murcia, Spain)

- 15:30-15:45 **Tommaso Occhipinti** (*Adaptica*, Padova, Italy)
Adaptica: products outline and technology developments
- 15:45-16:00 **Guillermo Perez** (*Voptica*, Murcia, Spain)
Adaptive optics vision analyzer
- 16:00-16:15 **John Taranto** (*Thorlabs*, Newton, USA)
AO Commercialization: From building block AO components to turnkey AO enhanced microscope instrumentation
- 16:15-16:30 **Frederic Rooms** (*ALPAO*, Biviers, France)
Recent developments of adaptive optics at ALPAO
- 16:30-16:45 **Paul Bierden** (*Boston Micromachines*, Cambridge, USA)
The shaping of light: MEMS deformable mirrors for adaptive optics applications
- 16:45-17:00 Discussion

17:00-24:00 *Excursion (visit to Roman Theatre in Cartagena & Mar Menor boat trip) and conference dinner*

WEDNESDAY, JUNE 8th

9:15-11:15 **Session VII. Adaptive Optics and microscopy**

Moderator: **Ignacio Iglesias** (Murcia, Spain)

9:15-9:45 **Martin Booth** (Oxford, UK)

Invited talk (30') Adaptive optics for microscopy and photonic engineering

9:45-10:00 **Cyril Bourgenot** (Durham, UK)

Wide field adaptive optics microscopy based on image sharpness optimization in a sensorless and sensed configuration

10:00-10:15 **Jordi Andilla** (Orsay, France)

Effective and robust implementation strategies for adaptive optics in sectioning microscopy

10:15-10:30 **Juan Bueno** (Murcia, Spain)

Extended depth-of-focus with induced spherical aberration improves 3D multiphoton microscopy

10:30-11:00 **Christopher Saunter** (Durham, UK)

Invited talk (30') Adaptive Optics in microscopy

11:00-11:15 Discussion

11:15-11:45 **Coffee Break**

11:45-14:00 **Session VIII. Adaptive Optics in Vision**

Moderator: **Pedro Prieto** (Murcia, Spain)

11:45-12:15 **Melanie Campbell** (Waterloo, Canada)

Invited talk (30') Adaptive Optics guided therapies

12:15-12:30 **Karen Hampson** (Bradford, UK)

Binocular adaptive optics system with dynamic convergence control

12:30-12:45 **Elie de Lestrang** (Galway, Ireland)

Implication of attention on the appearance of an aberrated target in the isoplanatic patch of central vision

12:45-13:00 **Yudong Zhang** (Chengdu, China)

Visual improvement of perceptual learning based on adaptive optics system for human eyes

13:00-13:15 **Christina Schwarz** (Murcia, Spain)

Binocular Adaptive Optics Visual Simulator Featuring Full Control over the Complex Pupil Functions

13:15-13:30 **Maria Vinas** (Madrid, Spain)

Adaptive Optics as a tool to study changes in the perceived neutral point after correction of astigmatism

13:30-13:45 **Laura Young** (Durham, UK)

Reading impairment in the presence of simulated defocus, coma or secondary astigmatism

13:45-14:00 Discussion

14:00-15:15 **Lunch**

15:15-16:30 **Group photo and guided visit to the LOUM facilities.**

16:30-18:00 **Session IX. Miscellaneous, research collaborations and future meeting**

Moderator: **Chris Dainty** (Galway, Ireland)

16:30-16:45 **Michel Verhaejen** (Delft, Netherlands)

Invited talk (15') Netherlands smart optics initiative

16:45-17:00 **Cosmas Mafusire** (Pretoria, South Africa)

Propagating aberrated laser beams

17:00-17:15 **Miguel Cagigas** (Santander, Spain)

Adaptive ground-based coronagraphy

17:15-17:30 **Guoqiang Li** (St. Louis, USA)

Adaptive lens for confocal imaging

17:30-17:45 **Andrew Forbes** (Pretoria, South Africa)

Next AOIM Workshop presentation

17:45-18:00 *Concluding remarks by* **Pablo Artal** and the Program Committee

20:00 **Murcia City guided tour and Farewell Reception**