OPEN POSITION WITHIN THE ERC-POC 2020 project ALPI

Within the ERC-AdG project BAKCUP (https://r1.unitn.it/back-up/), we developed a concept for an integrated photonic chip to be used in an optical transceiver to mitigate transmission nonlinearities. The concept is going to be implemented and demonstrated in a proof-of-concept project financed by the European Commission. The project will start 1 November and will last 18 months. To perform this activity, we are looking for **a telecom engineer/physicist with expertise in optical transceivers or optical communication** to drive the development and to facilitate the validation (test) phase. A PhD degree is not mandatory but is a plus.

The suitable person will be hired with a research fellowship (assegno di ricerca) for 18 months and will join the BACKUP team in this project. The working place is the Nanoscience Laboratory of the Department of Physics of the University of Trento. Starting data is 1 November.

Interested candidates are encouraged to contact prof. Lorenzo Pavesi (lorenzo.pavesi@unitn.it).

THE PROJECT

ALl optical signal recovery by Photonic neural network Integrated in a transceiver module (ALPI)

ALPI aims at the integration of a photonic neural network within an optical transceiver to increase the transmission capacity of the optical link. Based on a deep learning approach, the new compact device provides real time compensation of fiber nonlinearities which degrade optical signals. In fact, the tremendous growth of transmission bandwidth both in optical networks as well as in data centers is baffled by the optical fiber nonlinear Shannon capacity limit. Nowadays, computational intensive approaches based on power hungry software are commonly used to mitigate fiber nonlinearities. Here, we propose to integrate in the optical link the neuromorphic photonic circuits which we are currently developing in the ERC-AdG BACKUP project. Specifically, the proposed error-correction circuit implements a small all-optical complex-valued neural network which is able to recover distortion on the optical transmitted data caused by the Kerr nonlinearities in multiwavelength optical fibers. Network training is realized by means of efficient gradient-free methods using a properly designed data-preamble. A new neuromorphic transceiver demonstrator realized in active hybrid Si/InP technology will be designed, developed and tested on a 100 Gbps 80 km long optical link with multiple-levels symbols. The integrated neural network will mitigate the nonlinearities either by precompensation/autoencoding at the transmitter TX side or by data correction at the receiver RX side or by concurrently acting on both the TX and RX sides. This achievement will bear to the second ALPI's goal: moving from the demonstrator to the industrialization of the improved transceiver. For this purposes, patents will be filed and a business plan will be developed in partnership with semiconductor, telecom and IT companies where a path to the commercialization will be individuated. The foreseen market is the big volume market of optical interconnection in large data centers or metro networks.