Fibre Optic Nonlinear Technologies [FONTE] - A European Industrial Doctorate [GA766115]

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Project Details

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Consortium

Aston University

NOKIA Bell Labs

TELECOM ParisTech

TU Delft

DTU Technical University of Denmark

EC Funding

European Commission

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Executive Summary

FONTE/**Aston University** co-organised the Open-To-All Workshop **ML-Photonica 2019**, a symposium and workshop coinciding with the biennual international conference **PHOTONICA 2019** (26-30 August 2019 Belgrade, Serbia). The event was delivered with the participation of *keynote speakers* Prof Darko Zibar and Prof David Saad of FONTE's academic partners **Technical University of Denmark (DTU)** and **Aston University (AST)** respectively, and *invited speaker* Dr. Mathieu Chagnon of FONTE's industrial partner **Nokia Bell Labs (NBL)**. The symposium's opening address was delivered by Prof Sergei Turitsyn, FONTE Coordinator at **Aston University (AST).**

The two-day event took place 26-27 Aug 2019 at the Serbian Academy of Sciences and Arts in Belgrade, Serbia.

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LIST OF ACRONYMS

AiPT	Aston Institute Of Photonic Technologies
EC	European Commission
EID	European Industrial Doctorates
ESR/ECR	Early Stage Researcher/Early Career Researcher
ITN	Innovative Training Network
FONTE	Fibre Optic Nonlinear Technologies
OTAW	Open-to-all Workshop

1. ML-PHOTONICA 2019 – AN OPEN-TO-ALL WORKSHOP AT PHOTONICA 2019

The **VII International School and Conference on Photonics – PHOTONICA 2019** (26-30 August 2019 Belgrade, Serbia) is a biennial event organised by the **Vinča Institute of Nuclear Sciences**, **Optical Society of Serbia** and the **Serbian Academy of Sciences and Arts**. The conference is held in Belgrade, Serbia, since 2007 and aims to '*serve as a forum for education of young scientists, exchanging new knowledge and ideas, and fostering collaboration between scientists working within emerging areas of photonic science and technology*'. In 2019 the topics of the conference included topics such as Quantum optics and ultracold systems, Nonlinear Optics, Optical materials, Biophotonics, Devices and components, Optical communications, Laser spectroscopy and metrology, Ultrafast optical phenomena, Laser-material interaction, Optical metamaterials and plasmonics, and for the first time at PHOTONICA: Machine learning in photonics.

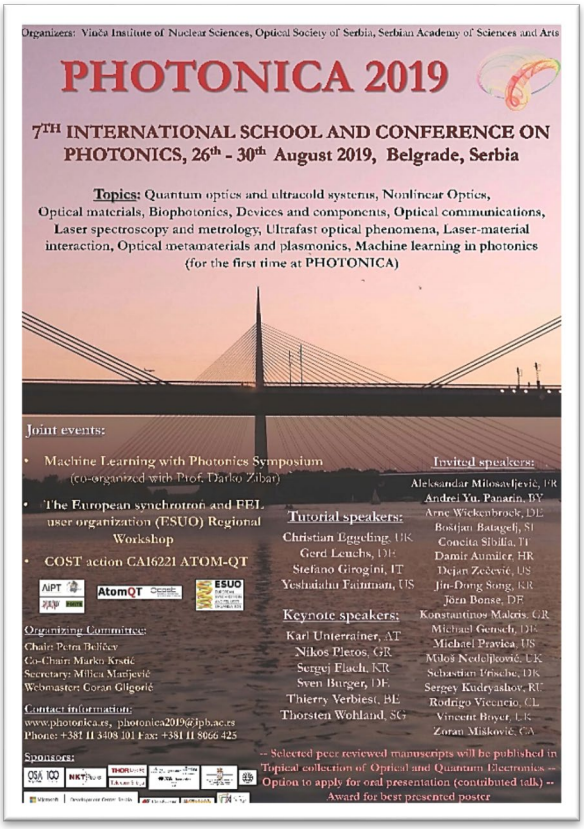

*Figure 1: Landing page of the **Photonica 2019** conference website at www.photonica.ac.rs*

Prof Darko Zibar, Technical University of Denmark (**DTU**), a FONTE WP leader and supervisor / co-supervisor of several FONTE ESRs had already been confirmed early on as a keynote speakers at **PHOTONICA 2019.**

The size and scope of this conferences, as well as the range of topics represented at **PHOTONICA 2019** undoubtedly highlighted a unique opportunity to organise a machine-learning workshop to run concurrently with the main conference, aiming to attract young scientists and Early-Stage Researchers (ESR) at the initial stage of their scientific careers in the field of photonics and machine learning in particular.

Having collaborated with the **Vinča Institute of Nuclear Sciences** previously and pooling resources across several projects currently coordinated by Aston University – among them MULTIPLY (EC GA 713694), CARDIALLY (EC GA 691051) and FONTE (EC GA 766115) – Aston University approached the organisers of **PHOTONICA 2019** with the suggestion of organising a bespoke 2-day open-to-all workshop (OTAW) and symposium '*Machine Learning in Photonics (**ML-Photonica 2019**)*' on 26th and 27th Aug 2019, i.e. alongside the main conference event.

A dedicated website was developed at https://ml-photonica2019.astonphotonics.uk/ and flyers produced.

*Figure 2: Landing page of the OTAW **ML-Photonica 2019** website at ml-photonica2019.astonphotonics.uk*

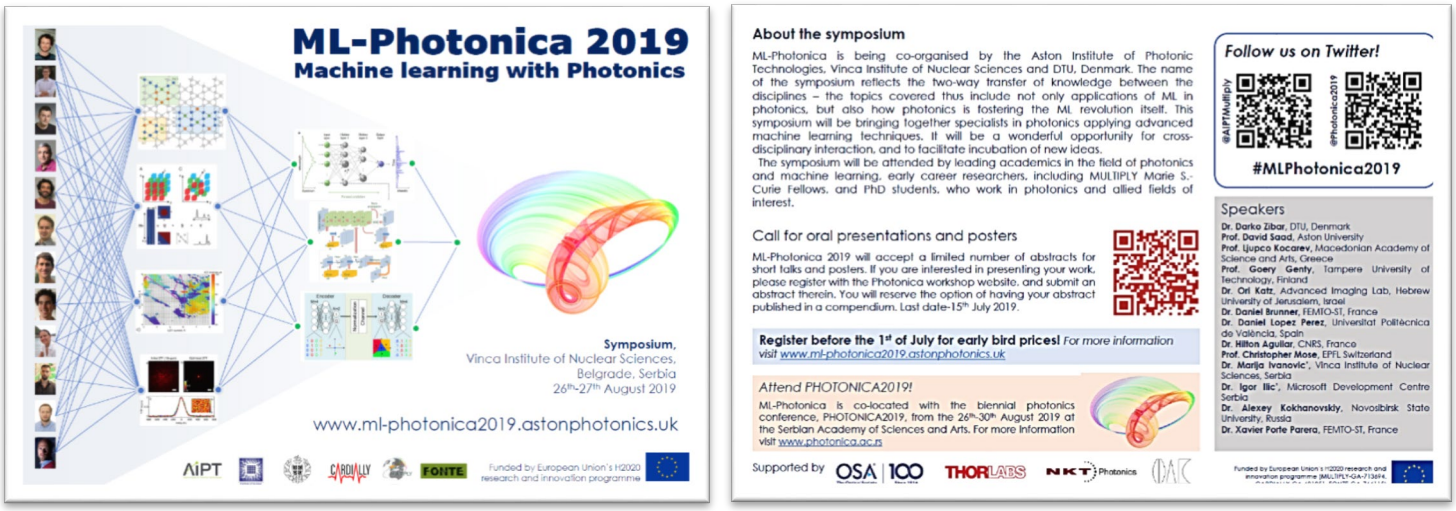

*Figure 3: Flyer for the OTAW **ML-Photonica 2019***

1.1 SPEAKERS

High calibre speakers were confirmed and included staff members from FONTE's project partners: **Prof. Sergei Turitsyn** (FONTE Coordinator, Aston University; opening address), **Prof. Darko Zibar** (DTU; keynote speaker), **Prof. David Saad** (Aston University; keynote speaker) and **Dr. Mathieu Chagnon** (Nokia Bell Labs; invited speaker). An ambitious selection of sixteen 45-minute talks was schedule for the 2-day event:

DAY 1 , 26TH AUGUST 2019

(Scroll Down for Day 2)

Time	Talk details
0845-0900	*Opening session* Prof. Darko Zibar, Prof. Sergei Turitsyn
0900-0945	*Machine Learning for Photonics.* Prof. David Saad, Aston University, UK
0945-1030	*Machine learning in photonic communication systems* Dr. Darko Zibar, DTU, Denmark
1030-1100	Coffee Break
1100-1145	*Nonparametric Bayesian methods for networks.* Prof. Ljupco Kocarev, Macedonia Institute of Sciences
1145-1230	*Pre- and post-transmission digital signal processing using neural networks applied to fiber-optic communication systems relying on power modulation and power detection : Advantages and drawbacks* Dr. Mathieu Chagnon, Bell Labs, Stuttgart
1235-1400	Lunch Break
1400-1445	*Scaling in optical neural networks: energy, substrates, noise and learning.* Dr. Daniel Brunner, FEMTO-ST, France
1445-1530	*Ising machines and Random Optical Networks by tumor spheroids.* Prof. Claudio Conti, University of Sapienza, Rome.
1530-1600	Coffee Break
1600-1630	*Mode-locked fibre laser controlled by machine learning algorithms* Dr. Alexey Kokhanovskiy, Novosibirsk State University, Russia
1630-1700	*Roadmap from Academia to IT industry.* Dr. Igor Ilic, Microsoft Development Center, Serbia.

*Figure 4: OTAW **ML-Photonica 2019** schedule day 1.*

DAY 2, 27TH AUGUST 2019

Time	Talk Details
0900-0945	*Using Machine Learning to 'Predict' Extreme Events in Fiber-Optics Instabilities from Single-shot Spectral Measurements.* Prof. Goery Genty, Tampere University of Technology, Finland
0945-1030	*Optimization and configuration of Programmable Photonics ICs.* Dr. Daniel Lopez Perez, Universitat Politècnica de València, Spain
1030-1100	Coffee Break
1100-1145	*Imaging with scattered light.* Dr. Ori Katz, Department of Applied Physics, Hebrew University, Israel
1145-1230	*Deep, fast and few: enhanced molecular imaging via spatial light modulators.* Dr. Hilton B. De Aguiar, ENS Paris
1235-1400	Lunch
1400-1445	*Matrix vs Machine Learning for transmitting images through multimode fibers.* Prof. Christophe Moser, EPFL, Lausanne
1445-1530	*Defibrillation outcome prediction as a potential guide to resuscitation* Dr. Marija Ivanovic, DIASENS, Serbia
1530-1600	Coffee Break
1600-1630	*Greedy Boolean Learning in Photonic Recurrent Neural Networks* Dr. Xavier Porte Parera, FEMTO-ST, France
1630-1700	*Computationally intelligent characterization of a photoacoustic detector* Dr. M. Pavlović

*Figure 5: OTAW **ML-Photonica 2019** schedule day 2.*

1.2 RECORDINGS

Talks at **ML-Photonica 2019** were recorded and the majority of speakers gave permission to upload both their presentation and recording to the secure *members-only* website areas of FONTE and the other H2020 projects involved in the organisation of the symposium, thus making them available to a large number of Early Stage Researchers, including those who were not able to attend the event in person.

1.3 POSTER PRESENTATIONS AND PRIZE

Participants of **ML-Photonica 2019** were invited to participate in a poster exhibition, with a cash prize for the best poster being sponsored by the **Microsoft Development Center Serbia.**

*Figure 6: OTAW **ML-Photonica 2019** poster prize sponsor - Microsoft Development Center Serbia*

1.4 ATTENDANCE AND SOCIAL MEDIA

The success of the **ML-Photonica 2019** OTAW and symposium can also be measured by the geographic spread of the attendees, covering Denmark, Finland, France, Germany, Israel, Italy, Macedonia, Russia, Serbia, Switzerland and the UK. All FONTE ESRs were invited, with 3 (of 4) registering for the event. The event was extensively tweeted and re-tweeted on social media.

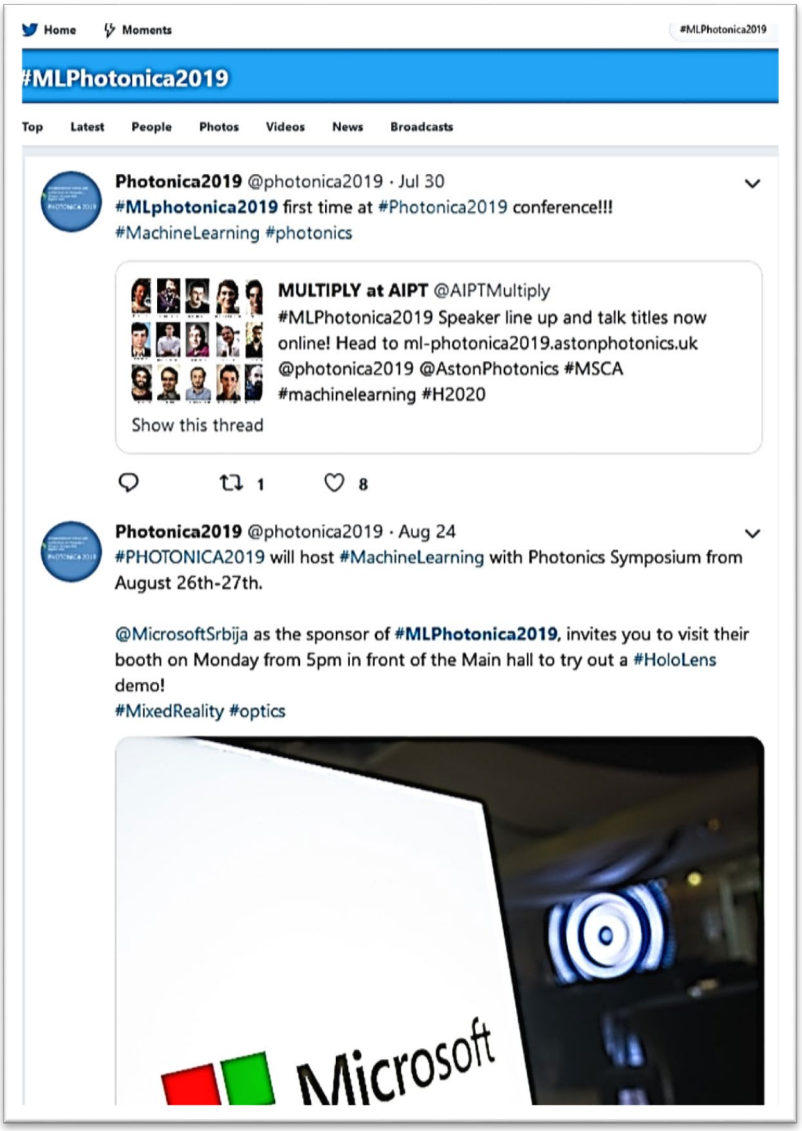

*Figure 7: OTAW **ML-Photonica 2019** on twitter*

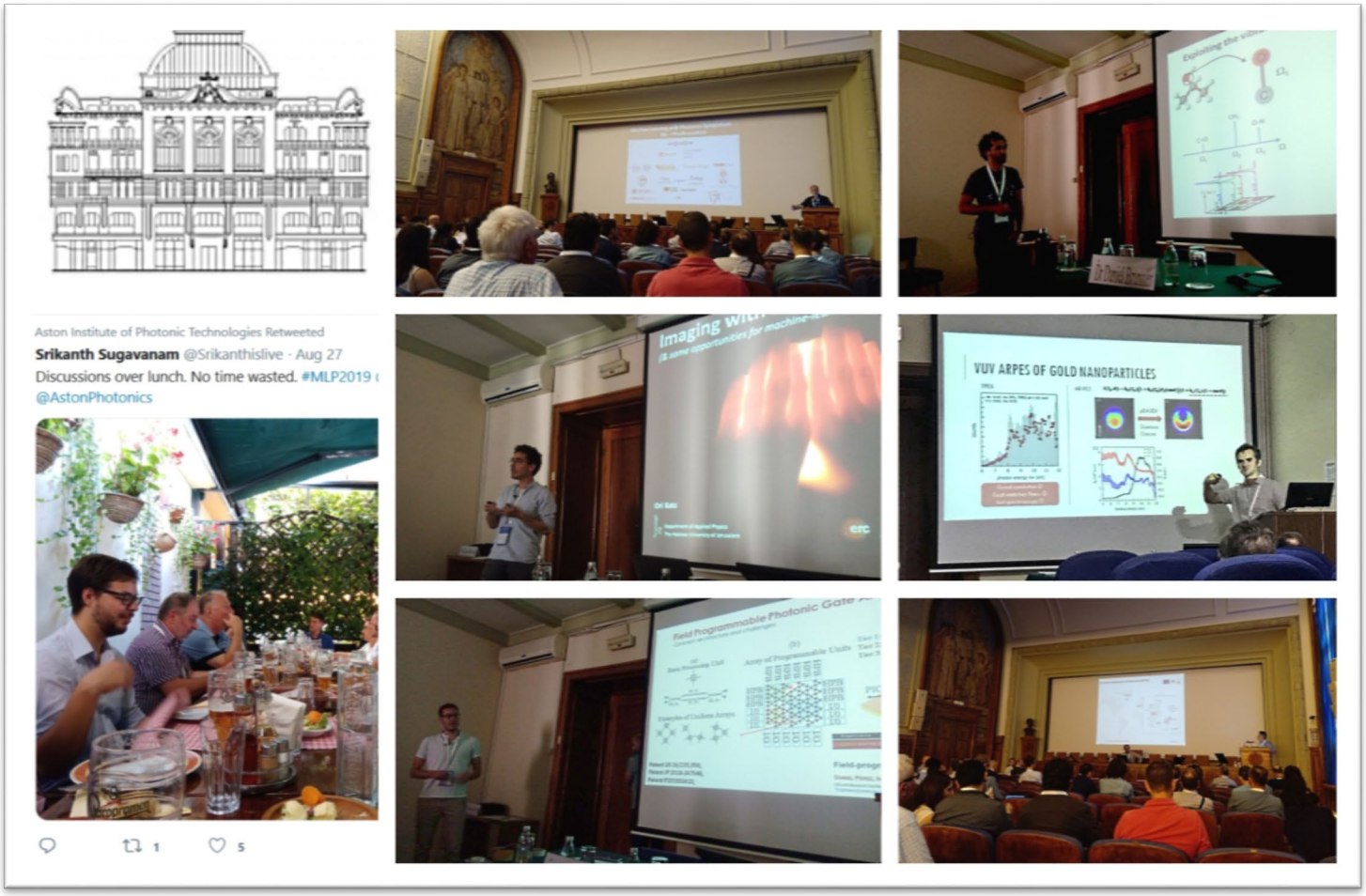

*Figure 8: Impressions from OTAW **ML-Photonica 2019**, Belgrade, Serbia, 26-27 Aug 2019*