

# COST Action CA19111

## Fourth Newsletter

# European **NEtWork** on **F**uture Generation **O**ptical Wireless **CommU**nication Technologies**S**



Funded by the Horizon 2020 Framework Programme  
of the European Union

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### Acknowledgement

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This newsletter is based upon work from COST Action NEWFOCUS, supported by COST  
(European Cooperation in Science and Technology).



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# NEWSLETTER #4

Dear Reader,

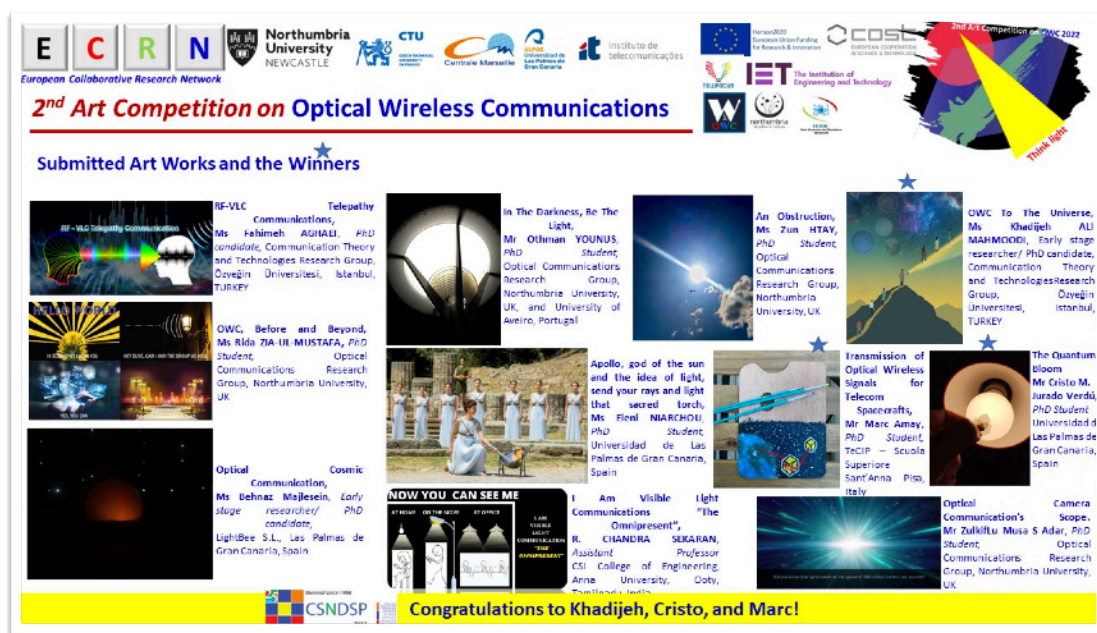
This is the fourth newsletter of our COST Action NEWFOCUS project, related to optical wireless communications (OWC) as one of the key enabling technologies for next generation Beyond-5G (B5G) networks.

NEWFOCUS project is focused on investigating technological solutions with the potential to impact the design of future wireless networks. It envisions OWC as an efficient technology that can satisfy the demanding requirements of backhaul and access network levels in 5G networks. This also includes the use of hybrid Radio Frequency (RF) solutions with OWC links, as well as the use of wired/fiber-based technologies.

The First White Paper in the framework of NEWFOCUS COST Action was released, and is available online at <https://www.newfocus-cost.eu/wp-content/uploads/2022/07/white-paper-2021-contribut-june-2022-final-v6.pdf> It deals mostly with the use of optical wireless communication as enabling technology in a range of areas outlined in Horizon Europe's Pillar II, including:

- ♦ Health,
- ♦ Manufacturing,
- ♦ Intelligent Transportation Systems,
- ♦ Unmanned Aerial Vehicles,
- ♦ Network and Protocol





Submitted Artworks and the winners of the 2nd Art Competition on OWC.

## NEWFOCUS 2nd Art Competition

the Second Art Competition has been concluded with the aim to encourage researchers working in the field of OWC to participate in this artistic challenge by submitting their artworks. Photos, sketches, paintings, and short films have been accepted, with the goal to popularise OWC main topics to the general public.

11 artworks have been submitted, the 3 nominated ones as winners are:

- ✦ “OWC to the universe”, Ms Khadijeh Ali Mahmoodi, Early Stage Researcher/PhD candidate, Communication theory and Technologies Research Group, Özyeğin Üniversitesi, Istanbul, Turkey
- ✦ “The Quantum Bloom”, Mr Cristo M. Jurado Verdù, PhD student, Universidad de Las Palmas de Gran Canaria, Spain
- ✦ “Transmission of Optical Wireless Signals for Telecom Spacecrafts”, Mr Marc Amay, PhD student, TeCIP – Scuola Superiore Sant’Anna Pisa, Italy

## NEWFOCUS 5th WG meeting

On 26th and 27th May 2022, the COST Action NEWFOCUS attended its fifth Working Group Meeting in Rome (Italy). It was hosted by Dr. Anna Maria Vegni at the Department of Industrial, Electronic and Mechanical Engineering, Roma Tre University. Considering the special circumstances due to COVID-19, this event has run in a hybrid format (i.e., both virtual and live).

Among the main activities, NEWFOCUS participants had a fruitful **brainstorming** about selected hot topics, such as the role of Optical Wireless Technology as a game changer in next generation

wireless networks. The main features of Optical Wireless have been stressed to identify use cases and applications where Optical Wireless exhibit notable advantages compared to RF or even facilitate the use of specific RF bands. The **gallery walk** was also supportive to identify selected research activities for joint working groups.



Brainstorming activity at the NEWFOCUS 5th WG meeting.



In-person attendees of the NEWFOCUS 5th WG meeting.



## NEWFOCUS 5th MC and 6th WG meeting

The fifth NEWFOCUS Management Committee was hosted by INESC-TEC in Porto (Portugal), in conjunction with the sixth Working Group Meeting on 18th and 20th July 2022. Among the main talks, we remind the following two invited talks:

- ✦ Prof Latif Ladid, University of Luxembourg “IPv6-based 5G/6G, Cloud Computing, OWC and Blockchain”
- ✦ Prof Steve Hranilovic, McMsater University, Canada “Recent Results from FOCAL Research Lab”



NEWFOCUS 6th WG meeting in Porto (Portugal).

Discussion on recent updates on WGs has been carried out, such as upcoming tasks, deliverables, and the deadlines; statistics on input documents & publications; dissemination activities:

- ✦ Update on WG1 activities: WG1 Vice Chair, Dr Pranciskus Vitta
- ✦ Update on WG2 activities: WG2 Chair, Prof Nobby Stevens
- ✦ Update on WG3 activities: WG3 Chair, Prof Stanislav Zvanovec
- ✦ Update on WG4 activities: WG4 Vice Chair, Dr Milica Petkovic

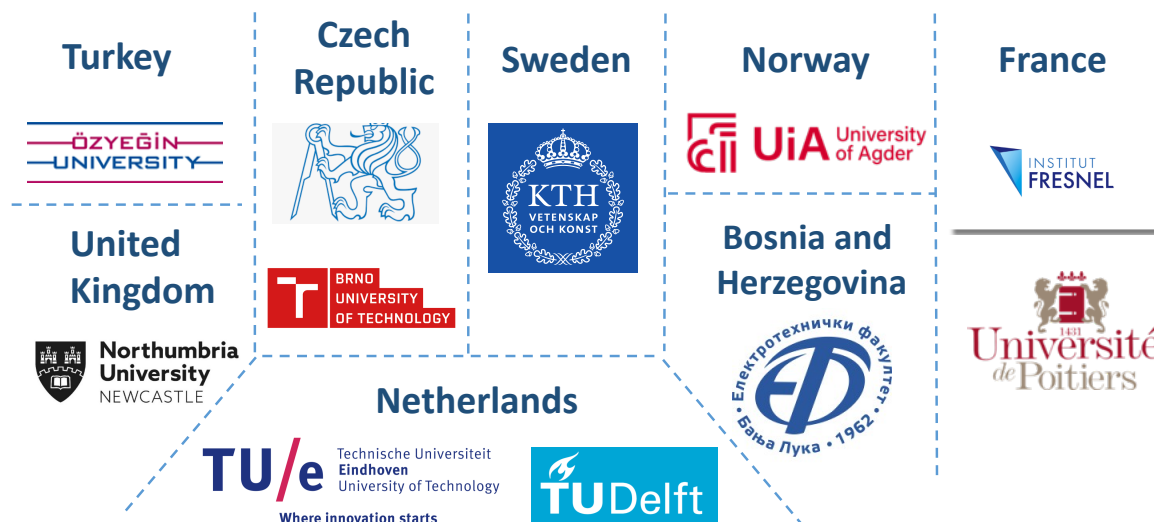


Group picture of the meeting

# NEWFOCUS Centers of Excellence

Several Centers of Excellence (CEX) have been identified. In the following, a short description of the main CEX in OWC in the framework of NEWFOCUS Cost Action is presented.

## Universities hosting CEX



### Özyegin University (Turkey)

**Activity:** Short and long range OWC. **Group leader:** Prof. Murat Uysal. **Web:** [faculty.ozyegin.edu.tr/muratuysal/](http://faculty.ozyegin.edu.tr/muratuysal/) **Key facilities:**

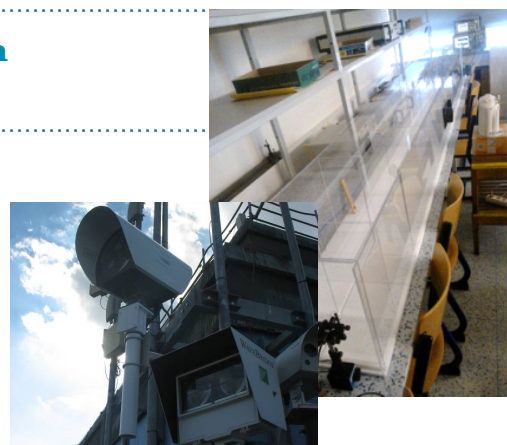
- Atmospheric chamber
- XYZ Table (Pointing error)
- Goniophotometer (LED illumination pattern)
- Underwater tank of 8 m long
- USRP and PXIs2 (Signal generation, waveform design)



### Czech Technical University in Prague (Czech Republic)

**Activity:** •FSO, VLC, Radio over optics, Optical fiber systems and sensors. **Group leader:** Prof. Stanislav Zvanovec. **Web:** [optics.elmag.org](http://optics.elmag.org) **Key facilities:**

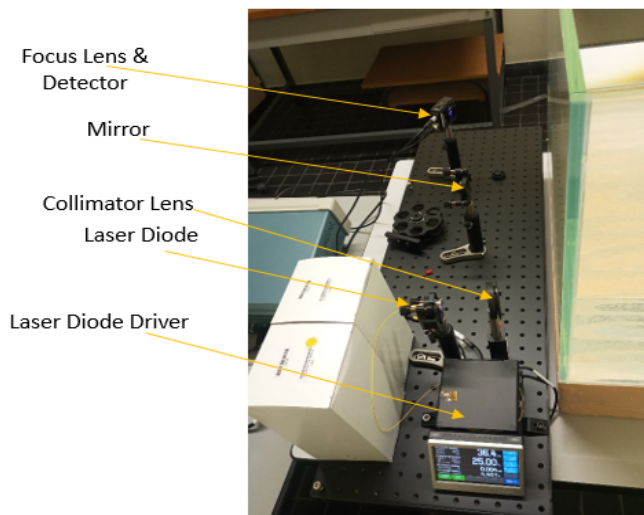
- 3 outdoor FSO links and 2 weather stations on roofs
- 6m turbulence chamber
- Fiber coupled 50-100m links
- Electrical and optical oscilloscopes
- Signal generators
- Cameras, LEDs, Optical Sources, Amplifiers, PD
- Optical modulators, Spectral/Vector Analyzers, Optical collimators, Variable attenuator



## SIX Research Centre/Dept. of Radio Electronics/OptaBro group (Czech Republic)

**Activity:** Communication, information and sensor technology. **Web:** [www.six.feec.vutbr.cz](http://www.six.feec.vutbr.cz)  
[www.urel.feec.vutbr.cz/optabro/](http://www.urel.feec.vutbr.cz/optabro/) **Group leaders:** Dr. Lucie Hudcová, Dr. Peter Barčík. **Key Facilities:**

- Atmospheric chamber
- Tunable Wavelength Laser
- Signal Quality Analyzer
- Laser Beamprofiler
- High Resolution Fiber Optic Spectrometer
- IR Fourier Spectrometer
- EDFA Fiber Amplifier
- Recorder Logoscreen



## Fresnel Institute (France)

**Activity:** VLC, FSO, Underwater communication. **Web:** [fresnel.fr](http://fresnel.fr) **Group leader:** Dr. Ali Khalighi **Key facilities:**

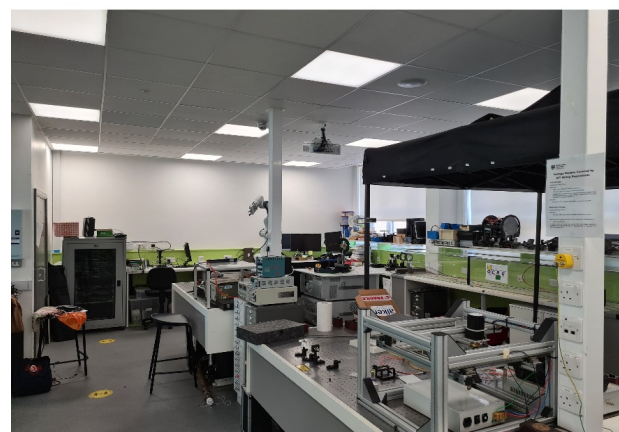
- Water tank
- Electrical and digital oscilloscopes
- Signal generators
- BiasT
- LEDs
- Laser diode, Laser diode controller
- Photodetectors,
- Broadband dielectric mirror, DC generator

## Northumbria University (UK)

**Activity:** FSO, VLC, RF, OCC. **Web:** [Optical\\_research\\_group](http://Optical_research_group)

**Group leader:** Prof. Z. Ghassemlooy. **Key facilities:**

- Indoor atmospheric chamber
- Fog/smoke and turbulence generators
- Traffic light
- High spec test and measurement up to 30 Gbps
- Precision Thermoelectric Temperature Controllers
- Cameras, Photodetector, Optical receiver, Optical power meter
- 3D printers, Circuit simulators, FPGA Boards
- OLEDs, Optics, Optical attenuators





## University of Agder (Norway)

**Activity:** Analogue and digital applications. **Group leader:** Prof. Frank Young Li. **Key facilities:** Analogue and digital electronics.

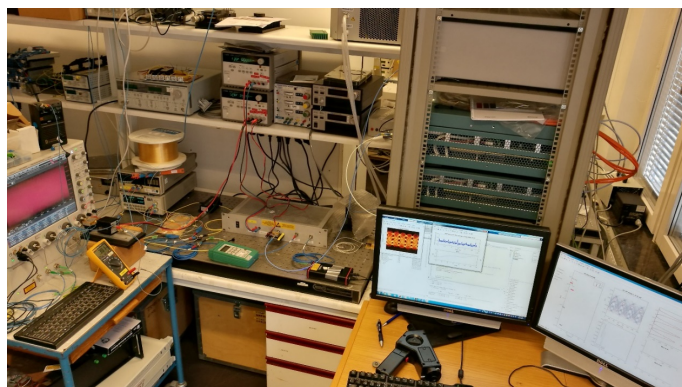


## Xlim Institut de Recherche (France)

**Activity:** OWC; Channel modeling; Channel coding; Wireless Body area networks; Software defined radio; Energy harvesting and OWC Application domains. The SYCOMOR team has developed different testbed to illustrate the main activities and compare with theoretical and simulated environment results for both IR and VLC links. **Web:** [xlim.fr](http://xlim.fr) **Group leaders:** Pr. Anne Julien-Vergonjanne, Dr. Pierre Combeau. **Key facilities:**



- RAPSOR software – Channel modeling by simulation for IR and VLC
- SDR optical testbed – Bidirectional SDR based IR links LOS and NLOS
- IR wearable testbed - Optical WBAN testbed: Off-body uplink
- VLC testbed



## KTH Royal Institute of Technology (Sweden)

**Activity:** Fiber-Wireless (Fi&Wi) in THz and mid-IR ranges; High-speed short-reach communications and devices; Coherent optical communications; Digital and photonic-assisted signal processing techniques; Quantum communications for secure Datacenter interconnects; Resource

efficiency and TCO analysis for fiber-wireless networks. **Web:** [aphys.kth.se](http://aphys.kth.se) **Group leader:** Dr. Xiaodan Pang. **Key facilities:**

- RF synthesizer
- BIT-pattern generator and error detector, 2 synchronized units of arbitrary waveform generator (AWG), Real time oscilloscope
- Mid-infrared quantum cascade lasers at 4- $\mu\text{m}$  and 9- $\mu\text{m}$
- Mid-infrared detector, Probe station, Simulation Software - MATLAB

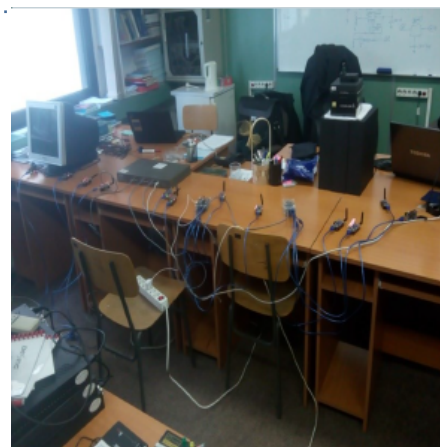


## University of Banja Luka (Bosnia Herzegovina)

**Activity:** Wireless sensor networks and Internet of Things protocols and applications, Mobile wireless communication systems of the next generation, Positioning in wireless telecommunication networks, Conventional wired and wireless telecommunications, Antennas, radio-communications and modern RF/Microwave engineering, Nano-scale and molecular communications. **Web:** [etf.unibl.org](http://etf.unibl.org); [communications.etfbl.net](http://communications.etfbl.net)

**Group Leader:** Prof Gordana Gardašević. **Key facilities:**

- IoT testbed is based on industrial OpenMote WSN hardware devices
- OpenMote - open-hardware platforms that is particularly adapted to Industrial Internet of Things (IIoT) applications
- Heterogeneous IoT testbeds includes:
- IEEE 802.15.4 sensor nodes, LoRa nodes, NB-IoT nodes, Raspberry Pi and Arduino kits



## Aalto University (Finland)

**Activity:** Wireless communications, Information and communications theory.

**Web:** <https://www.aalto.fi/en/departement-of-communications-and-networking>

**Group Leader:** Dr. Alexis Dowhuszko

**Key facilities:**

- Software-defined VLC demonstrator (Implementation of OFDM-based waveforms, Pre-distortion and post-distortion compensation of non-linear and memory effects introduced by LEDs, Channel state information acquisition for VLC-based indoor monitoring)



## Technische Universiteit Eindhoven (Netherlands)

- *TU/e Electro-optical Communication Group*. **Web:** [tue.nl](http://tue.nl) **Group leader:** Dr. Ir Joanne Oh
- *TU Delft Space Institute*. **Web:** [spaceinstitute.tudelft.nl](http://spaceinstitute.tudelft.nl) **Group leader:** Prof. Eberhard Gill
- *Photondelta Eindhoven* – private partner. **Web:** [photondelta.com](http://photondelta.com) **Group leader:** Ewit Roos
- *TU/e Signal Processing Systems Group & Signify Company*. **Web:** [signify.com](http://signify.com) **Group leader:** Dr. Ir. Jean-Paul Linnartz

## **C**all for papers

•We are pleased to announce *the First Workshop on Underwater Communication, Access and Networking (UCAN)* that will be held in conjunction with IEEE ICC 2023 that will be organized in Rome, Italy, on 28 May - 01 June 2023. More details can be found on the following link: <https://icc2023.ieee-icc.org/workshop/ws-24-1st-workshop-underwater-communication-access-and-networking-ucan>

**Organizers(s):** Prof. Mauro Biagi, Dr. Valeria Loscrì, Dr. Anna Maria Vegni

**Submission deadline:** February 3rd, 2023

**Join us at the following  
social networks!**

women\_in\_owc 

@WomenOWC 

<https://www.linkedin.com/groups/9064687/> 

**Contact us:** [annamaria.vegni@uniroma3.it](mailto:annamaria.vegni@uniroma3.it)

**Website:** <https://www.newfocus-cost.eu/>

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