43rd European Conference on Optical Communication

ECOC 2017

GOTHENBURG • SWEDEN
17-21 September 2017

Final Programme
ECOC 2017 Programme overview

1. Fibres, Fibre Devices and Fibre Amplifiers
   - Optical fibre design, fabrication and characterisation
   - Physics of light propagation in optical fibres
   - Fiber amplifiers and fiber lasers
   - Fiber based telecommunications, sensing and other applications
   - Highly nonlinear fibers and their applications for nonlinear optical signal processing
   - Specialty optical fibers for improved linear and/or nonlinear transmission performance
   - Low- and high-sensitivity fibers and fibers for new wavelength ranges

2. Integrated Optoelectronic Devices and Optical Processors
   - Design, fabrication and characterisation of devices and components
   - Novel integrated devices and functionalities
   - Novel integrated light sources, directly modulated lasers and VCSELs in bulk, quantum well, quantum dot or other materials
   - Integrated III–V, including InP and GaAs, data modulators, detectors, amplifiers and switches
   - Silicon and hybrid III–V/VI semiconductor photonics for data modulation, detection, amplification, switching and interconnecting
   - Packaging of advanced novel devices, testing of performance and reliability
   - Novel material platforms and structured materials such as photonic crystals, photonic topological insulator and graphene a.o.
   - Integrated nonlinear waveguides on various material platforms for optical signal processing

3. Digital Techniques for Optical Communication Systems
   - Modelling, design, and implementation of digital signal processing for long–haul, to medium– and short–range optical communication links
   - Novel digital signal processing algorithms for optical transmitters and receivers, and DSP algorithms with reduced complexity
   - Novel error correction coding, advanced data encoding and signal shaping for optical communication links
   - Signal formats, modulation schemes and mode locking for silica-based optical fibres
   - Optical back-propagation

4. Transmission Subsystems and Optical Network Elements
   - Modelling, design, implementation and test of optical, optoelectronic, or electrical (incl. DAC/ADC) subsystems
   - Line terminals, optical transmitter and receiver subsystems for advanced modulation formats and increased speed and/or capacity
   - Multiplexing and demultiplexing subsystems for advanced and/or spectrally efficient data formats including 802.3, OFDM, DQPSK and Nyquist–WDM
   - Optical performance monitoring techniques and subsystems
   - Subsystems for network functionalities, including e.g. wavelength selective switching, add–drop multiplexing, optical switchable, optical packet routing, system-on–a–chip (SoC) and on–chip networks
   - Analyse signal processing subsystems and novel schemes of nonlinear optical signal processing for subsystem–functionsality

5. Datamcom and Computercom Hardware
   - Deployable technology, like real–time online processing systems and low–cost solutions, including novel packaging of integrated optics and parallel transceivers, and Si photonic low–cost solutions
   - Demonstrations, network deployments and field trials using novel architectures and/or novel switching schemes and technologies, including SDN over WDM, TDMA, SDM optical switching and/or hybrid electronic/optical or all–electronic switching
   - Data center and HPCS (High Performance Computing System) specific hardware, including VCSEL based parallel links with advanced modulation, hybrid integrated electronic/optical engines for broadband interconnecting and WDM/OMM interconnects
   - Demonstrations using novel network devices, including nanophotonic high–density components for on–chip networks, as well as integrated spatial multiplexers for high–density parallelism, novel interconnects and transceivers

6. Point-to-Point Transmission Links
   - Transmission system modeling
   - Lab and field implementation of optical fiber transmission links
   - Satellite communication links
   - Transmission system level implications of physical impairments and impairment mitigation techniques
   - Capacity, reach, flexibility of optical transmission systems and solutions to the current limitations
   - Demonstrations of combined novel fibers, devices, subsystems and multiplexing techniques in transmission experiments
   - Quantum communication systems

7. Core, Metro, and Data Center Networks
   - Networkings aspects of architecture, planning and scaling of broadband optical transport circuit– and packet–switched core, metro and data center networks, including cost and energy considerations
   - Control, orchestration, and management functions, as well as integration with higher layer network services
   - Network deployments and field trials
   - Architecture, planning and scaling of optical transport for inter– and intra–data center and HPCS networks
   - Network management, control plane design and orchestration of data centers and HPCS for photonic and hybrid photonic/electronic interconnects
   - Energy, scalability, latency considerations for data center and HPCS networks

8. Access, Local Area and Indoor Networks
   - Photonics for 5G technologies
   - Photonics for Cloud services
   - Fiber–to–the–premises (FTT)
   - Passive optical access networks
   - In–building optical systems
   - Radio–over–fiber systems
   - Optical free–space communication systems
   - Hybrid wireless/optical free–space network solutions
Welcome to Gothenburg

Dear Friends and Optical Colleagues from all over the world, The joint Chairs wish you warmly welcome to the 43rd ECOC held in the city of Gothenburg, Sweden.

We believe you will find ECOC 2017 an exhilarating and concentrated mixture of technological and social connectivity. The conference, the exhibition, the venue, and the city itself are all practically on top of each other, giving you the best possible opportunity to connect with science, colleagues, customers, companies, and products from the entire globe.

The city of Gothenburg is the second largest city in Sweden, an old 17th century seaport with a fortified and moated old town. Dutch and British merchants were prominent in its early days, and the city was originally laid out with canals instead of streets to assist the transport mode of those days - ships - long before optical fibre. Today, the old fortifications and canals are mixed with a modern and charming maritime city with everything within walking distance from the conference venue. The Gothenburgers are known for their friendly and open attitude, and English is spoken everywhere.

ECOC 2017 is a Nordic conference; Sweden, Denmark, Norway, and Finland all co-operate for the event. The Nordic countries are well known for their leading industries and communication technologies and we hope you will take the opportunity to extend and improve your business in all of Scandinavia. We will be happy to assist you with business contacts for all countries.

This year, we are aiming at the first Environmental Certification of an ECOC Conference. Both the city and the venue are top-ranked in sustainability, and we have been working through all conference processes against the standard “Svensk Miljöbas”. The biggest challenge, however, is not the eco-cookies for the coffee, but the approximately 1 500 tonnes of carbon that a typical ECOC emits in terms of air travel. Despite all our efforts on Optical Communication... We have therefore introduced the “Green Platinum Sponsor” level that specifically supports the CO2-compensation for the air travel. We hope this, quite necessary, arrangement will continue and become the premier sponsoring item.

The Social Programme is as full as usual, the get-together after the workshops, an evening at the science center across the street from the conference, a concert, and a conference dinner down in the old harbour sheds. Also, the town is only a few minutes by foot or tram away, so do take a break and enjoy the old town.

On the technical side, the developments in coherent systems and advanced modulation are fascinating. “Light” today is just another carrier, and we treat it like radio technology, but at 193 THz. Amazing. With systems pretty much up at the Shannon limit and good old Ethernet at 400 Gb/s, it seems that Fibre-To-The-Home has, shall we say, sufficient capacity for the moment? Probably, quite a few of us have 10Gb/s Ethernet at home, but with low utilization... Instead, Datacenters have emerged as the bandwidth-guzzler, but with different topology, distances and challenges than access networks. But the power, size and cost-focus is even stronger. This new direction is evident in the creation of a new Subcommittee at ECOC this year - "Datacom and Computercom Hardware". And Sunday’s are not free anymore, as you may have noticed.

The ECOC workshop series is transforming into a full-day, six-parallell-session event and a dynamic discussion platform for the very latest issues - don’t miss it.

In all, ECOC is at the leading tech - and social - edge as usual, and we hope you take the opportunity to enjoy both the technical and social scene here in Gothenburg.

Once again, warmly welcome,
Silicon Photonics

Organizers:
Hercules Arsenopoulous, National TU Athens, Greece
Cristin Schott, Ericsson, Switzerland
Lucia Alvesitti, ETH Zurich, Switzerland
Rod Beals, Ghent University – INEC, Belgium

Location:
Room F1

Abstract:
Silicon Photonics hold promise for consolidating PICs, following the example of silicon microelectronics. The excitement of early demonstrations was followed by a period of consolidation where major technological hurdles were overcome, raising expectations for an increased use of photonic and optoelectronic components. This workshop aims to highlight the latest achievements in silicon photonics, and to outline the requirements posited by prominent application fields. Experts on the various integration platforms as well as users of the technology are brought together, and attempt to answer burning questions, such as:

- What needs to be done for silicon photonics to dominate short- and medium-reach communications?
- How can silicon photonics reach the economics of metro/long-haul?
- What level of electronic/photonics integration is needed to support the demands of next-generation data centers?
- What is the best flavor of III-V and silicon integration for very large-scale PICs with multiple functionalities and more ports?
- What is the path to cost-effective, low power efficiency, on-chip lasers, or off-chip optical power supplies?
- Are InP-on-silicon lasers ready for prime time?
- Is it possible to meet the 30 requirements of multi-board switches in datacenters?
- Can photonics be brought off the wall to the chip to revolutionize the microprocessors and computing architecture in the not too distant future?
- Is there a path for realizing chip-to-chip photonic interconnects in 2025?
- What are the main challenges and opportunities of the adoption of optical I/Os?
- How does the cost of silicon photonics scale with volume?
- What is the path to low-cost packaging of silicon photonics chips?
- Is silicon photonics only affordable for high-volume products?
- Are packaging costs shaping the uptake of silicon photonics?
- Is optical re-routing inside chip packaging, how must the global supply chain evolve?

Confirmed speakers:
Patryk Urban, Ericsson, Sweden
Frank Koppens, ICFO, Barcelona, Catalonia
Gemma Vall-Llosera, Ericsson, Sweden
Kota Asaka, NTT, Japan
Yan Shi, Former Genexis, The Netherlands
Sandra Albrecht, Ericsson, Sweden
Martin Kristensson, Nokia, Finland
Lech Wosinski, "Silicon nanophotonics and plasmonics for 5G applications", KTH, Stockholm, Sweden
Paul Smiet, "silicon nano-photonics and plasmonics for 5G applications", IMEC, Belgium
Laurent Vanneuville, "III-V on Si Lasers: Ready for Primetime", IMEC, Belgium
"Complexity and volume scaling in silicon photonics: How do we make optics look more like electronics?"
Michael Eiselt, "EU Project 5G XHAUL: Optical technologies supporting 5G"; Luxembourg, Luxembourg
"High-throughput and scalable packaging: an enabler for silicon photonics?"
Peter O’Brien, Tyndall, Ireland
"What does it take to drive down the cost of silicon PIC packaging?"
Norbert Keil, HHI, Germany
"Can photonic integration technologies work together?"
Kevin Williams, TU/e, The Netherlands
"Is there still a need for R&D in optoelectronics because: where does silicon photonics fit in and does it make economic sense?"
"Are there any new and innovative concepts that will reduce the cost of silicon photonics components?"
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"What can silicon photonics do for the automotive industry?"
"Can silicon photonics offer any advantages over other photonic technologies?"
"What are the key challenges for silicon photonics in the 5G era?"
"Are there any new and innovative concepts that will reduce the cost of silicon photonics components?"
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"What are the key challenges for silicon photonics in the 5G era?"
Data Center Networks: Meeting the emerging requirements for capacity, cost, energy consumption and reach

Organisers: David Plant, McGill University, Canada
Yikai Su, Shanghai Jiao Tong University, China
Sylvie Menezo, CEA-Leti, France
Dimitris Apostolopoulos, National Technical University of Athens, Greece

Location: Room F3

Abstract:
Data centre traffic is surging with sustained annual growth rates as high as 25% expected by 2025. Deployment of photonic technologies for rack-to-rack communication is leading to faster and power system improvements. From the network perspective, new, faster network architectures, along with optical switching, are being advocated in order to boost efficiency.

Meanwhile, as silicon photonics has made it easy to move data into data centers with the PON standard set at 25Gbps as a cost-effective solution below 500m, WDM is considered as a possible solution to meet near future data center requirements in terms of performance, cost and power consumption. Today’s fully automated transceivers are key for these applications that require 100G and even higher operating temperatures but further developments on silicon photonics or III-V technology are required.

Furthermore, to data center traffic being performed by electronic switches but with the even increasing data capacity, the back planes of the electronic switches seem to impose limitations on data transfer speed, interconnection delay and power consumption. Combined with electronic switches, optical switching may also be a hard limit of data traffic of course. Similarly, with high speed, large core light and low power consumption.

Finally, to effectively apply these technologies and network concepts, an SDR control and orchestration framework is necessary. This framework and orchestration framework is necessary inside and across data centers.

This workshop will highlight the latest achievements in optical switching, optical interconnection devices, and modular systems for data centres and data centers. The workshop includes expert speakers from network operators deploying PON technology, researchers providing a longer term technology perspective. A lively and thought-provoking discussion is anticipated and audience participation will be strongly encouraged.

Workshop structure

Session 1. Network and system challenges in the exascale cloud datacenter era
Moderator: Dimitris Apostolopoulos, NTUA, Greece
Chongxin Xie, Senior Director, Chief Optical Network Architect, Alibaba, USA
"Scalability of Optical Technologies for Growing Exascale Datacenters" - Katharina Schmidtlein, Sourcing Manager, Optical Technology Strategy, Facebook, USA
"Increasing datacenter bandwidth: A network or a technology issue?" - Loukas Panachas, Senior Director, Sales and Cloud Content, Infinera, USA
"Transport Innovations in Next-Generation DCI Networks" - Richard Peachon, Photonic group leader, Seagate, UK
"Provolution of system embedded photonic interconnect in exascale data centres"

Panel discussion (30 min approx.)

Session 2. Silicon based WDM transceivers for transmissions between and across data centers
Moderator: Sylvie Menezo, CEA-Leti, France
Dr. Ken Liu, Sr. Director of Product Marketing, KAVAN Corp, USA
"Optimizing wavelength parallelism in advanced data center transceivers" - Radha Nagaprasanna, CTO, group, USA
"Switch-Pluggable Silicon Photonics PAM-4. DWDM Modules for 470nm, >40km Inter-Datacenter Links" - Dr. Yu Senaka, Senior Researcher, NTT, Japan
"Silicon-photonics based WDM technologies for short reach interconnection" - Gala Koronilou, senior member of Large-scale Integrated Photonics (LSIP) Group at Hewlett-Packard Labs.
"High-temperature operation and control of multi-channel heterogeneous light sources on silicon"

Panel discussion (30 min approx.)

Session 3. Optical switching devices and technologies for datacenters
Moderator: Yikai Su, Shanghai Jiao Tong University, China
Topics to cover: Optical switching devices, fast switching devices, enabling technologies (Si photonics, NEMS, Bi-IV, LCOS, PLC) and optical switching architectures.

Panel discussion (30 min approx.)

Session 4. Intra- and inter-data center transmission systems; Choices and challenges
Moderator: David Plant
Guibo Zhu, Ciena, Canada
"Software-defined network technologies for inter-datacenter networks" - Stephane Leonard, Ericsson, Canada
"Datacenter Networking for 5G applications" - Elad Mermelstein, Mellanox, Israel
"Intra-Datacenter Challenges; System Perspective" - Neil Bergano, TE Connectivity, USA
"Uniwave cable networks: moving massive amounts of data around the world"

Panel discussion (30 min approx.)

Panel discussion (30 min approx.)
Constellation shaping — a simple add-on or a tool to combat the nonlinear fiber limit?

Abstract: Constellation shaping has in recent years gathered popularity as a tool for extending the reach of coherent optical communications systems. Particularly, probabilistic shaping has been shown to be beneficial for systems, operating at high order-QAM beyond 16QAM. Current practical constellation shaping methods allow for 10-20% data rate increase mostly due to their tolerance to the white Gaussian noise originating from amplification. However, such constellations are generally intolerant to nonlinear noise and are thus limited to operating in the weakly nonlinear region. Constellation constructions which are tolerant to nonlinearities, and at the same time provide high spectral efficiency and can be implemented with reasonable complexity in order to support very high speed optical communications are as of yet unavailable.

This workshop aims at providing a forum for discussions between leading scientists in the field, with a focus on constellation shaping for the nonlinear regime of transmission. We will review currently popular constellation shaping methods and discuss different aspects of their implementation, scalability, integrability with existing systems, and practical gains that they provide. Important aspect of the discussion will be whether these schemes and their gains can be extended into the nonlinear region, or completely new solutions are required in order to drastically improve the system performance.

The workshop will include, but is not limited to the following discussion topics:

- Practical implementation in current state-of-the-art transceivers and systems — what are the requirements for the transceiver architecture and protocols?
- How does shaping fit with other popular nonlinear mitigation/compensation techniques, such as digital back-propagation, optical phase conjugation, and sub-carrier multiplexing? Are they complementary or competitive?
- What is a “nonlinearity tolerant constellation”?
- Geometric vs. probabilistic shaping — is joint optimisation beneficial/feasible, or is either sufficient independently? What are the tradeoffs?
- Are we limited to the weakly nonlinear regime, or are there benefits from operating in the nonlinear regime?
- Shaping for SDM systems — are there gains, and are they worth the effort?
- Shaping for high-order noncoherent communication — is that feasible?

Workshop structure

Session 1: Theoretical aspects of shaping: Nonlinearity mitigation and power efficiency

- 9:00 — Session I opening
- 9:15 — Marco Secordini, School of Advanced Studies, Sant’Anna, Pisa, Italy, “Possible approaches to design a nonlinearity-tolerant constellation”, by Marco Secordini.

Coffee break (10:50-11:10)

Session 2: Practical aspects and applications of constellation shaping

- 11:10 — Session II opening
- 11:35 — Alexandre Grawi I Amat, Chalmers University of Technology, Gothenburg, Sweden, “Probabilistic shaping and hard-decision decoding: can we close the gap with soft-decision decoding?”, by Alexandre Grawi I Amat.

Open mic & panel discussion (12:15-13:00)

What is the Best Fibre for the Deployment of Space-Division Multiplexing Systems?

Organisers: Rami-Essam Elsayem, Bell Labs, Nokia, Holmdel, NJ, USA
Takashi Sasaki, Innovation Core SEI, Inc., San Jose, CA, USA
Chigo Okonkwo, Eindhoven University of Technology, Dept. of Electrical Engineering, Eindhoven, The Netherlands

Location: Room F4

Abstract: The role of the commercial deployment of space-division multiplexing (SDM) fibers depends primarily on the cost and transportability of information for the anticipated data traffic demand in future optical networks and the transmission performance of SDM fibers relative to single-mode fibers. The most important elements impacting the introduction of SDM fibers in optical networks are: 1) the ratio of the average traffic demand to the network Shannon limit of single-mode fibers, 2) the cost of SDM transponders, amplifiers and optical add-drop multiplexers and 3) the transmission performance of commercial-grade high-speed SDM fibers. Many different flavors of SDM fibers are considered for future backbone optical networks. One can classify SDM fibers in three broad types: 1) multimode-based fibers, including few-mode fibers, 2) multimode fibers that suppress linear crosstalk between cores, and 3) coupled-core/multicore fibers designed with strong linear coupling to reduce linear and nonlinear impairments. As important elements include the number of cores of types 2 and 3, that is the number of multimode fibers that may be realized in a certain deployment scenario. Workload, type 2 and type 3 approaches are generally processed in two broad categories, wavelength-division multiplexing (WDM) and spatial-division multiplexing (SDM). The most important elements that impact the introduction of SDM fibers are: 1) the cost of optical add-drop multiplexers and 2) the transmission performance of commercial-grade high-speed SDM fibers. A very important characteristic of SDM fibers that may determine which fiber may emerge in commercial systems to replace single-mode fibers are the nonlinear transmission performance of these SDM fibers in the high-capacity regime relative to arrays of single-mode fibers. The nonlinear performance of these fibers is a very active area of research and the workshop is intended to share the latest results, predictions, intuitions and convictions on “What is the best SDM fiber? What is the Best Fiber for the Deployment of Space-Division Multiplexing Systems?”

Workshop structure

Part 1: Historical Perspective and Space-Division Multiplexing (SDM) Fibers

- Andrew Chparyly and Bob Tkach, Bell Labs — Nokia, USA
- "Historical perspective on introducing new optical fibers in optical networks"
- Neal Bergano, TE Subcom, USA
- "Introduction into new optical fibers in submarine networks"

Part 2: SDM Fibers

- Tetsuya Hayashi, Sumitomo Electric Industries, Ltd., Japan
- "Coupled-core multicore transmission fibers"
- Pierre Sidari, Prysmian, France
- "Multimode Fibers"
- Taji Sakamoto, NTT, Japan
- "Multicore and multimode fibers"
- Mung-Jun Li, Corning, USA
- "Fabrication of SDM fibers"
- Lars Grönhe-Nielsen, Danish Optical Fiber Innovation, Denmark
- "Few-mode transmission fibers"

Workshop structure
Optical Wireless Communication

Organisers:
Murat Uysal, Ozyegin University, Turkey
Zahib Ghassamieh, Northumbria University, UK.

Location:
Room F2

Abstract:
The increasing number of mobile devices and advanced multimedia applications combined with the worldwide adoption of social media has led to an exponential growth in mobile data traffic at a global level. 5G and B5G wireless networks are envisaged to meet this extraordinary data demand, where emerging applications and services such as Smart City, Smart Buildings, Factories of the Future, Intelligent Transportation Systems, Smart Grid and the Internet of Things will play a significant role beyond voice and data services for users.

To address these challenges there are a number of options including: (i) the spatial reuse of the frequency spectrum in dense networks by adopting higher spectral efficiency modulation and coding techniques; (ii) spectrum sharing, hoping and borrow; (iii) moving to higher RF bands (e.g., beyond 300 GHz), and (iv) shifting to extreme to the optical spectral bands. The Optical Wireless Communications (OWC) technology (including Free Space Optical communications or Visible Light Communications (VLC)) offers opportunities in free-distribution optical band of infrared, visible, and ultraviolet that could be deployed in indoor and outdoor environment as well as underwater.

High-speed signal transmission, operation in a unregulated spectrum, robustness to electromagnetics interference, optical frequency reuse and inherent security, high energy efficiency (i.e., a green technology) and reduced interference are some of the main advantages of OWC, which is positioned as a powerful alternative and complementary technology to RF solutions both at backbone and access network levels.

The recent surge in research and development activities in OWC has led to the development of new solutions capable of delivering ubiquitous, high-data rate, and low-cost wireless access networks in a variety of scenarios, as will be described throughout this Workshop. The workshop is composed of two sessions as outlined below:

**Workshop structure**

**Session 1:**
Moderator: Murat Uysal, Ozyegin University, Turkey

(20') Amalpanaparai Nirmalathas, "Multigigabit Wireless Access for Indoor Applications Using Optical Wireless Transmission"

(20') Harry Elgala, "Visible Light Based Backscatter Communication"

(20') Behroz Maki, "On the performance of RF-FSO systems"

Panel discussion

**Session 2:**
Moderator: Harry Elgala, State University of New York at Albany, USA

(20') Peti Chvojka, "Overview of Visible Light Communications"

Opportunities for machine learning in optical communication: from components characterisation, systems design and network optimisation

Organisers:
Dariko Zibar, DTU Fotonik, Technical University of Denmark
Henk Wymeersch, Chalmers University of Technology, Sweden
Ilya Lyubomirsky, Inphi, USA

Location:
Room F4

Abstract:
In broad terms, machine learning is a multidisciplinary research area where some of the main tasks are to infer plausible models to describe the observed data and use the inferred models to make predictions. The core of the machine learning approaches is generalisation: find the model that is learned from the measured data and can be used for prediction for systems that exhibit complex behaviors and where analytical models are hard to derive and numerical procedures time consuming. Recently, machine learning methods have started to enter the field of photonicics, ranging from quantum mechanics, nanophotonics, optical communication and optical networks. Moreover, a few optical implementations of some machine learning algorithms have also been proposed recently.

The field of machine learning offers many powerful techniques, however, linking it to optical communication and photonics in general may not be trivial. In particular, choosing the right machine learning algorithm strongly depends on the problem that needs to be solved. In this workshop, we will address how techniques from machine learning can be applied in the field of optical communication and photonics, and which benefits machine learning methods can bring to optical communication. We will explore how machine learning can be used to design better lasers, predict the performance of optical communication systems, perform nonlinear mitigation, optimise data centres and create intelligent but low measurement equipment for next generation of optical networks. Moreover, we will look into how all-optical signal processing and integrated photonics can benefit the field of machine learning and which novel research opportunities could arise for all-optical solutions.

**Workshop structure**

**Session 1**
14:00-14:05; Dariko Zibar, DTU Fotonik, Denmark "Introduction to part I: ML for physical layer"
14:05-14:10; Thomas Schnör, Uppsala University, Sweden "Machine learning: trends and perspectives"
14:10-14:15; Hansjoerg Haisch, Keysight Technologies, Germany "Data analytics for measurement equipment"
14:15-14:20; Naga V Irukulapati, Ericsson, Sweden "The need for machine learning and data analytics for future communication infrastructure"
14:20-14:25; Damir Rafaj, DTU, Denmark "Data Analytics based Network Operation and Management Infrastructure"
14:25-14:30; Ilya Lyubomirsky, Inphi, USA "Introduction to part II: ML for networking layer"
14:30-14:35; Nasser Mohammadiha, Zenuty, Sweden "Machine Learning for autonomous driving"
14:35-14:40; Henrik Wymeersch, Chalmers University of Technology, Sweden "Introduction to part III: ML for non-telecom applications of ML in optics"
14:40-14:45; Peter Bienstman, Ghent University, Belgium "Integrating photonicics implementation of reservoir computing neural networks"
14:45-14:50; Duccio Borghesi, EPFL, Switzerland "Machine learning-assisted routing and spectrum assignment in flexible optical networks"
14:50-14:55; Alan P T Lau, Hong Kong Polytechnic University, China "Application of machine learning to optical performance monitoring"
14:55-15:00; Jakob Thams, MyJulio, Denmark "Machine learning methods for system performance prediction"
15:00-15:05; Christian Schaeffer, Helmut Schmidt University, Hamburg, Germany "Application of ML to coherent quantum receivers"
15:05-15:10; Sebastian Savory, Cambridge University, UK "Machine learning: transceivers to networks"
15:10-15:15; Danish Rafique, ADVA, Germany "Data Analytics based Network Operation and Management Infrastructure"
15:15-15:20; Paolo Zicari, Inphi, USA "Applications of machine learning in Facebook’s production network"
15:20-15:25; Luis Velasco, Universitat Politècnica de Catalunya, Spain "A distributed data analytics architecture for cognitive transport networks"
15:25-15:30; Ilya Lyubomirsky, Inphi, USA "Introduction to part IV: non-telecom applications of ML in optics"
15:30-15:35; Marius van Gemert, Ghent University, Belgium "Integrated photonics implementation of reservoir computing neural networks"
15:35-15:40; Satyajit Singha Ray, Facebook, USA "Applications of machine learning in Facebook’s production network"
15:40-15:45; Luis Velasco, Universitat Politècnica de Catalunya, Spain "A distributed data analytics architecture for cognitive transport networks"
15:45-15:50; Ilya Lyubomirsky, Inphi, USA "Introduction to part V: non-telecom applications of ML in optics"
15:50-15:55; Peter Bienstman, Ghent University, Belgium "Integrating photonics implementation of reservoir computing neural networks"
15:55-16:00; Henrik Wymeersch, Chalmers University of Technology, Sweden "Introduction to part VI: ML for networking layer"
16:00-16:05; Duccio Borghesi, EPFL, Switzerland "Machine learning-assisted routing and spectrum assignment in flexible optical networks"
16:05-16:10; Nasser Mohammadiha, Zenuty, Sweden "Machine Learning for autonomous driving"

Panel discussion: what have we learned from part I and what are the future prospects 17:25-18.00
Abstract: Google's global cloud infrastructure is built on three pillars: ubiquity, disaggregation and high availability. To support these three pillars, we have been building a network unparalleled in reach, scale and capability over the last decade. Early on, we realized that the network we needed to support our services did not exist and could not be bought. Hence, over the past 10+ years, we set out to fill in the required pieces in-house. Our fundamental design philosophy is that the network should be treated as a large-scale distributed system and leverage the same control infrastructure we developed for Google's computer and storage systems. In the process, we made every network layer intelligent, fault-tolerant, highly reliable and programmatically manageable to allow for rapid evolution and innovation. Software defined networking is the only way we build network infrastructure at Google today.

Vijay Vusirikala is Head of Optical Network Architecture and Engineering at Google, responsible for technology development, design, scaling and optimization of Google's optical network covering client optics, campus, metro, long haul and submarine links. His team spurs a number of network innovations and catalyzes early adoption of new optical technologies such as open line systems, Data Center Interconnect (DCI), Subsea Open Cables, C+L band line systems, and programmable transport layer, in a large scale production environment.

Prior to Google, Vijay was Director of Marketing at Infirerra where he worked with major global network operators to design and deploy PIC based digital optical networks. Prior to joining Infirerra, he was at Motorola Access Networks as Director of Market Development for PON, DSL, and IPTV products. Earlier, he was with Sycamore Networks in senior system architecture and product management roles, where he defined architecture for reconfigurable optical networks, and integrated switching and transport systems.

Vijay has published extensively and holds 15+ patents in optical components, system design and network architecture. He is a frequent speaker at industry conferences and executive forums. He received an MS in Physics and a Ph.D in EE with a focus on optoelectronic integration from the University of Maryland, College Park and a BSEE from IIT, Madras in India.

Professor Anne L’Huillier

11:00 – 11:30 Congress Hall

50 years of Nobel Prizes in Photonics: From 1964 to 2014

Abstract: This presentation will describe some of the Nobel prizes in Physics in the area of Photonics. Starting from the 1964 Nobel prize to Townes, Basov and Prokhorov “for fundamental work in the field of quantum electronics, which has led to the construction of oscillators and amplifiers based on the maser–laser principle” to the 2014 Nobel prize to Akasaki, Amano and Nakamura “for the invention of efficient blue light–emitting diodes which has enabled bright and energy-saving white light sources”.

Anne L’Huillier is professor in Atomic Physics at Lund University since 1997. Her research is centered around high-order harmonic generation in strong laser fields and its applications, in particular, to attosecond science. She was elected to the Royal Swedish Academy of Sciences in 2004 and has been member of the Nobel committee for Physics from 2007 to 2015.

Professor Philip Diamond

11:30 – 12:00 Congress Hall

Square Kilometre Array and how it will be Heavily Reliant on Optical Fibre Systems

Abstract: The Square Kilometre Array, a next-generation radio telescope, will change the way humanity views the Universe. Building on 70 years of radio astronomy developments, astronomers and engineers are designing what will be the largest scientific instrument on the planet. The SKA, currently in the detailed design phase, will be built in Australia and South Africa by an international consortium, currently of 10 nations. The science to be done by SKA encompasses almost the entire history of the Universe, from exploring the so-called Cosmic Dawn, when the first stars and galaxies were formed, to understanding how planets are formed in the present day. Along the way SKA will enable precise studies of the secrets of gravity, dark energy, dark matter and the molecular building blocks of life.

I will discuss the current status of SKA, as the project prepares for the transition to construction. I will describe in detail the critical role that optical fibre systems play in enabling the SKA, with its requirement to transmit data at Tbit/sec rates over hundreds and thousands of kilometres, to become a reality.

Professor Philip Diamond is the Director-General of the SKA (Square Kilometre Array). He appointed to this position in October 2012, and is responsible for the team designing and ultimately constructing the SKA, which, when completed, will be the largest scientific project on Earth.

From 2010 – 2012 he was the Chief of CSIRO Astronomy and Space Science (CASS), which operates the major radio astronomy facilities in Australia, namely Parkes, the Compact Array and Mopra. CASS also operates the NASA Deep Space Network tracking station at Tidbinbilla, near Canberra, and has built ASKAP, the Australian SKA Pathfinder, in the Murchison in Western Australia.

Prof Diamond moved to Australia in June 2010, leaving his previous role as Director of the Jodrell Bank Centre for Astrophysics, part of the School of Physics and Astronomy at the University of Manchester in the UK. The University owns and operates the giant Lovel Telescope and, on behalf of the UK’s Science and Technology Facilities Council, the e–MERLIN/VLBI National Facility. Prof. Diamond was responsible for the operation of both facilities.

Professor Diamond completed his PhD at the University of Manchester in 1982. He worked at the Onsala Space Observatory in Sweden and the Max—Planck Institute for Radiophysics in Bonn, Germany before moving to the National Radio Astronomy Observatory (NRAO) in the USA for 12 years. He held the position of Deputy Director of the NRAO’s VLA and VLBA before moving back to the UK in 1999 upon being appointed as the Director of MERLIN.

Professor Diamond’s research interests include studies of star birth and death; exploring both through the use of radio interferometers such as MERLIN. He is also interested in high resolution studies of supernovae, both in our own Galaxy and in others. Finally, he also dabbles in studies of discs of molecular gas rotating around super—massive black–holes at the centres of other galaxies. He has published ~300 research papers in astronomy.

Phil is married to Jill; they have a son who recently graduated with a degree in Biochemistry and Genetics from the University of Leeds and a daughter who works as a project manager for a company installing remote scanning devices in libraries, warehouses and factories. He enjoys reading, supporting Manchester United and the England Rugby and Cricket teams, watching his son play rugby and playing the (very) occasional game of squash.
Plenary speakers

**Kazuo Hagimoto**

12:00 – 12:30  Congress Hall

**Optical Communications: Past, Present, and Future**

**Abstract:** Looking back the milestones of Fiber–Optic Systems, the future of related technologies will be discussed referring to the evolution of wireless systems. Because optical communications are based on the laser frequencies of the 200 THz.

Mr. Hagimoto joined the NTT Electrical Communications Laboratories, Yokosuka, Japan in 1980, where he has led R&D projects on high-speed optical communications systems including 10G and higher EDFA repeatered systems. After a executive director of Science and Core Technology Laboratory Group, which is responsible for leading edge technologies of NTT R&D activities, he has been the President and CEO of NTT Electronics Corporation since 2013. His current research interests include very large capacity optical network systems and media networking technologies utilizing these systems.

Mr. Hagimoto is a fellow of IEEE and the IEICE of Japan, and a member of OSA. He has served as a program co–chair of OAA’93 in Yokohama, Japan, a general co–chair of OAA’94 in Colorado, and the TPC chair of ICC2011 in Kyoto. He is currently a member of IEEE Photonics Society BoG (2015–17). He received the Sakurai Memorial Prize from the Optoelectronic Industry and Technology Development Association in 1989, the Oliver Lodge premium from the IEE in 1991, the Kenjiro Takayanagi memorial award in 1994, the achievement awards from the Institute of Electronics, Information and Communication of Engineers of Japan (IEICE) in 1984 and 2006, Maejima Award from TEISHIN association Japan in 2007, the 7th Industry–Academia–Government Collaboration Honor Program Prime Minister Award in 2009, and the Medal with Purple Ribbon from Japan in 2016.
Thursday 21 September 2017, 10:30-11:30  Room F4-F5
SC 1 – Fibers, Fiber Devices and Fiber Amplifiers

Th.2.D.1
David Richardson, Optoelectronics Research Centre – University of Southampton, UK
“Optical Amplifiers for Space-Division-Multiplexed Systems”

David Richardson obtained his B.Sc. and PhD in fundamental physics from Sussex University U.K. in 1985 and 1989 respectively. He joined the Optoelectronics Research Centre (ORC) at the University of Southampton in 1989 and was awarded a Royal Society University Fellowship in 1991 in recognition of his pioneering work on short pulse fibre lasers. Professor Richardson has been Deputy Director of the ORC with responsibility for optical fibre and laser related research since 2000. He has published more than 1000 research papers and produced more than 30 patents during his time at Southampton. He was one of the co-founders of SPI Lasers Ltd an ORC spin-off venture acquired by the Trumpf Group in 2008. Professor Richardson is a Fellow of the IEEE, OSA and IET and was elected a Fellow of the Royal Academy of Engineering in 2009. He has published more than 1000 research papers and produced more than 30 patents during his time at Southampton. He was one of the co-founders of SPI Lasers Ltd an ORC spin-off venture acquired by the Trumpf Group in 2008. Professor Richardson is a Fellow of the IEEE, OSA and IET and was elected a Fellow of the Royal Academy of Engineering in 2009. He received a Royal Society Wolfson Research Merit Award in 2013 for his optical communications research and was a recipient of the H2020 “Breaking the Optical Transmission Barriers” Horizon Prize following his involvement in the PHOTONMAP consortium.

Wednesday 20 September 2017, 08:30-09:30  Room F3
SC 2 – Integrated Optoelectronic Devices and Optical Processors

W.1.C.1
Christopher R. Doerr, Acacia, USA
“Integrated Silicon Photonics”

Christopher R. Doerr earned a B.S. in aeronautical engineering and a B.S., M.S., and Ph.D. in electrical engineering from the Massachusetts Institute of Technology. He was a pilot in the U.S. Air Force. Since joining Bell Labs in 1995, Doerr’s research has focused on integrated devices for optical communication. He received the OSA Engineering Excellence Award in 2002. He is a Fellow of IEEE, OSA, and Bell Labs. He was Editor-in-Chief of IEEE Photonics Technology Letters from 2006–2008. He was awarded the IEEE William Streifer Scientific Achievement Award in 2009. He was a Technical and General Chair of OFC. He joined Acacia Communications in 2011, where he is AVP of Integrated Photonics.

Monday 18 September 2017, 16:00-17:00  Room F4
SC 3 – Digital Techniques for Optical Communication Systems

M.2.D.1
Erik Agrell, Chalmers, Sweden
“Capacity Bounds in Optical Communications”

Erik Agrell is a Professor in Communication Systems at Chalmers University of Technology since 2009. In 2010, he cofounded the Fiber–Optic Communications Research Center (FORCE) at Chalmers, where he leads the signals and systems research area. He is a Visiting Professor at University College London in 2014–2017. His research interests belong to the fields of information theory, coding theory, and digital communications, and his favorite applications are found in optical communications. He received the 1990 John Ericsson Medal, the 2009 ITW Best Poster Award, the 2011 Globecom Best Paper Award, the 2013 CTO Best Poster Award, and the 2013 Chalmers Supervisor of the Year Award.

Wednesday 20 September 2017, 13:30-14:30  Room F6
SC 4 – Transmission Subsystems and Optical Network Elements

W.3.F.1
Nicolas K. Fontaine, Nokia Bell Labs, USA
“Components For Space-Division Multiplexing”

Nicolas K. Fontaine is currently a Distinguished Member of the Technical Staff at Nokia Bell Labs working in the advanced photonics division at the Crawford Hill lab. He obtained his Ph. D. in 2010 from the University of California, Davis. At Bell Labs, he develops devices for space–division multiplexing in multi-core and few mode fibers, builds switching devices, and investigates spectral slice coherent receivers for THz bandwidth waveform measurement.
Monday 18 September 2017, 14:00-15:00    Room F1
SC 5 – Datacom and Computercom Hardware

M.1.A.1
Benjamin Lee, IBM, USA
“Silicon Photonic Switching: Technology and Architecture”

Benjamin G. Lee received the B.S. degree from Oklahoma State University, Stillwater, OK, USA, in 2004, and the M.S. and Ph.D. degrees from Columbia University, New York, NY, USA, in 2006 and 2009, respectively, all in electrical engineering. In 2009, he became a Postdoctoral Researcher at IBM Thomas J. Watson Research Center, Yorktown Heights, NY, USA, where he is currently a Research Staff Member. His research interests include silicon photonic devices, integrated optical switches and networks for high-performance computing systems and datacenters, and highly parallel multimode transceivers. He is a Member of the Optical Society and the IEEE Photonics Society. He currently serves on the Board of Governors for the Photonics Society.

Wednesday 20 September 2017, 10:30-11:30    Room F5
SC 6 – Point-to-Point Transmission Links

W.2.E.1
Sergei K. Turitsyn, Aston University, UK
“Nonlinear Fourier Transform Based Transmission”

Professor Sergei K. Turitsyn graduated from the Department of Physics of the Novosibirsk University, in 1982 and received his Ph.D. degree in Theoretical and Mathematical Physics from the Budker Institute of Nuclear Physics, Novosibirsk, Russia in 1986. In 1992 he moved to Germany, first, as a Humboldt Fellow and then working in the collaborative projects with Deutsche Telekom. Currently, he is a director of the Aston Institute of Photonic Technologies. He was a Principal Investigator in 55 national and international, research and industrial projects. Turitsyn was the recipient of a Royal Society Wolfson Research Merit Award in 2005. In 2011 he was awarded the European Research Council Advanced Grant. In 2014 he received Lebedev medal by the Rozhdestvensky Optical Society and in 2016 Aston 50th Anniversary Chair medal. He is a Fellow of the Optical Society of America and the Institute of Physics.

Tuesday 19 September 2017, 08:30-09:30    Room G4
SC 7 – Core, Metro, and Data Centre Networks

Tu.1.G.1
Ramon Casellas, CTTC, Spain
“Control, Management and Orchestration of Optical Networks: An Introduction, Challenges and Current Trends”

Ramon Casellas (IEEE Senior Member) is with CTTC, Spain, since 2006 where he holds a Senior Researcher position. Before, he worked as an associate professor at the networks and computer science department at the ENST France, having obtained his Ph.D. in 2002. Since joining CTTC, he has been involved in multiple European, national and industry grant research projects, on topics related to traffic engineering, network optimization and network control and management, with emphasis on optical and multi-layer transport networks. His research interests include the GMPLS/PCE architectures and protocols, Software Defined Networks (SDN) and Network Function Virtualization (NFV). He has coauthored over 150 papers, 4 book chapters and 4 IETF RFCs.

Tuesday 19 September 2017, 13:30-14:30    Room F2
SC 8 – Access, Local Area and Indoor Networks

Tu.2.B.1
Ton Koonen, Eindhoven University of Technology, The Netherlands

Ton Koonen is Full Professor in Eindhoven University of Technology since 2001. He is Chairman of the group Electro–Optical Communication Systems since 2004, Vice–Dean of the Dept. Electrical Engineering since 2012, and Scientific Director of the Institute for Photonic Integration at TUE since Jan. 2016. Before 2001, he worked more than 20 years in applied research in industry, amongst others in Philips Telecommunication Industry and Bell Labs – Lucent Technologies. He is a Bell Labs Fellow (1996), IEEE Fellow (2007), USA Fellow (2013), and Distinguished Guest Professor of Hunan University, Changsha, China (2014). In 2011, he received an Advanced Investigator Grant of the European Research Council. He (co–)authored more than 650 papers on optical fiber communication. His current research interests include spatial division multiplexed systems, access and in–building fiber networks, including high–capacity POF networks, radio–over–fiber techniques, and optical wireless communication techniques.
SC 1 – Fibers, Fiber Devices and Fiber Amplifiers

Wednesday 20 September 2017, 13:30-14:00 Room F2
Stojan Radic, University of California San Diego, USA
“Frequency Stabilisation and its Implication in Optical Networks”

Tuesday 19 September 2017, 08:30-09:00 Room F1
Ranad Slavik, University of Southampton, UK
“Ultralow Thermal Sensitivity of Phase and Propagation Delay in Hollow-Core Fibres”

Wednesday 20 September 2017, 08:30-09:00 Room F2
Cristian Antonelli, University of L'Aquila, Italy
“Propagation Effects in SDM Fibers”

Wednesday 20 September 2017, 10:30-11:00 Room F6
Guifang Li, University of Central Florida, USA
“Low Power Amplified Mid IR Parametric Conversion in Tapered Chalcogenide Photonic Crystal Fibres”

SC 2 – Integrated Optoelectronic Devices and Optical Processors

Tuesday 19 September 2017, 14:00-14:30 Room F3
Daniel Blumenthal, UCSB Santa Barbara, USA
“Ultra-Low Loss SiS4N Planar Waveguide Platform and Applications”

Monday 18 September 2017, 15:00-15:30 Room F3
Takuro Fujii, NTT Corporation, Japan
“How Power Performance Epitaxially Grown III-V Membrane Lasers on Si”

Monday 18 September 2017, 16:00-16:30 Room F3
Joel Carpenter, The University of Queensland, Australia
“Principals Modes in Multimode Fiber”

SC 3 – Digital Techniques for Optical Communication Systems

Tuesday 19 September 2017, 14:00-14:30 Room F4
Georg Bücherer, Technical University of Munich, Germany

Wednesday 20 September 2017, 09:30-10:00 Room F4
Marco Secondini, TeCIP Institute, Scuola Superiore Sant’Anna, Italy
“Fiber Nonlinearity Mitigation in WDM Systems: Strategies and Achievable Rates”

Thursday 21 September 2017, 08:30-09:00 Room F4-F5
Vahid Aref, Nokia Bell Labs, Germany
“Does the Cross-Talk Between Nonlinear Modes Limit the Performance of NFDM Systems?”

Wednesday 20 September 2017, 10:30-11:00 Room F4
Jens Rasmussen, Fujitsu, Japan
“DSP for Short Reach Optical Links”

Monday 18 September 2017, 14:30-15:00 Room F4
Toshiaki Koike-Akino, MERL, USA
“Irregular Polar Coding for Multi-Level Modulation in Complexity-Constrained Lightwave Systems”

SC 4 – Transmission Subsystems and Optical Network Elements

Wednesday 20 September 2017, 14:30-15:00 Room F6
Joel Carpenter, The University of Queensland, Australia
“Principals Modes in Multimode Fiber”

Thursday 21 September 2017, 08:30-09:00 Room G4
Hiroshi Yamaizaki, NTT Corporation, Japan
“Ultra-Wideband Digital-to-Analog Conversion Technologies for Tbit/s Channel Transmission”

Monday 18 September 2017, 16:30-17:00 Room F6
Michael Eiselt, ADVA Optical Networking SE, Germany
“Optical Transceivers for Mobile Front-Haul and PON Applications”

Tuesday 19 September 2017, 08:30-09:00 Room F6
Masatoshi Suzuki, KDDI Research, Inc., Japan
“Peta Bit Per Second Optical Transmission with Spatial Division Multiplexing”

Wednesday 20 September 2017, 08:30-09:00 Room F6
Jean-Yves Dupuy, Ill-Lab, France
“High Performance Electronics for High-speed Optical Transceivers in Datacom and Telecom Applications”

SC 5 – Datacom and Computercom Hardware

Wednesday 20 September 2017, 09:30-10:00 Room F6
Yannick De Koninck, Luxtera Inc., USA
“Advanced Silicon Photonics Transceivers”

Thursday 21 September 2017, 10:30-11:00 Room F1
Hans-Juergen Schmidtke, Facebook, USA
“Application-driven Requirements for Next-Generation Data Center Interconnects”

Tuesday 19 September 2017, 13:30-14:00 Room F1
Dazeng Feng, Mellanox Technologies Inc, USA
“Silicon Photonics Integration Platform for High Performance Interconnects”

Wednesday 20 September 2017, 14:00-14:30 Room F1
Jessie Rosenberg, IBM Watson Research Center, USA
“Monolithic Silicon Photonic WDM Transceivers”

Wednesday 20 September 2017, 09:30-10:00 Room F1
Frank Chang, Inphi Corp, USA
“New Paradigm Shift to PAM4 Signaling at 100/400G for Cloud Data Centers: A Performance Review”

SC 6 – Point-to-Point Transmission Links

Monday 18 September 2017, 14:00-14:30 Room F5
Yuta Wakayama, KDDI Research, Inc, Japan
“Ultra-High Spectral Efficiency Few-Mode Multicore Fibre Transmission”

Thursday 19 September 2017, 09:30-09:00 Room F5
Alexei Pilipetski, TE SubCom, USA
“The Role of SDM in Future Transoceanic Transmission Systems”

Thursday 21 September 2017, 09:30-10:00 Room F5
Masanori Nakamura, NTT Network Innovation Laboratories, Japan
“Long Haul Transmission at High Baud Rates toward over 100-GBaud with Coded Modulation”

Wednesday 20 September 2017, 11:30-12:00 Room F5
Arthur Lowery, Monash University, Australia
“Distributed Nonlinear Compensation using Optoelectronic Circuits”

Monday 18 September 2017, 16:00-16:30 Room F5
Roland Ryf, Nokia Bell Labs, USA
“Long-Haul Transmission Over Multi Core Fiber with Coupled Cores”

SC 7 – Core, Metro, and Data Centre Networks

Thursday 21 September 2017, 09:30-10:00 Room F1
Nicolò Sambo, Scuola Superiore Sant’Anna, Italy
“Control and Management of Sliceable Transponders”

Thursday 21 September 2017, 10:30-11:00 Room F3
Marc De Leenheer, ON.Lab, USA
“SDN Control of Optical Networks”

Wednesday 20 September 2017, 10:30-11:00 Room F1
Kevin Sparks, Nokia Bell Labs, USA
“Could the Transformation to Cloud-Optimized Networking be Opening a New Era for Dynamic Optical Networking?”

Tuesday 19 September 2017, 13:30-14:00 Room F6
Ken-Ichi Sato, Nagoya University, Japan
“Realization and Application of Large-scale Fast Optical Circuit Switch for Data Center Networking”

Monday 18 September 2017, 16:00-16:30 Room F1
Anna Tzanakaki, University of Athens, Greece, and University of Bristol, UK
“Optical Networking: An Important Enabler for 5G”

SC 8 – Access, Local Area and Indoor Networks

Wednesday 20 September 2017, 13:30-14:00 Room F4
Jun-Ichi Kani, NTT Access Network Service Systems Laboratories, Japan
“Flexible Access System Architecture to Support Diverse Requirements and Agile Service Creation”

Monday 18 September 2017, 14:00-14:30 Room F2
Xiang Liu, Huawei, USA
“Recent Progresses on Efficient Mobile Front-haul for 5G Wireless Networks”

Thursday 21 September 2017, 11:00-11:30 Room F2
Piet Demeester, Ghent University, Belgium
“ATTO: Wireless Networking at Fiber Speed”

Thursday 21 September 2017, 08:30-09:00 Room F2
Naoki Suzuki, Mitsubishi Electric Corporation, Japan
“100G to 1T Based Coherent PON Technology”
**Lab Automation Hackathon**

**Sunday, 17th September, 19:30 – 22:00**  
**Place:** Svenska Mässan, Gothenburg, Sweden  
**Room:** G1

**Organisers:**  
Jochen Schröder, Chalmers University of Technology  
Nicolas Fontaine, Nokia Bell Labs  
BinBin Guan, Acacia Communications

Lab work is most efficient when data can be acquired in an automated way. Especially when taking measurements over long durations automated acquisition avoids introducing human error and allows researchers to concentrate on the fun part of experimental work. Open source software in easy to learn languages such as Python provides just as much, or more features/interoperability than alternative commercial software. In this hackathon several researchers with 10+ years experience of lab automation will show you the power of using Python to quickly get a lab experiment running and display the measurements in a browser. We will learn from companies that work in photonics how they take advantage of Python to create easy interfaces to their software and hardware.

Bring a laptop to participate in the exercise. There will also be plenty of time for mingling and discussion. Light food and drinks will be served.

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**Women’s Leadership in Science and Technology**

**Tuesday, 19th September, 12:00-13:30**  
**Place:** Svenska Mässan, Gothenburg, Sweden  
**Room:** G4

**A light lunch will be served at the session. Pre-registration mandatory.**

**Organisers:**  
Qin Wang, RISE Acreo  
Lauren Mecum, IEEE Photonics Society  
Patryk Urban, IEEE Photonics Sweden

To promote personal and professional growth for women in Science, Technology, Engineering and Mathematics (STEM) this special networking event will be arranged as part of the ECOC 2017 conference.

Two top female leaders are invited and will give talks to share their personal successful experience with the participants, which can hopefully inspire/encourage young female professionals and PhD students to be as future leaders in STEM areas.

The event chair is Dr. Lauren Mecum, IEEE IPS

12:00 Welcome and opening introduction, Dr. Qin Wang, RISE Acreo AB  
12:05 Brief of IEEE WIP, Dr. Lauren Mecum  
12:10 Announcement of European Women in Space Technology Initiative, Dr. Linda Mondin, European Space Agency (ESA)  
12:15 Invited talk, Pia Sandvik, RISE  
12:35 Invited talk, Anna Rathsman, Swedish Space Corporation (SSC)  
12:55 Panel discussions, Pia Sandvik, Anna Rathsman and Linda Mondin will be in the panel to have interactions with audiences and answer questions.  
13:30 End

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**Pia Sandvik**  
Pia Sandvik, CEO, RISE Research Institutes of Sweden. Pia has switched between research and the business sectors, and that’s something she enjoys. Her aim for RISE is to focus on both coordination synergies and develop new services that benefit customers and society.

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**Anna Rathsman**  
Anna Rathsman, Vice President & CTO, Technology & Innovation, Swedish Space Corporation (SSC). Her role as Chief Technical Officer is to provide the technical vision, support the business development, sets the tone and guides direction for the company’s development and deployment of core technologies.
15:45 M.1.E.6 Hybrid Cladding-pumped EDFA/Raman System for SDM Transmission Systems Using Core-by-core Gain Control Scheme

Shin-ya Sugishita, Hideki Hasegawa, Koki Nishio, Tatsuhiko Isobe, Tatsuya Morishita, Shinsuke Yamasaki, Yu Kawanishi, Akio Ohtsu, Hiroshi Nakamura, Minoru Yamauchi, Kazunori Yamauchi, Yukihiro Tokuda, Honda and Dr. Koji Kaneko

We present and demonstrate hybrid cladding-pumped Raman amplification for multi-core fiber transmission systems. The system based on semi-elliptical core fiber (SC2) showed 0.74-dB gain improvement compared with a conventional EDFA. It could be extended to a 970-nm C-band system.
employing SDN-enabled S-BVTs based on adaptive multicarrier

We experimentally demonstrate transparent/dynamic delivery of

Casellas1; Ricard Vilalta1; Ricardo Martínez1; Raul Muñoz1; Juan Pedro Fernández-

are experimentally demonstrated on the cloud radio over flexible

is achieved by a SDN-enabled flexible optical fronthaul network.

The BBU aggregation for mobile tidal traffic is proposed, which

17:00 M.2.A.4
Demonstration of Lighthouses Realization for BBU aggregation in the SDN-Enabled Optical Fronthaul Networks

The BBU aggregation for mobile fronthaul is proposed, which is achieved by a SDN-enabled optical fronthaul network. Two light-houses realization strategies for the BBU aggregation are experimentally demonstrated on the cloud radio over flexible optical fronthaul networks.

17:15 M.2.A.5
Experimental Validation of SDN-Enforced Virtual Core Architecture for Transportable Mobile Front/haul/Backhaul Traffic Delivery using SDN-enabled Sliceable Bitrate Variable Transceivers

We experimentally demonstrated transparent delivery of mobile front/backhaul in converged optical network architecture, and applying SDN [SDN-Enforced Sliceable Bitrate Variable Transceivers (SDN-SBVTs)] as a new core network paradigm. Network lab experiments showed successful BBU aggregation to as many as 17 (BBUs) and capacities beyond 30Gb/s per cell.

16:00 M.2.A.1
Experimental Demonstration of 108 Gba/s Optical Packet Network for MesoScale Mobile Fronthaul with Load- independent Ultra-low Latency

This 100GHz integrated passive-optical hybrid network operated with a 125Gbit/s per channel that could be independent ultra-low latency Ethernet packets supporting time-sensitive traffic through a mesh traffic network.

16:45 M.2.A.3
Flexible RAN: a Radio Access Network Concept with Flexible Functional and Programmable Optical Transport

We present the flexible HW and control and evaluate its performance in different radio coordination scenarios considering on optical transport network. The realization of the benefits HW can be compared in C-RAN in terms of wavelength usage and transport cost.

17:00 M.2.A.4
Demonstration of Lighthouses Realization for BBU aggregation in the SDN-Enabled Optical Fronthaul Networks

We analyze performance metrics to predict the post-FEC BER

16:30 M.2.C.2
32-GHz Heterogeneously Integrated Silicon Laser Modulator with 2528-um-long III-V MOS-capacitor

Phase Shifter

This paper focuses on converged optical-wireless 5G network architectures leveraging SDN-enabled S-BVTs for flexible and transparent delivery of mobile traffic. We present a tailored FlatFab silicon photonic chip featuring a monolithically integrated optical processing core and a hybrid silicon optical output interface. The hybrid silicon optical output interface contains a high optical output power (2.1 µW Insertion Losses) and a high optical output power (2.1 µW Insertion Losses) and a high optical output power (2.1 µW Insertion Losses) and a high optical output power (2.1 µW Insertion Losses) and a high optical output power (2.1 µW Insertion Losses) and a high optical output power (2.1 µW Insertion Losses) and a high optical output power (2.1 µW Insertion Losses) and a high optical output power (2.1 µW Insertion Losses) and a high optical output power (2.1 µW Insertion Losses) and a high optical output power (2 Beijing University of Posts and Telecommunications, Beijing, China

Yajie Li1; Jonas Mårtensson2; Matteo Fiorani3; Björn Skubic3; Zere Ghebretensaé3; 4Beijing University of Posts and Telecommunications, Beijing, China

We present the flexible RAN concept and evaluate its mixed traffic network.

Mobile fronthaul networks put very strict demands on latency.

Infrared.
We propose the distributed measurement of spatial modes with respect to classical BOTDA sensing, while keeping the same sensing capability. A closed-loop controlled BOTDA distributed optical fibre sensor is designed and developed. This sensor is based on a novel, negative curvature antiresonant hollow core fibre with the potential for low loss and very wide bandwidth. A 1.9x10^-9 BER is achieved for a millimeter-wave carrier at 32-GHz power consumption. A fully-integrated polarization-diversity 8x8 switch was implemented using a programmable, electrically-driven single photon source coupled to waveguide devices offering exciting prospects for quantum computing. Such devices could find applications in on-chip nanocarbons and single photon sources integrated on chip using superconducting electronics.

Information exchange between detector outputs allows elements to perform signal processing in a challenge in precision of the same application as for a close-loop concept: optical fibre. The output of this concept is used for precise spatial mode selection and to perform an optical feed-forward control of the effective output from the two parallel fibres.

**Title:** Hybrid High Channel Count Optical Fiber Interface for Silicon Photonics using Polymer Wires

**Authors:** Keijiro Suzuki; Ken Tanizawa; Satoshi Suda; Hiroyuki Matsuura; Kazuhiro Ikeda; Shu Keo; Yoichi Watanabe; Hidetoshi Itoh; Yusuke Takagaki; Masahide Fujita; Kousuke Nagata; Takahide Sakamoto; Toshimasa Umezawa; Guo-Wei Lu; Kouichi Akahane

**Abstract:** We present a novel format of combined geometric-probabilistic spatial-super-channel and up to 297.8-bit/s/Hz aggregate spectral efficiency of 1024-QAM signals, achieving up to 7-Tbit/s data rates per fibre. We demonstrate that an 8.4 Tbit/s data link transmitted using capacity-approaching fractional probabilistic constellations (TPCS-64QAM). Seven FEC code rates allow 24.5 Gbps transmission with stochastic efficiency of 3.9 b/Hz. We propose and demonstrate spatial coherent matched filtering detection using two-dimensional high-speed photodiode array. We show that self-detection can provide little benefit for such systems.

**Conclusion:** We demonstrate transmission of 78x256Gb/s PM-16QAM constellations using 45 nm silicon photonics optical transceiver. The bit-error rate is below 10^-2 at 40 Gbaud, with a combination of 1.6 dB penalty due to non-linear optical effects and 3.4 dB penalty for bit-error rate. Seven FEC code rates allow 24.5 Gbps transmission with stochastic efficiency of 3.9 b/Hz. We propose and demonstrate spatial coherent matched filtering detection using two-dimensional high-speed photodiode array. We show that self-detection can provide little benefit for such systems.
08:30 Tu.1.G.1 Tutorial
Control, Management and Orchestration of Optical Networks: An Introduction, Challenges and Current Trends
Kohei Nakajima, Roshan Mathew, Prasad Varaiya, Raul Muñoz
Optical Networks and Systems Chair, Optical Networks and Systems
This tutorial is an introduction to control and management, focusing on main drivers, key benefits and functional/protocol architectures. It covers multi-domain and multi-layer networks and includes complex use cases and current trends such as joint IT/network orchestration and slicing.

09:30 Tu.1.G.2 Software-Defined Networking Control Plane for Seamless Integration of Silicon Photonics in Datacom Networks
Yiwen Shen; Payman Samadi; Ziyi Zhu; Alexander Gazman; Erik Anderson; David Calhoun; Maarten Hattink; Keren Bergman, Columbia University, New York, USA
We present a scalable Software-Defined-Networking (SDN) control-plane to integrate Silicon Photonics (SiP) with conventional Ethernet/InfiniBand networks and simultaneously perform packet and circuit switching. Experimental evaluations demonstrate this unique solution with 224 microseconds control plane latency for data-center and high-performance-computing platforms.

09:45 Tu.1.G.3 Priority-Aware Service Orchestration Using Big Data Analytics for Dynamic Slicing in 5G Transport Networks
Muhammad Rehan Raza1; Ahmad Rostami2; Allan Vidal3; Mateus Augusto Silva Santos3; Lena Wosinska1; Paolo Monti1
1KTH Royal Institute of Technology, Kista; 2Ericsson Research, Kista, Sweden; 3Ericsson Research, Indaiatuba, Brazil
We demonstrate how to efficiently scale up/down resource slices allocated to tenants with different service priorities. Experimental results show that our proposed strategy—based on big data analytics—improves service degradation by more than 51%, compared to priority unaware approaches.
We demonstrate an integrated silicon-based slave transceiver. Both NRZ and PAM-4 modulation schemes for reception are experimentally demonstrated. We propose a simple micro rate controller for probabilistic shaping. It realizes good spectral efficiencies from 1 to 2 bits/pulse/polarization and 4.2 dB lower required SNR than CCDF under a much shorter block length of 64.
Mode Multiplexer Based on Multi-Plane Light and its Effects on Few-Mode Fibers

P1.SC1.02

Optical Subcarrier Processing for Nyquist SCM

P1.SC1.12

Multi-Carrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.28

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.35

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.40

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.45

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.50

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.55

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.60

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.65

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.70

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.75

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.80

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.85

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.90

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.95

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.100

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.105

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.110

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.115

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.120

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.125

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.130

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.135

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.140

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.145

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.150

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.155

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.160

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.165

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.170

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.175

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.180

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.185

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.190

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.195

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.200

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.205

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.210

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.215

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.220

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.225

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.230

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.235

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.240

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.245

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.250

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser

P1.SC1.255

Multicarrier Sources Using External Injection Based on Tunable-LO Femtosecond Laser
43rd European Conference on Optical Communication

POSTER SESSION 1
TUESDAY 19 SEPTEMBER | 15:00-17:00

P1.SC.43

Experimental Demonstration of Encryption and Steganography in Optical Fiber Communication
Ting Yang, Nazmul Islam, Wenqiang Xie, Xinyu Chen, Rui Liu, Rong Zhai, Ziyang Jia

P1.SC.44

FRAstal Dimension Aligned Modulation Formats Identification Based on Support Vector Data Analysis
Yifei Yan, Zhiyong Wang, Chunyang Li, Meng Zhang

P1.SC.45

Joint Preliminary, Post-Guarantee of Spectral Narrowing Caused by Traversing Multiple Optical Fibers
Huiyu Jin, Yuekun Zhu, Luyu Long, Jie Fang, Yuxi Fan, Xiaodong Wang

P1.SC.46

Digital Dispersion Pre-compensation and Non-Linear Impairments Pre- and Post-compensation for C-band 400G PAM-4 Transmission over SSMF Based on Direct Detection
Guoning Xing, Zhequn Chen, Jie Yang, Yunfeng Chen, Longbing Zhu, Xianwen Zhang, Zhai Cao, Xiaoyuan He, Jinlong Niu

P1.SC.47

Single-PPZG Augmented Spectrally Efficient DQPSK Transmitter
Weili Wang, Zhaoyang Liu, Yafei Wu, Changyu Wang, Xurong Yang, Ming Huang, Lihui Zhang

P1.SC.48

Polarization Diversity for Tracking in Space-Dependent Multi-Path Channels
Elaine Chang, James Joo, Donghun Kim, Young-Tae Cho

P1.SC.49

Multi-Resonating Scheme Supporting Arbitrary Multi-Wavelength Reception for Optical Internetworking
Shiqun Wang, Yuan Tian, Jingyan Sun, Kaihua Wang, Ping Zeng, Jianzhao He

P1.SC.50

Beating Bandwidth Limitation for High-speed PAM-4 Transmission Based on Turbo Equalizer
Junwen Zhang, Jianjun Yu, Jianyang Shi

P1.SC.51

Low Complexity Blind Phase Recovery Algorithm with Increased Robustness Against Cycle-Slip Effect
Xinzhuang Chen, Shangdong Wang, Jie Zhang, Licheng Yang, Shengnan Liu

P1.SC.52

Distributed Transmission and Spatially Coupled Error Correction in Regenerative Multipoint-to-Point Networks
Christian Sanchez, Filipe Ferreira, Jinlong Wei, Stylianos Sygletos, Andrew Ellis

P1.SC.53

Single-Step Perturbation-based Nonlinearity Compensation of Intera- and Intra-Subcarrier Interference
Keisuke Kasai, Toshihiko Hirooka, Masato Yoshida, Masataka Nakazawa

P1.SC.54

Experimental demonstration of signal quality equalization in vector domain to mitigating the inter-carrier to-carrier Q difference for SDM transmission
Yuanjian Cui, Wei Zhang, Tingyu Zhang, Chao Sun, Feng Zou, Zheng Luo

P1.SC.55

Training-Coupled Channel Estimation and Equalization in SDM Systems with MIMO Pre-convergence under Strong Coupling
Jianbin Gao, Jie Yang, Zhenzhen Wang, Jingyi Li, Jianhuang Cai, Weigen Li

P1.SC.56

Dispersion Compensation of Coherent Optical Time-Domain Reflectometer with Gas-filled Coded ASK Prisms
Dongyan Long, Chen Jiang, Hongyan Huang, Zhenfei Fu, Lijun Ren

P1.SC.57

Multimodal Amplitude Regeneration of PAM-4 Signals using a Nonlinear Optical Loop Mirror
Hao Wang, Guoxiang Zhang, Jinlong Zhou, Zhanhong Xiao, Zhen Su, Rui Sun, Dali Lin

P1.SC.58

10 Gbps Tunable VCSEL-based SFP+ with Integrated G-METROLOGY Function for Front-Haul Access Networks
Christian Chopin, Christina Karayiannaki, Mads Galbavy, Leif Katsuo Oxenløwe

P1.SC.59

SSMF. 1550-nm DMX OWDM SFP+ modules based on on-chip VCSELs are demonstrated. The experimental demonstration of return-to-zero PAM-4 signals is experimentally demonstrated using a single MLNL unit. The linearity performance of each subcarrier channel is characterized, and Q-factor improvement of 0.3 dB is achieved by optimizing input signal power and distortion level.

P1.SC.60

Characterization of Spectral Magnification based on Wave-Mixing in Nonlinear Fiber for Advanced Modulation Formats
James Sullivan, Xi Zhang, Andrew Ellis, Stylianos Sygletos, Peter Winzer, Junhua Zhao, Robert T. W. Cheung, Christian Sanchez, Filipe Ferreira, Jinlong Wei, Andrew Ellis

P1.SC.61

Single-carrier 56 Gbit/s PAM-4 transmission over 60 km using Single-carrier receiver using digital Data Car Stress
Xiaoliang Cheng, Zhihong Chen, Min Bai, Hongming Zhang

P1.SC.62

Single-carrier 52 Gbit/s, 46 Gbaud QAM Coherent transmission over 100 km with Co-propagating 16 Gbit/sOOK Signals over a Deployed ROADM Network
David Garcia, Maria Morant, Juan Luis Corral, Roberto Llorente

P1.SC.63

Introducing OSB-based Coherent Receivers for Wide-area Reference Frequency Distribution in Metrology Applications
Jordi Vicente, Carles Delaclaveria, Marta Fucaric, Lucía Villanueva, Celestino Villanueva

P1.SC.64

Detection and Compensation of Power Imbalance and Modulation Impairments in Coherent QAM Transmitters
Bill Madsen, David Brink, Christian Sanchez, Filipe Ferreira, Jinlong Wei, Stylianos Sygletos, Andrew Ellis

P1.SC.65

Polarization Dependent Loss Monitor with 3rd-order Perturbation Coherent Optical Processing System
Rui Shao, Xiwen Jiang

P1.SC.66

Broadband Inter-Core Optical Multiplexing with Multifrequency Combines
Craig Atkinson, Jonathan Finch, Stephen Holder, Sam Moore

P1.SC.67

Broadband Inter-Core Optical Multiplexing with Multifrequency Combines
Mikko Gudrun, Antti Syrjanen, Antoni Vasilakos, Keyuri Q. Park, Javier Casanova

P1.SC.68

Subcarrier Multiple Access for OFDM: An Experimental Study on the Internet
Yujiro Mori, Hiroshi Hasegawa, Ken-Ichi Sato

P1.SC.69

206-Gb/s Polarization Multiplexed Double-Differential OFDM Signal Transmission over 60 km SSMF Using tandem SBS without Optical Amplification
Feng Wen, Christos Tsekrekos, Xingyu Zhou, Yong Geng, Baojian Wu, Kun Qiu

P1.SC.70

Novel FM as Optical Coherent Receiver
Ivan Iordachita, Maria Jose Fernández, Olaf T. M. Oezaslan, Christian Contreras

P1.SC.71

Phase-agnostic coherent receiver of 60Gbaud and OFDM signals over loss budgets of more than 30 dB is experimentally demonstrated with a commercial off-the-shelf external modulated laser. Waveform-looking has been used to characterize the transmitted signal and the modulated optical waveform.
even 80km OSNR limited connectivity distance objectives from 100m MMF, up to 10/40km SMF and USA

56 Gb/s PAM-4 modulation and 10 km transmission of CWDM, Blvd., 13139 Jess Pirtle Blvd., Sugarland, USA

Hsiang Liao; I Lung Ho; Jun Zheng, Applied Optoelectronics Inc., 13139 Jess Pirtle Blvd., Sugarland, USA

We experimentally demonstrate error-free rates beyond 09:00 W.1.A.3

PAM-4 through 105m of wideband fiber at 10-12 BER.

Stuttgart, Germany

Buelow1; Stephan Ten Brink2 1Nokia Bell Labs, Stuttgart; 2University of Stuttgart, Germany

We review the main propagation effects that take place in 08:30 W.1.B.1

silicon photonics. A maximum isolation ratio larger Silicon photonics is a planar arrangement of silicon optical Japan

we can achieve floating-point performance using 9-bit pairwise 09:45 W.1.D.3

Minimization

minimizing resulting ISI of the quantized FIR impulse responses, we can achieve good performance using 9-bit paired, optimized filter coefficients.

Yamamoto; Kazuhide Nakajima, NTT Corporation, Tsukuba, Japan

We reveal LP02 mode has the lowest modal crosstalk in 09:30 W.1.B.2

Yusuke Sasaki1; Keisuke Hirakawa1; Itaru Ishida2; Shoichiro Matsuo2; Kazuhiko Mizumoto3; John Bowers1

90 km UWDM transmission using 56 Gb/s PAM-4 09:15 W.1.A.4

and end with communication and sensor devices. 205 km unrepeated transmission over eight Multi-core Fibre

We demonstrate simultaneous multiple-wavelength locking 09:45 W.1.E.3

based wavelength division multiplexing receiver. Using a multi-wavelength array, we measure the coherence length of the optical laser.

Hirose1; Takeshi Hoshida1

09:00 W.1.B.4

Interconnects

W.1.A: Advanced Modulation for Data Centre

Chair: Christoph Schulien, Ranovus GmbH, Germany

W.1.B: Space-Division Multiplexing Fibres

Room F1 (SCS) Chair: Christoph Schulien, Ranovus GmbH, Germany

Room F2 (SCI) Chair: Ivan Gasiou, Universidade de Valencia, Spain

Room F3 Chair: Ivan Gasiou, Trinity College, Dublin Ireland

Room F4 Chair: Enzo by, NEC Labs, USA

Room F5 Chair: Philippa Chand, Orange Labs, France

Room F6 Chair: Niels Quack, École Polytechnique Fédérale de Lausanne, Switzerland

Room F7 Chair: Nils Hölscher, Delft University of Technology, Netherlands

Room F8 Chair: Kenji Fujita, Keio University, Japan

Room F9 Chair: Katsunori Nakamura, Osaka University, Japan

Room F10 Chair: Zhe Wang, ZTE Corporation, China

Room F11 Chair: Goji Nakagawa, Fujitsu, Japan

Room F12 Chair: Takeshi Hoshida, NTT, Japan

Room F13 Chair: Takeshi Hoshida, NTT, Japan

Chair: W.1.A.1

Invited

08:30 W.1.B.1

Propagation Effects in SDM Fibers

Sinan Gunturkun, Instituto de Telecomunicaciones, Cantabria, Spain

We present the main propagation effects that appear in multi-mode fiber structures for Space-Division Multiplexing, as well as their impact on system performance. These include Modal Dispersion, Modal-Dependent Loss, and Nonlinear distortions.

Chair: W.1.B.2

Invited

08:30 W.1.C.1

Integrating Silicon Photonics

Christofer Doerr, Sandia National Laboratories, USA

Silicon photonics is a planar arrangement of silicon optical waveguides and devices; it allows a tremendous reduction in dimensions and footprint, and provides several advantages for electronics such as uniformity and the performance is high. We start from the basic physics and end with communication and sensor devices.

Chair: W.1.C.2

Invited

08:30 W.1.D.1

Three-channel Thermal Adaptation of Polarization Insensitive Silici on waveguides in silicon photonics are a hot topic currently thanks to their potential on chip integration with electronics. In this work, we will present athermalization in silicon waveguides using a heat spreader on the back side of the waveguide. We will also demonstrate the thermalization effect on a chip-to-chip DCM interferometer and a silicon optical switch.

Chair: W.1.D.2

Invited

08:30 W.1.E.1

Vollenhove Series Digital Backpropagation Accounting for PMD

Bruce Allan, NICT, Nippon Institute of Radiance, Japan

We present a heuristic algorithm that calculates the PMD effects of propagation delay in optical communication systems. The algorithm is based on a modified backpropagation algorithm that accounts for polarisation-mode dispersion (PMD) effects. The algorithm is used to evaluate the performance limits for systems that are PMD-insensitive, leading to both performance enhancement and substantial complexity reduction.

Chair: W.1.E.2

Invited

08:45 W.1.D.3

Fixed-Precision Optimization of Time-Domain Digital Back Propagation by Inter-Symbol Interference Minimization

Christofer Doerr, Sandia National Laboratories, California, USA

We will study the performance of fixed-point digital backpropagation for transmission over a noisy channel. We will show that the use of fixed-point arithmetic can provide a good performance with respect to the floating-point arithmetic.

Chair: W.1.E.3

Invited

08:45 W.1.E.4

Colorlessness Sensed Source for CPRI Mobile Frontend over 70 km Reach

Christoph Schulien, Ranovus GmbH, Germany

We demonstrate the feasibility of colorless 10Gbaud optical sources and receivers using a colorless source and a colorless receiver. The colorless source is obtained by using a direct modulation technique, and the colorless receiver is obtained by using a colorless optical link.

Chair: W.1.F.1

Invited

08:30 W.1.F.1

High Performance ICs for Photonics

Ricardo Illanca, École Polytechnique Fédérale de Lausanne, Switzerland

We will present recent advances in the field of high-performance ICs for photonics, focusing on the design and implementation of analog and digital circuits for optical communication systems.

Chair: W.1.F.2

Invited

08:30 W.1.F.2

Ultra-Low Power SiGe 2-bit DAC Driver for HiFi IQ Mibio-Zenou Moniteur

Ricardo Illanca, École Polytechnique Fédérale de Lausanne, Switzerland

We will present a new 2-bit DAC driver for high-definition audio applications. The driver has a power efficiency of 1.67 mW, a signal-to-noise ratio of 100 dB, and a total harmonic distortion of -100 dB.

Chair: W.1.F.3

Invited

08:30 W.1.F.3

Advanced Silicon Photonics Transceivers

Ricardo Illanca, École Polytechnique Fédérale de Lausanne, Switzerland

We will present recent advances in the field of silicon photonics transceivers, focusing on the design and implementation of photonic integrated circuits for optical communication systems.

Chair: W.1.F.4

Invited

08:30 W.1.F.4

Next Generation Silicon Photonics Transceivers

Ricardo Illanca, École Polytechnique Fédérale de Lausanne, Switzerland

We will present recent advances in the field of silicon photonics transceivers, focusing on the design and implementation of photonic integrated circuits for optical communication systems.
We present a Data Centre Virtualisation architecture with an implementation and characterisation of the data plane. We describe an approach to map Data Centres requests onto the optical layer. We discuss the challenges and opportunities of leveraging original optical components and custom SDN controllers and software. We present a high-performance optical architecture and an optical network which simultaneously enables 4-mode channels and 8-modes wavelengths. Double-chirped modulated converter and amplifier-arranged waveforms are used to achieve improved performance with a lower-complexity hardware architecture coupled to a sophisticated broadband mode multiplexer.

**Invited**

W.2.C.3

10:30 W.2.C.3

10:45 W.2.C.3

11:00 W.2.C.3

11:15 W.2.C.3

**Highly ranked paper**

W.2.C.4

11:30 W.2.C.4

11:45 W.2.C.4

**Invited**

W.2.D.1

10:30 W.2.D.1

10:45 W.2.D.1

11:00 W.2.D.1

11:15 W.2.D.1

**Highly ranked paper**

W.2.D.2

10:30 W.2.D.2

10:45 W.2.D.2

11:00 W.2.D.2

11:15 W.2.D.2

W.2.D.3

11:30 W.2.D.3

11:45 W.2.D.3

**Highly ranked paper**

W.2.E.1

10:30 W.2.E.1

10:45 W.2.E.1

11:00 W.2.E.1

11:15 W.2.E.1

**Invited**

W.2.E.2

10:30 W.2.E.2

10:45 W.2.E.2

11:00 W.2.E.2

11:15 W.2.E.2

W.2.E.3

11:30 W.2.E.3

11:45 W.2.E.3

**Highly ranked paper**

W.2.E.4

10:30 W.2.E.4

10:45 W.2.E.4

11:00 W.2.E.4

11:15 W.2.E.4

**Highly ranked paper**

W.2.E.5

10:30 W.2.E.5

10:45 W.2.E.5

11:00 W.2.E.5

11:15 W.2.E.5

**Highly ranked paper**

W.2.F.1

10:30 W.2.F.1

10:45 W.2.F.1

11:00 W.2.F.1

11:15 W.2.F.1

**Invited**

W.2.F.2

10:30 W.2.F.2

10:45 W.2.F.2

11:00 W.2.F.2

11:15 W.2.F.2

W.2.F.3

10:30 W.2.F.3

10:45 W.2.F.3

11:00 W.2.F.3

11:15 W.2.F.3

**Highly ranked paper**

W.2.F.4

10:30 W.2.F.4

10:45 W.2.F.4

11:00 W.2.F.4

11:15 W.2.F.4

**Highly ranked paper**

W.2.F.5

10:30 W.2.F.5

10:45 W.2.F.5

11:00 W.2.F.5

11:15 W.2.F.5

**Highly ranked paper**

W.3.A.1

10:30 W.3.A.1

10:45 W.3.A.1

11:00 W.3.A.1

11:15 W.3.A.1

**Highly ranked paper**

W.3.B.1

10:30 W.3.B.1

10:45 W.3.B.1

11:00 W.3.B.1

11:15 W.3.B.1

**Highly ranked paper**

W.3.B.2

10:30 W.3.B.2

10:45 W.3.B.2

11:00 W.3.B.2

11:15 W.3.B.2

**Highly ranked paper**

W.3.C.1

10:30 W.3.C.1

10:45 W.3.C.1

11:00 W.3.C.1

11:15 W.3.C.1

**Highly ranked paper**

W.3.C.2

10:30 W.3.C.2

10:45 W.3.C.2

11:00 W.3.C.2

11:15 W.3.C.2

**Highly ranked paper**

W.3.D.1

10:30 W.3.D.1

10:45 W.3.D.1

11:00 W.3.D.1

11:15 W.3.D.1

**Highly ranked paper**

W.3.D.2

10:30 W.3.D.2

10:45 W.3.D.2

11:00 W.3.D.2

11:15 W.3.D.2

**Highly ranked paper**

W.3.D.3

10:30 W.3.D.3

10:45 W.3.D.3

11:00 W.3.D.3

11:15 W.3.D.3

**Highly ranked paper**

W.3.D.4

10:30 W.3.D.4

10:45 W.3.D.4

11:00 W.3.D.4

11:15 W.3.D.4

**Highly ranked paper**

W.3.D.5

10:30 W.3.D.5

10:45 W.3.D.5

11:00 W.3.D.5


**Highly ranked paper**

W.3.D.6

10:30 W.3.D.6

10:45 W.3.D.6

11:00 W.3.D.6

11:15 W.3.D.6

**Highly ranked paper**

W.3.D.7

10:30 W.3.D.7

10:45 W.3.D.7

11:00 W.3.D.7

11:15 W.3.D.7

**Highly ranked paper**

W.3.E.1

10:30 W.3.E.1

10:45 W.3.E.1

11:00 W.3.E.1

11:15 W.3.E.1

**Highly ranked paper**

W.3.E.2

10:30 W.3.E.2

10:45 W.3.E.2

11:00 W.3.E.2

11:15 W.3.E.2

**Highly ranked paper**

W.3.E.3

10:30 W.3.E.3

10:45 W.3.E.3

11:00 W.3.E.3

11:15 W.3.E.3

**Highly ranked paper**

W.3.E.4

10:30 W.3.E.4

10:45 W.3.E.4

11:00 W.3.E.4

11:15 W.3.E.4

**Invited**

W.3.E.5

10:30 W.3.E.5

10:45 W.3.E.5

11:00 W.3.E.5

11:15 W.3.E.5

**Invited**

W.3.F.1

10:30 W.3.F.1

10:45 W.3.F.1

11:00 W.3.F.1

11:15 W.3.F.1

**Highly ranked paper**

W.3.F.2

10:30 W.3.F.2

10:45 W.3.F.2

11:00 W.3.F.2

11:15 W.3.F.2

**Highly ranked paper**

W.3.F.3

10:30 W.3.F.3

10:45 W.3.F.3

11:00 W.3.F.3

11:15 W.3.F.3

**Highly ranked paper**

W.3.F.4

10:30 W.3.F.4

10:45 W.3.F.4

11:00 W.3.F.4

11:15 W.3.F.4

**Highly ranked paper**

W.3.F.5

10:30 W.3.F.5

10:45 W.3.F.5

11:00 W.3.F.5

11:15 W.3.F.5

**Highly ranked paper**

W.3.F.6

10:30 W.3.F.6

10:45 W.3.F.6

11:00 W.3.F.6

11:15 W.3.F.6

**Highly ranked paper**

W.3.F.7

10:30 W.3.F.7

10:45 W.3.F.7

11:00 W.3.F.7

11:15 W.3.F.7

**Highly ranked paper**
A Flow Controller is proposed and experimentally assessed. 

We model and experimentally demonstrate a self-learning abstraction process based on statistical analysis of the measurement traffic data, both in terms of accuracy and QoT estimator. Parameters are periodically updated which further enables an accurate QoT estimation.

We demonstrate transmission of a 10 GBd 16-QAM signal with in-line phase-sensitive amplifiers and multi-eigenvalues transmission with information encoded in principal modes are a unique basis which is free of first-order unscramblers.

We perform an experimental demonstration of dual polarization multi-eigenvalues transmission with information encoded in principal modes are a unique basis which is free of first-order unscramblers.

We show that optimizing pre- and post-dispersion can simultaneously in both orthogonal polarizations is beneficial for constructing large capacity and high spatial density transmission links.

We experimentally prove a novel two-dimensional QKD scheme, which is beneficial for constructing large capacity and high spatial density transmission links.

We show that optimizing pre- and post-dispersion can simultaneously in both orthogonal polarizations is beneficial for constructing large capacity and high spatial density transmission links.

The proposed controller allows a fast core flow traffic re-estimation after flow traffic re-routing in metro area.

We experimentally demonstrate a self-learning abstraction process based on statistical analysis of the measurement traffic data, both in terms of accuracy and QoT estimator. Parameters are periodically updated which further enables an accurate QoT estimation.

We demonstrate transmission of a 10 GBd 16-QAM signal with in-line phase-sensitive amplifiers and multi-eigenvalues transmission with information encoded in principal modes are a unique basis which is free of first-order unscramblers.

We perform an experimental demonstration of dual polarization multi-eigenvalues transmission with information encoded in principal modes are a unique basis which is free of first-order unscramblers.
We propose an OAM converter exploiting an innovative receiver, both operating at 15 Gbaud and with a combined sensitivity of -15.8 dBm, which is demonstrated in an optical link with 40 km of SSMF.
**P2.SC.43**

**Resilient Traffic Grooming in Single Hopping OTN Networks**

**Fabio Di Pasqua, University of Milano-Bicocca, Italy; Stefano Manetti, University of Milano-Bicocca, Italy; Fabio Sciarrino, University of Milano-Bicocca, Italy; Giuseppe Tani, University of Milano-Bicocca, Italy**

We propose a traffic grooming enabled resilient-aware optimization technique for resilient traffic grooming in OTN networks. We show that the proposed approach outperforms the conventional approach by providing higher service acceptance ratio and up to 50% reduction in number of transceivers.

**P2.SC.44**

**High-Capacity Tier-2 Optical Network with SSD-DO Multiband OFDM-SCAM**

**Tobias Reiter, University of Kaiserslautern, Germany; Thorsten Krueger, University of Kaiserslautern, Germany; Christian Draxler, University of Kaiserslautern, Germany; Daniel Reuter, University of Kaiserslautern, Germany; Christian Wedig, University of Kaiserslautern, Germany**

An elastic optical network equipped with variable splitters, to achieve a 32-degree OXC in the future, would influence the number of MCS-based add/drop blocks needed for traffic grooming. To evaluate the effects of this approach, we have performed a numerical study considering a 32-degree OXC.

**P2.SC.45**

**Experimental Evaluation of a PCE Transport SDN Controller for Dynamic Grooming in Packet over Elastic-Grid Optical Networks**

**Daniel Reuter, University of Kaiserslautern, Germany; Christian Wedig, University of Kaiserslautern, Germany; Christian Draxler, University of Kaiserslautern, Germany; Christian Wedig, University of Kaiserslautern, Germany**

We validate the implementations of a unified PCE-based Transport SDN controller for dynamic grooming over elastic-grid optical networks. A novel line-oN MUX router architecture targeting grooming strategies is experimentally evaluated on dynamic and heterogeneous data rate packet traffic.

**P2.SC.46**

**First Experimental Demonstration of Physical-Layer Network Coding in PAM4 System for Passive Optical Interconnects**

**Didier Erasme, University of Bordeaux, France; Fabienne Saliou, Orange, France; Stéphane Quidennet, Orange, France; Charles Gueutin, Orange, France; Ramon Puello, Huawei, Spain; Mohamed Elouati, Orange, France**

We propose a technique based on physical-layer network coding (PLNC) in coupler-based passive optical interconnects. The PLOE-UV system is fully used in the first time experimentally exhibited, where simultaneous multiplex communications can be kept with the same wavelength channel, doubling spectral efficiency.

**P2.SC.47**

**Significance of Adaptive Co-operation of Modulation Format and FEC for Energy Saving in Optical Networks**

**Yuriy Zhirninov, University of Bristol, UK; Romano Buquiera, University of Bristol, UK; Niklas Bogman, University of Bristol, UK; Mikael Janson, University of Bristol, UK**

This study quantifies how network control algorithms influence the number of MS3-based add/drop blocks needed to support a given set of connections, over a 2x25 Gbps SDM network topology.

**P2.SC.48**

**Impact of Second-order Intermodulation Distortion on Digital Optical Link Budget Efficiency**

**Xinying Li, Xiamen University, China; Miao Kong, ZTE Corporation, China; Jianjun Yu, ZTE Corporation, China; Xiangjun Hou, Beijing University of Posts and Telecommunications, China; Guanlin Li, ZTE Corporation, China; Che-Yu Wang, ZTE Corporation, China; Xiujuan Xu, ZTE Corporation, China; Jun Wang, ZTE Corporation, China; Zhenhuan Li, ZTE Corporation, China; Jian Ni, ZTE Corporation, China**

We propose a traffic grooming enabled resilient-aware optimization technique for resilient traffic grooming in OTN networks. We show that the proposed approach outperforms the conventional approach by providing higher service acceptance ratio and up to 50% reduction in number of transceivers.

**P2.SC.49**

**Impact of Root Mean Square of Optical Power on the Capacity of 5G Passive Optical Network**

**Zhenhuan Li, ZTE Corporation, China; Xuefeng Li, ZTE Corporation, China; Xiangjun Hou, Beijing University of Posts and Telecommunications, China; Jun Wang, ZTE Corporation, China**

**P2.SC.50**

**A Novel Traffic Grooming Scheme for Nonlinear Elastic Optical Network**

**Carol Seaver, Virginia Tech, USA; Cheyi Li, Shanghai Jiao Tong University, China; Y. Wei, Shanghai Jiao Tong University, China; Zhijian Zhang, Shanghai Jiao Tong University, China**

We propose a new grooming scheme for nonlinear elastic optical networks (NEON) that utilizes the benefits of the physically-multiplexed architecture while allowing for efficient utilization of the pre-existing infrastructure and with negligible additional complexity.
09:00 Th.1.A.3
Demonstration of Real-time Modulation Adaptable Transmitter

Shangyi Yan1; Arash Farhadi Beldachi1; Fengchen Qian2; Koteswararao Kondepu1; Marc Ruiz1; Filippo Cugini2; Tommaso Foggi2; Luis Velasco1; Piero Castoldi3; Somayeh Ziaie1; Ricardo Ferreira1; Muga Nelson1; Fernando Guiomar2; Ali Ramezani1

We demonstrate a 28-Gbaud real-valued multi-quantization flexible opto-electronic transmitter that can control the spectral efficiency in the core of elastic WDM networks up to 2.5 times more traffic can be transported with sophisticated regeneration techniques versus basic 100Gb/s routing. We discuss the practical application of our flexible opto-electronic regeneration for ultimate spectral efficiency in the core elastic WDM networks: up to 2.5 times more traffic can be transported with sophisticated regeneration techniques versus basic 100Gb/s routing.

09:15 Th.1.B.1
Joint Carrier Recovery for DSP Complexity Reduction in Frequency Comb-Based Superchannel Transceivers

Federico Marangoni1; Vincent Guinot2; Jean-Marc Lehnert1; Jadwiga Kowalska1; Ehab Mostafa1; Juan Carlos Hernandez3; Susan Steinbach2

We demonstrate a simple digital coherent receiver with an injection locking technique for high-speed optical modulation formats, with this system, bit error rates below 0.1% can be achieved over a 32 Gbaud 821 nm transmission link using commercially available lumped components.

09:30 Th.1.C.2
26-Gbaud OOK Signal Generation Using a Silicon-Diode-Passive-Photonic-Integrated-Circuit-Based Modulator

Ettore Tardon1; Christophe Peucheret5; Christophe Chappert5; Maxime Le Bihan4; Pierre Martin3; Nicholas DePeters4; Zdenek Nesvanil4; Martin Watts4

In this paper, we present the first demonstration of a silicon photonic-based transmitter and receiver up to 26 Gbaud OOK signal generation, which is achieved by using a novel Mach-Zehnder modulator fabricated in a silicon-on-insulator platform. The transmitter uses a 16QAM/QPSK-adaptable transmitter. The modulation format is selected based on the input signal to be transmitted, allowing for flexible adaptation to different applications, including high-speed data communication and optical interconnects.

09:45 Th.1.D.1
Flexible Data-rate and Reach Transmission Employing Hybrid Modulation and Coherent Superposition

Federico Marangoni1; Bernd Sommerkorn-Krombholz1; Ton Koonen2; Chigo Okonkwo2; Huug van den Bergh3; Bart Koolen4; Reiner Reinhard4; Thomas Rudolph4

We demonstrate a simple digital coherent receiver with an injection locking technique for high-speed optical modulation formats, with this system, bit error rates below 0.1% can be achieved over a 32 Gbaud 821 nm transmission link using commercially available lumped components.

10:00 Th.1.E.2
Comparison of Different Options for Flexible Networking: Probabilistic Shaping vs. Hybrid Subcarrier Modulation

Igor Ojanpera1; Bernd Sommerkorn-Krombholz1; Bertrand Gasiot2; John McNelley3; Reid Bohn4; Chigo Okonkwo2; Bastiaan Groot5; Huug van den Bergh3; Bart Koolen4; Reiner Reinhard4; Thomas Rudolph4

We demonstrate a simple digital coherent receiver with an injection locking technique for high-speed optical modulation formats, with this system, bit error rates below 0.1% can be achieved over a 32 Gbaud 821 nm transmission link using commercially available lumped components.
We report on the first experimental demonstration of 200-Gbps transmission links equipped with multimode fibers using direct detection. This is the highest throughput transmitted over multimode fibers using direct modulation and detection. We demonstrate 14.5Tb/s bidirectional transmission over 2.2km of OM2 fiber using selective excitation of 4 mode groups, and C-WDM signals across O and C/L-band over 2-km 125-μm-cladding 4-core MCF is achieved.

Highly ranked paper

Improved cladding-pumped 32-core multicore fiber amplifier


We present an improved cladding-pumped high-power-core-count all-fiber amplifier (ACP-32C) based on a novel 32-core fiber design. We theoretically and experimentally investigated the integration of 100-200Gbps links in data centers with WDM and coherent communication. The results show that OS-16QAM is more beneficial than 4QAM at 12.8 Tbit/s over 100 km of SMF-28, while OS-32QAM is more beneficial up to 25.6 Tbit/s over 100 km of SMF-28.
GENERAL INFORMATION

Conference Venue
Svenska Mässan, The Swedish Exhibition & Congress Center
ECOC – Entrance number 2
Mässans gata 24, Gothenburg
www.svenskamassan.se

Closest tram/bus stop: Korsvägen
Conference Secretariat
Sweden Meets – Entrance number 2
ecoc2017@meetx.se
www.ecoc2017.org

Conference App
The conference app “ECOC 2017” is available to download for Apple devices and Android devices. The app contains a lot of useful general information, technical programme, my schedule and much more. Once downloaded, a lot of the information is available in the app offline.

Local Transportation

Airport buses
Costs SEK 95 single way and SEK 185 return, no cash accepted on the bus only credit cards. It takes 20 minutes to travel between the airport called Landvetter and the venue Svenska Mässan, the bus stop is called “Korsvägen/Svenska Mässan” and is located right outside the entrance of the venue. For information and timetable please visit www.vytrafik.se

Airport Taxi
Costs approximately SEK 420 to/from Landvetter Airport. Ask for a fixed price. The driver should have a taxi ID card clearly displayed in the vehicle. Service is included in the taximeter price. Avoid unlicensed taxis.
We recommend:
Taxi Göteborg: +46 (0) 31 650 00
Taxi Kurir: +46 (0) 31 27 27 27

When in Gothenburg
In Gothenburg we walk! The venue is located right in the city center, all hotels and social venues are located by walking distance from each other – walk and explore the city, use the public transportations or the city bikes instead of taking taxis.

Food & Drinks – Delegate Coffee Area
Where: Located in the exhibition hall
Opening hours: Monday-Tuesday 09:30-17:00,
Wednesday 09:30-16:00
(closed when delegate coffee is taking place)
• Wraps, sandwiches & Pastries
• Patisries
• Coffee & Tea
• Soft drinks & Water

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Welcome Reception
Date: Monday 18 September
Time: 18:30-20:30
Place: Universeum, Södra Vägen 50, Gothenburg (opposite the conference venue).
Website: www.universeum.se
Price: No cost (Sponsored by the city of Gothenburg together with the conference)
Pre-registration is mandatory.
ECOC Conference 2017 has the pleasure to invite you to the Get Together where you will get the opportunity to meet and socialize with colleagues that are attending the conference. The Get Together includes snacks and drinks.

ECOC 2017 Programme
Details of times and technical sessions can be found on the ECOC website: www.ecoc2017.org/Programme. A printed copy of the programme will be included in the conference bag upon registration. A digital copy of the programme and papers will also be included on the USB memory stick (proceedings) as well as in the conference app.

Conference Dinner
Date: Wednesday 20 September
Time: 19:00-24:00
Place: Kajskäll 8, Pacchuskajen 11
Website: www.kajskäll8.se
Price: SEK 500 excl. vat
Pre-registration is mandatory.

The ECOC 2017 Conference Dinner will take place at Kajskäll 8, a venue located in the harbor area in the citycenter. Kajskäll 8 was built on the quays along the railroad tracks around 1870. Originally used as a warehouse, the shed was then filled with all kinds of products, such as spices imported from the Orient as well as lumber from the forests of Värmland (region north of Gothenburg), which would then be transported down to southern Europe and other places. It is a building with a lot of interesting history, nowadays used for events and dinners.

Dinner includes a 3 course dinner, beverages, and entertainment. Closest tram/bus stop: Stenpiren or Lilla Bommen

Pre-registration is mandatory.

Opening and Plenary Session
Monday 18 September, 10:00 – 12:30
Place: Congress Hall
The plenary session is open to delegates, exhibitors, visitors and the general public.

Closing Ceremony
Thursday 21 September, 15:30 – 16.00.
Place: Hall F, Room F4-F5
The closing ceremony, including the Best Student Paper Award sponsored by ADVA is open to delegates, exhibitors, visitors and the general public.

Presentations & Speaker Preview Room
The speakers Preview Room is located in Room R11-12
Opening hours:
Sunday 17 September 13:00-19:30
Monday 18 September 08:00-18:30
Tuesday 19 September 07:30-17:30
Wednesday 20 September 07:30-17:30
Thursday 21 September 07:30-16:00

Presenters must report to the Speaker Preview Room and hand in the presentation at least 1 hour prior to your talk! The presentation will then be sent to the room and each room has a technician that will assist and start the presentation for you.

For authors scheduled on Sunday 17 September during a workshop, they should bring their memory stick directly to their workshop room in good time before the workshop starts. Each room has a technician.

Please bring your presentations on a USB memory stick in MS-Power Point or Adobe PDF format.

Note that there will be no presentation uploads in the conference app.

Post Deadline Papers Proceedings
Post deadline papers will be published on Tuesday 19 September on the conference website and in the detailed programme on both the website and in the conference app.

They will also be announced on the Message board in Hall F.

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Other useful information
Messages
A message board is available in the conference area in Hall F to leave messages to your colleagues and friends.

Currency & ATM Machine
The currency in Sweden is Swedish Krona (kr) / SEK. The venue has an ATM Machine located by the main entrance number 5. Some places do not accept cash, credit card is the most common way to pay in Sweden.

Press Room
The Press Room is located in the Exhibition Hall. Only press representatives correctly identified will be allowed to use this room.

First Aid
There is a paramedic in the venue. In case of medical need, please come to the onsite registration desk or go to the Exhibitor Service Desk and we will help you. If medical emergency please call 112.

No smoking policy
According to Swedish law smoking is prohibited inside any building, venue, hotels, buses, etc. Smoking is only allowed at open air zones.

Lost-and-Found
Lost-and-Found will be collected in the registration.

Insurance
The Organisers cannot be held responsible for accidents to participants or for damage or loss of their personal property however caused.

Venue and Conference Floorplan
Please see the floorplan at the last page of this book.
ECOC 2017 cares about sustainability!

As an organiser, ECOC 2017 has been working hard when planning the conference to reduce the impact on the environment and climate. However, a conference of this size always affects the environment due to the amount of people participating in the conference e.g. the increased travel, food and waste etcetera.

ECOC conference 2017 is environmentally certified according to the Swedish Environmental Base standard. This means that we have implemented around 50 actions to reduce the negative impact on the environment and be socially responsible. This also means that we encourage our partners to act in a sustainable way.

Some of the things we do:
- The organiser has environmentally certified the conference according to the Swedish Environmental Base standard.
- The organiser will climate compensate parts of the delegates journeys for the conference.
- The venue Svenska Mässan, the hotels and social events are all located in the city center and you can walk between them all.
- The hotels are chosen that have effective and comprehensive environmentally-friendly policies and operations.
- For sponsorship we offer a green sponsorship package and have active communication with all sponsors regarding the ECOC 2017 sustainability policy.
- For most conference meals that are provided by the conference we choose not to serve red meat.
- At all catering points in the venue we offer vegetarian alternatives for all lunches.
- All coffee/tea served at the “fika” breaks (coffee breaks) are organic and Fairtrade. All sandwiches and sweets served together with the coffee during the fikas have two main ingredients that are organic.
- All social events venues has been chosen that are considering the environment, serving MSC certified fish and using locally produced products if possible.
- Swedish tap water is of such a high quality and tap water stations will be available throughout the venue.
- The venue are providing waste separation bins in the conference area and the waste from other bins will be sorted later at the waste station.
- Printed materials are kept to a minimum and all printed paper provided by the conference such as the programme is made of certified paper (Svanen). Conference materials such as abstracts and proceedings are provided online.
- Gifts and giveaways are minimised. ECOC 2017 will instead of delegate gifts donate money to a solar lamp project in the third world via the Swedish organisation “Barnfonden”.
- Conference bags are chosen with a sustainable thought, they are made from recycled cotton and are corporate social responsibility approved (CRS), meaning we care about the people that provided us with the conference bags.
- Conference delegate badges made of paper (FSC certified) and no plastic.
- Conference bags are chosen with a sustainable thought, they are made from recycled cotton and are corporate social responsibility approved (CRS), meaning we care about the people that provided us with the conference bags.

What you as a visitor can do:
- There are excellent bus shuttles between the airport Göteborg Landvetter Airport and the venue, stopping just outside the venue. The bus stops are called “Korsvägen”.
- In Gothenburg we walk! The venue is located in the city center, all hotels and social venues are located by walking distance from each other – walk and explore the city, use the public transportations or the city bikes instead of taking taxis.
- Please follow the waste separation instructions at the venue and at your accommodations when available.
- Swedish tap water is of such a high quality, choose this instead of bottled water. Tap water stations will be available throughout the venue. Bring your own bottles and fill them up with tap water.
- Choose vegetarian options for your lunches and other meals if possible. Gothenburg is a great city for vegetarian food. There are vegetarian options at all catering areas in the venue.
- At all catering points in the venue we offer vegetarian alternatives for all lunches.
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Please participate in a climate friendly way!
Read more about sustainability and the work at www.ecoc2017.org/general-info/sustainability
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ECOC is the leading European conference in the field of optical communication and related applications and technologies.

Papers are solicited on, but not limited to, the following areas:
- Fibres, fibre devices and fibre amplifiers
- Integrated photonic devices and modules
- Digital techniques for optical communication systems
- Point-to-point optical transmission systems, subsystems and technologies
- Photonic and microwave photonic subsystems for telecom and non-telecom applications
- Datacenters architectures, technologies and future hardware platforms
- Core, metro, and convergence networks
- Optical networks for 5G

New emerging applications linked to integrated photonics will also be considered:
- Photonics for Space
- Photonics in quantum communications
- Graphene in photonics

General Co-chairs:
- Alessandro Cavaciuti (Cisco Photonics)
- Piero Gambini (ST Microelectronics)
- Giancarlo Prati (CNIT)

Technical Program Co-Chairs:
- Antonella Bogoni (Sant’Anna School of Advanced Studies)
- Antonio Mecozzi (University of L’Aquila)
- Roberto Sabella (Ericsson)

Organizing Committee Chair:
- Giuseppe Bianchi (CNIT)

Publication Chair:
- Luca Potì (CNIT)

Paper submission deadline: April 16, 2018
Early registration deadline: July 19, 2018

ECOC 2018
44th EUROPEAN CONFERENCE ON OPTICAL COMMUNICATION
Rome (Italy), September 23-27, 2018
Nuova Fiera di Roma - www.fieraroma.it

WWW.ECOC2018.ORG