FONTE EID NEWSLETTER

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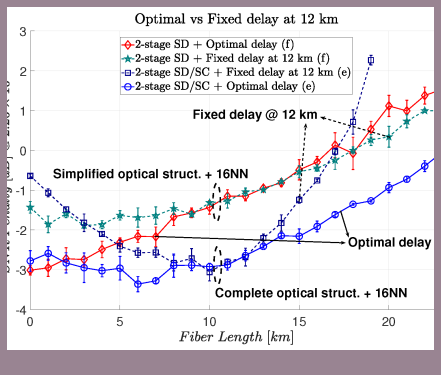
PUBLICATIONS

Our ESRs are first authors on three research papers recently published in peer-reviewed journals:

V.Bajaj et al: *Exact nonlinear frequency division multiplexing in lossy fibers*. Proc. 45th European Conference on Optica Communication (ECOC), Dublin, Ireland, Sept 2019

S. Magalhaes Ranzini et al: *Joint low-complexity opto-electronic chromatic dispersion compensation for short-reach transmission*. Proc. 2019 IEEE Photonics Conference (San Antonio, TX, USA)

S. Magalhaes Ranzini et al: *Tunable optoelectronic chromatic dispersion compensation based on machine learning for short-reach transmission.* Applied Sciences Vol 9 (20), 2020. DOI 10.3390/app9204332



MAJOR EVENTS

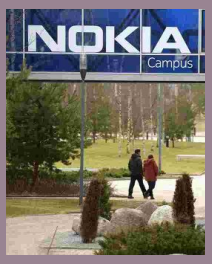
Since June 2019 FONTE has had a busy period with numerous scientific training evens, two management meeting and finally the crucial **Mid-Term Check** with the European Commission and our Project Officer Nina Poumpalova in Dublin on 27th September 2019.

FONTE's '***First Annual Workshop***' was a closed meeting at NBL in Stuttgart and focused on presentation skills, It was followed swiftly by our public and ***Open-To-All workshop*** on '**Machine Learning in Photonics**' [Belgrade, Serbia] in August 2019, with invited speakers from Europa and beyond.

SECONDMENTS

The first two of FONTE's Early Stage Researchers have successfully negotiate the German bureaucracy and formalities and have obtained the *Gastforscher Visa* (Guest Researcher):

Vinod Bajaj left TU Delft in November 2019, while **Stenio M. Ranzini** made his move in January 2020, both arriving in Stuttgart to start their 18 months secondment with **Nokia Bell Labs** and their industrial supervisors Drs **Henning Buehlow** and **Vahid Aref.** Both ESRs are also studying German in their free time.



UPCOMING MAJOR EVENTS

2-day Open-To-All Workshop on Non-Fourier Transform (TU Delft ; 4-5 Feb 2020)

Confirmed internationally reknown speakers from outside FONTE include **Prof S. Randoux (Lille), G. EL P. Suret (Lille) (Northumbria) .**

2-day Transferable Skills Workshop; Aston University 27-28 Feb 2020.

The event will be focusing on presentation and communication skills, open access, and research integrity, as well as networking and team working. Schedule on the website

CONFERENCE TALKS AND POSTERS

FONTE ESRs have presented talks and posters at Conferences:

1. Stenio M. Ranzini, along side his co-authors from DTU and NBL, had a INVITED presentation entitled '*Neural Networks based hybrid optical-digital equalisation for short-reach transmission*' at the **Photonic Reservoir Computing and information Processing in Complex Networks** Meeting (Dec 2019; Trento, Italy).

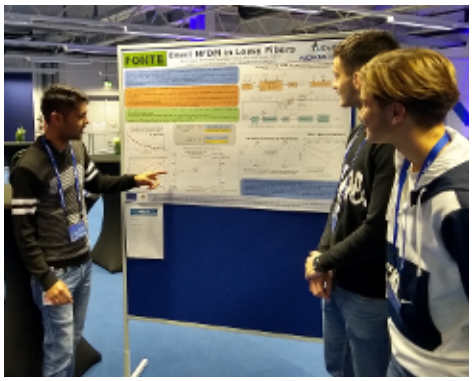
2. Vinod Bajaj had a presentation at **ECOC** 2019 in Dublin , entitled '*Exact nonlinear Frequency division multiplexing in lossy fibres*'.

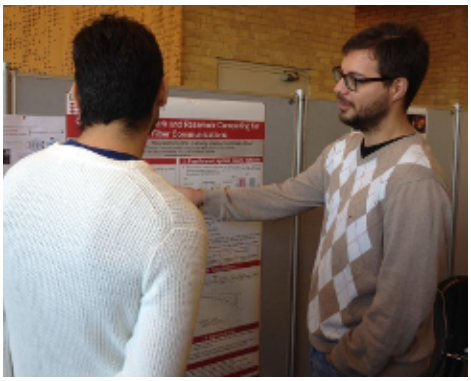
3. Stenio M Ranzini gave a Conference talk at **IEEE Photonics** (San Antonio, USA) entitled '*Joint low complexity opto-electronic chromatic dispersion compensation for short-reach transmission*'

International conferences and workshops attended by ESRs

Since August 2019 our FONTE ESRs have attended conferences as part of their scientific training. They have traveled to ML-Photonica 2019 [Belgrade, Serbia], ECOC2019 [Dublin; Ireland], IPC2019 [San Antonio, USA], NeurIPS 2019 [Vancouver, Canada], Next-Generation Cloud Infrastructure Workshop [Cambridge; UK], and the TRANSNET Project Conference [London; UK],

OUTREACH & SOCIAL MEDIA





Our ESRs have been engaged in numerous **Outreach Activities** to make research done within the FONTE project accessible to the wider public:

ESR1 has represented FONTE at the ***Photonex 2019 Exhibition*** (Engagement with Industry), while ESR2 has taken part in the ***Student Day at Nokia Bell Labs*** in November 2019. ESR3 has participated in both Copenhagen's '**Culture Night 2019**' and the ***Project Day at the University of Denmark'***, both aimed at the general public. This year ***Culture Night*** was attended by 35,000 people.

All ESRs have a dedicated **blogspot** page, with their entertaining blogs feeding directly in to the FONTE website.

Finally, FONTEs regular **tweets** are starting to attract a wider audience, and are foreseen to become a major vehicle to disseminate FONTE's research results and engage with a wide and diverse audience world-wide.

NEWS FROM OUR PARTNERS

Aston Institute of Photonic Technologies has been awarded a **seventh** Initial Training Network, funded by the EC under H2020 MSCA to the tune of €3.9 Mill. **POST-DIGITAL** will recruit 15 ESRs from summer 2020, bringing the total number of ESRs in ITNs coordinated by AiPT to 59! With **FONTE**, **WON**, **REAL-NET** and **MOCCA** already up and running, and **MEFISTA**, **MONPLAS** and **POST-DIGITAL** about to start recruiting their intake of ESRs, AiPT has the unique opportunity to draw on synergy and co-operation between these seven networks. Joint training and networking events are already taking place with more in the planing stage.

RESEARCH NEWS IN DETAIL: WORK PACKAGE PROGRESS

WP1 (ESR1; Aston University)

Research started in early autumn 2019 when ESR1 arrived at his host Aston University. Since then he has conducted research in developing the system based on periodic NFT approaches and demonstrated the system operability in numerical simulations. ESR1 has also prepared the review of the general NFT field, published on the FONTE website as scientific deliverable '*D1.1 Review and optimizsation results for the NIS NFT based systems*'.

WP2 (ESR2; TU Delft)

ESR2 started his research objectives by surveying the most important impairments of NFT-based fiber-optic communication systems. Fiber loss is one of the most significant impairments in NFT-based transmissions. He then investigated how specialty fibers in combination with suitably adapted NFTs can be used to mitigate this impairment. ESR2 investigated the use of dispersion tailored fiber together with modified nonlinear Fourier transform (NFT) in the NFT based transmission systems. The proposed scheme avoids the impairments due to the fiber-loss. Significant improvement in the performance was observed through numerical simulation study.

In order to validate the results with experiments, currently ESR2 is involved in addressing the challenges related to transmitter-side nonlinearity in the practical systems. First results were presented at the 45th European Conference on Optical Communication (ECOC 2019) in Dublin, Ireland 22 – 26 September 2019 and published in the conference proceedings.

Scientific deliverables 'D2.1 *Report on the major impairments in NFT-based transmission*' and 'D2.2 *Software implementations of the developed robust NFT algorithms*' have been published on the FONTE website.

WP3 (ESR3; DTU)

ESR3 simulated an optical device to compensate chromatic dispersion, called spectral decomposition and spectra composition (SD/SC), together with an electronic neural network. The results were completed and presented at the 2019 IEEE IPC Conference (San Antonio, TX, USA) and published in the conference proceedings. Currently, DTU is expanding the results by increasing the number of photodetectors in the structure. These analysis have been accepted for publication in the peer-reviewed Journal of Applied Science. Scientific deliverable '*D3.1 S*urvey of machine learning algorithms for optical performance monitoring' and '*D3.2 System identification and parameter estimation*' have been published on the FONTE website.

WP4 (ESR4; TPT)

ESR 4 has reviewed and analysed a variety of papers and formulated a concrete plan of experiment. The software infrastructures necessary for these experiments are being natively created. Furthermore, the state-of-the-art electrical engineering approach to the problem was implemented and analyzed. Scientific deliverable '*D4.1 Principles of linear and nonlinear frequency-division multiplexing*' has been published on the FONTE website.

WP5 (ESR1-4; NBL)

NBL, together with the 4 ESRs, have defined the practical challenges of interest that the ESRs planned and already have started to tackle in the scope of the project. Since ESRs follows their individual research direction according to the work packages, together NBL and ESRs defined different experimental plans for each ESR. The detailed experimental plans have been published as scientific deliverable '*D5.1 Transmission regime definition and plan of experiments*' and are based on the progress of ESRs in their research.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 766115