ANNUAL HIGHLIGHTS

2017 has been an even more exciting year than 2016 for SPOC. Where 2015-2016 enjoyed the influx of SPOC resources set loose on, to some degree, existing platforms, 2017 has been a year of embracing SPOC-only platforms and ideas built up during the first two years, and seeing them brought to fruition. This has included changing buildings, labs and making a new experimental facility run at full speed. Many of the original SPOC ideas have matured into experimental evidence, and at the end of the year we were able to submit no less than 14 original papers to the peer reviewed (peer selected) international Conference on Lasers and Electro-Optics, CLEO 2018, which were all accepted (only about 60% of these regular submissions are accepted). And though we were somewhat delayed by moving buildings, we still managed to keep a presence at our all-important conferences with two prestigious *postdeadline papers*. The centre leader was the general technical programme co-chair for the European Conference on Optical Communications (ECOC) in 2017, and ECOC was started off in Copenhagen with a Special ECOC Symposium, where centre leaders from around world were invited to come and share their thoughts on what makes a good research centre. It was a very inspiring symposium.

In November 2017, SPOC partner at DTU, Prof. Toshio Morioka co-organised with the Royal Danish Embassy in Japan, a Photonics Seminar in Tokyo to mark the 150'th anniversary of Danish-Japanese Diplomatic Relations. Centre leader Leif Katsuo Oxenløwe was invited to give a presentation, as was SPOC partner Jan W. Thomsen, head of the Niels Bohr Institute. It was a very rewarding experience.

Scientifically, SPOC has been at full steam, resulting in about 30 peer reviewed journal publications and about 60 peer reviewed (*peer selected*) conference papers. Apart from our usual strive for postdeadline papers, we have also published more in Nature family journals in 2017, such as Nature Communications (NCOMMS), Nature Photonics (NPHOT), Nature Partner Journal NPJ Quantum Information, the Open Access Nature Scientific Reports, and work done in 2017 has recently come out in early 2018 in Science and NCOMMS and NPHOT. SPOC'ers are frequently invited to give tutorials or invited talks at our major conferences, or to write tutorial papers for journals, or book chapters.

In 2017 we have taken some major technical steps, including the

- development of a new stable nonlinear material chip platform (amorphous silicon)
- demonstration of superior bandwidth of the AlGaAs nonlinear chips
- highest number of orbital angular momentum modes transmitted as separate channels
- advanced data modulation with probabilistic shaping, 256-1024 QAM
- multi-dimensional quantum key distribution using multi-core fibre
- multi-core fiber with highest number of cores (37) (to be used a lot in 2018)
- fabrication of advanced optical chip for 16-dimensional quantum entanglement
- combination of graphene with silicon and photonic crystals as data modulators

Finally, in 2017 SPOC'ers received the DOPS Award, Elektroprisen, Dir. Ib Henriksens Forskerpris, an ERC Consolidator grant, a Villum Young Investigator grant, a Co-Fund Marie Curie grant, a Vetenskapsrådet project with Chalmers, and a H2020 project on quantum communications, and the centre leader contributed with an article about the value of fundamental science on videnskab.dk.