

**COAT
2023**

**Communications and
Observations through
Atmospheric
Turbulence**

27th - 31st March

Durham University, UK

Workshop Schedule

Time	Wednesday	Thursday	Friday
09:00	Registration & Coffee	Otarola	Krimmer
09:10			Bos
09:20		Castro-Almazán	Boddeda
09:30			Lai
09:40			
09:50		Quatresooz	
10:00			
10:10	Fiorino		
10:20			
10:30	Welcome	Coffee	Coffee
10:40	Mata Calvo		
10:50			
11:00			
11:10	Poliak	Tokovinin	Hartley
11:20			
11:30	Le Kerneç	Griffiths	Gooding
11:40			
11:50		Birch	Bharmal
12:00	Bonnefois		
12:10		Osborn	Zou
12:20			
12:30	Lunch	Lunch	Lunch
12:40			
12:50			
13:00			
13:10			
13:20			
13:30	Poster session	Poster session	Poster session
13:40	Martinez	Ziad	Ragazzoni
13:50			
14:00	Hristovski	García-Lorenzo	Vera
14:10			
14:20	Conan	Pierzyna	Kongkaew
14:30			
14:40	Kudielka	Dungee	Vene
14:50			
15:00	Coffee	Coffee	Coffee
15:10			
15:20	Horst	Laidlaw	Robles
15:30			
15:40	Lognoné	Westerby-Griffin	McDonald
15:50			
16:00	Farley	Fuentes	Kelemu
16:10			
16:20	Billaud	End	Abadi
16:30			
16:40			
16:50			
17:00			
17:10			
17:20			
17:30	End		End

Session 1 (Wednesday 10:30)

Welcome

Ramon Mata Calvo (invited)

ESA

Satellite networks: HydRON

Juraj Poliak (invited)

DLR

Optical Technologies and systems for Satellite Links

Arnaud Le Kernec

Thales Alenia Space

The H2020 VERTIGO project: a major milestone towards optical feeder links

Aurélie Montmerle-Bonnefois

ONERA

Status of Onera's GEO-FEEder LINKs optical Ground Station, FEELINGS

Session 2 (Wednesday 14:00)

Noelia Martinez (invited)

Australian National University

Past, Present and Future of Uplink Correction

Ilija Hristovski

DLR

Pre-distortion adaptive optics: preliminary results

Jean-Marc Conan

ONERA

Turbulence mitigation strategies for Ground-GEO uplinks: adaptive optics pre-compensation on single aperture versus multi-aperture diversity

Klaus Kudielka

GA Synopta

Successful first GEO feeder link demonstration between a ground station and a GEO satellite applying adaptive optics pre-compensation

Session 3 (Wednesday 16:00)

Yannik Horst (invited)

ETH Zurich, Institute of Electromagnetic Fields (IEF)

Tbit/s Single Channel Free-Space Optical Transmission Over 53 km - Assessing the Feasibility of Optical Satellite Feeder Links

Perrine Lognoné

ONERA

GEO Feeder uplinks: tip-tilt-focus estimation at PAA aided by on-axis phase and amplitude sensing and LGS off-axis high-order measurements.

Ollie Farley

Durham University

Optimising European GEO Feeder Link networks with FAST

Antonin Billaud

Cailabs

Multi-Plane-Light-Conversion-based turbulence mitigation for free space optical communication: latest results presenting 100 Gbps communication and 45-modes turbulence mitigation

Session 4 (Thursday 09:00)**Angel Otarola (invited)**

ESO

Astronomical Site Monitoring plan for the joint Paranal-Armazones Observatories: instruments, measurements, and forecasting of key atmospheric parameters

Julio Castro-Almazán

Instituto de Astrofísica de Canarias / Dept. de Astrofísica (Universidad de La Laguna)

Validation of turbulence profile forecasting with WRF at the Canary Islands astronomical observatories.

Florian Quatresooz

UCLouvain

Daytime forecast of optical turbulence for optical communications

Steven Fiorino

Air Force Institute of Technology (AFIT)

Comparison of SODAR turbulence measurements using Sensible Heat values from Energy Balance and Aerodynamic methods

Session 5 (Thursday 11:00)**Andrei Tokovinin (invited)**

Cerro Tololo Inter-American Observatory

Portable turbulence profilers: from MASS to RINGSS

Ryan Griffiths

Durham University

Demonstrating 24-hour continuous vertical monitoring of the atmospheric optical turbulence using the 24hSHIMM.

Marcus Birch

Australian National University

A small, low-cost, turbulence profiling instrument for free-space optical communication

James Osborn

Durham University

Line of Sight Dome Turbulence Monitor

Session 6 (Thursday 14:00)**Aziz Ziad (invited)**

Cote d'Azur University/Observatory

Metrology of atmospheric turbulence for Astronomical Observations and Optical Communications.

Begoña García-Lorenzo

Instituto de Astrofísica de Canarias / Dept. de Astrofísica (Universidad de La Laguna)

Taking advantage of seeing-limited integral field spectroscopy to estimate the optical turbulence outer scale.

Maximilian Pierzyna

Delft University of Technology

Parameterizing optical turbulence (C_n^2) in the atmospheric surface layer with gradient boosting

Ryan Dungee

University of Toronto

One turbulent night: a thorough look at temporal tomography

Session 7 (Thursday 16:00)

Douglas Laidlaw

DLR

Atmospheric profiling using the downlink from a spacecraft

Lily Westerby-Griffin

Durham University

Measuring atmospheric optical turbulence in London's financial district

Marco Antonio Sepúlveda Fuentes

Instituto de Física, Pontificia Universidad Católica de Valparaíso

Inertial sub-range assessment for temperature and velocity turbulence fluctuations: comparison between physical and fractal analysis based techniques.

Session 8 (Friday 09:00)

Jonas Krimmer

Karlsruhe Institute of Technology

Experimental Validation of Statistical Model of Mode-Diverse Reception in Coherent Free-Space Optical Communications

Jeremy P. Bos

Michigan Technological University

Effect of model parameters on the accuracy of wave optics simulations.

Rajiv Boddeda

Nokia Bell Labs

Achievable Capacity of Ground to Geostationary Satellite Optical Links with Atmospheric Turbulence

Olivier Lai

Laboratoire Lagrange, Observatoire de la Côte d'Azur, Université Côte d'Azur, CNRS.

Altering reality to fit our turbulence simulations. A slow descent into madness...?

Session 9 (Friday 11:00)

Kathryn Hartley (invited)

Durham University

First On-Sky Demonstration of a Scintillation Correction technique using Tomographic Wavefront Sensing

Dave Gooding

Lumi Space

Novel commercial applications of AO corrected laser systems: a technology roadmap.

Nazim Ali Bharmal

Durham University

The Laser Guide Star, or how to more easily implement tomographic wavefront sensing using artificial beacon

Runnan Zou

University of Ottawa

Wavefront Sensorless Adaptive Optics for Free-space Satellite-to-Ground Communication using Reinforcement Learning

Session 10 (Friday 14:00)

Roberto Ragazzoni (invited)

INAF - Astronomical Observatory & University of Padova

Dealing with turbulence in astronomy and elsewhere...

Esteban Vera

Pontificia Universidad Catolica de Valparaiso

Improving wavefront sensors through deep optics: a case example based on the pyramid wavefront sensor.

Puttiwat Kongkaew

Durham University

Intensity-weighted slopes as a faster alternative method to optical propagation modelling in Shack-Hartmann Wavefront Sensors

Timothée Vene

ONERA

Revisiting wavefront sensor design for space-ground optical telecommunications in strong scintillation conditions.

Session 11 (Friday 16:00)

Pablo Robles

ONERA

Laboratory Validation of an Adaptive Optics Predictive Controller for LEO Satellite Tracking Applications

Douglas McDonald

Fraunhofer IOSB, Germany

Demonstration of Coherent Free-Space Optical Communications over an 800 m Link Using a Single Receiving Photodetector

Helawae Friew Kelemu

DLR

Demonstration of advanced adaptive optics control for optical satellite links

Mojtaba Mansour Abadi

MPEE, Northumbria University

Artificial Atmospheric Chamber Design to Mimic Turbulence Effect on Optical Wireless Communication Links

Posters

Andrea Montserrat Carrillo Flores

DLR

Absolute Power Vectors for the Optical LEO Uplink Channel

Pascal Jaufmann

University of Stuttgart

MagCcado: Development of magnification control technology for the ELT / MICADO camera

Nuno Miguel Cardoso Morujão

Faculty of Engineering - University of Porto

Seeing estimation from NAOMI adaptive optics telemetry data

Nicolas Galland

Université Paris-Saclay, Institut d'Optique Graduate School, CNRS

Auto-tuned AO control for all: design and simulation of an unsupervised LQG regulator

Marin Fouchier

Miratlas

Passive monitoring of air turbulence using solar scintillation for free-space optical communications

Haider Al-Juboori

South East Technological University, Faculty of Engineering, Dept of Electronics Eng.

Laser Beam Propagation Features via Atmospheric Turbulence for Optical Satellite Feeder Links: Testbed Conceptual Design

Jaya Chand

Durham University

Turbulence monitoring using a robust non-tracking Differential Image Motion Monitor (DIMM)

Gilles Orban de Xivry

STAR Institute, Université de Liège

SALTO, the Belgian laser-guided adaptive optics system demonstrator: project overview and first on-sky results

Wasiu Popoola

The University of Edinburgh

Optical wireless communication through a turbulence channel

Raphael Bellossi

Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung IOSB (Germany)

Impact of atmospheric turbulence on the quality of data transmission in a coherent free-space optical communications link

Nurdan Baci

TUBITAK

Estimation of Refractive Index Structure Parameter from Turbulent Heat Fluxes

Andrew Reeves

DLR

Adaptive Optics corrected free space optical links with AlphaSat from the 80cm DLR Optical Ground Station

Marie-Bertille Mosnier

ISAE-Supaero

EPLO: free-space optics emulator for satellite ground link

Sneha Ramakrishnan

Indian Institute of Science Education and Research, Thiruvananthapuram

Sonic anemometer-thermometer observations of atmospheric refractive index structure parameter at a semi-arid region

Ry Render

University of York

Emulation and implementation of phase-encoded quantum key distribution over a horizontal free-space channel

Vincent Billault

Thales Research & Technology

On the usage of PIC for the coherent combining of multiple telescopes in FSO communications

Pablo Robles

ONERA

PICOLO: turbulence emulator adaptive optics assisted satellite-to-ground optical communications

David Jenkins

ESO

CaNaPy AO RTC: Updating DARC for Sat Com AO

Vicente Westerhout Aliste

Pontificia Universidad Catolica de Valparaiso

Analysis of the atmospheric turbulence effect in event-based cameras for space situational awareness

Petr Janout

European Southern Observatory

CaNaPy facility: opto-mechanical design and requirements for optimal visible systems
LGS-AO